

Managing Algal Blooms in Prairie Lakes and Reservoirs

Algal blooms are becoming a common summertime occurrence in many prairie lakes. A more disturbing trend is the increase in frequency and severity of cyanobacteria blooms which can produce toxins harmful to animals and people. These blooms not only cause potential health risks they also have a negative impact on recreation, tourism, industry and property values.

What is the best way to reduce or eliminate algal blooms in lakes?

Most aquatic scientists agree that the limiting nutrient in algae blooms is phosphorus. The less phosphorus that is available in the water of a lake during the summer months, the less algae that will grow. This means that limiting the amount of available phosphorus in a lake's water will reduce the frequency and severity of algal blooms. If the phosphorus levels can be lowered sufficiently severe algae blooms can be eliminated.

There are a number of strategies that can be implemented to reduce phosphorus levels. By far, the most common in Western Canada are watershed best management practices (BMPs).

Reducing phosphorus inputs

Over the last decades BMPs have been implemented in many prairie watersheds to reduce the nutrients entering lakes. Despite this management, the algal blooms in many lakes continue to increase in frequency and intensity.

Does this mean that the intensity (and cost) of BMPs needs to be increased or does it mean that alternative solutions should be considered?

The answer is yes to both, depending on how much of the phosphorus feeding the algae growth is from external (watershed) sources and how much is from internal (sediments) sources.

Understanding the problem and determining solutions

Algae Control Canada is pleased to sponsor two extremely qualified speakers to help MCDA conference attendees understand the cause of algal blooms in prairie lakes and how to determine the best and most cost effective way to manage them.

Aquatic scientist Dr. Dörte Köster examines the importance of proper sampling, analysis and study as the initial step in managing problem algal growth.

Limnologist Dr. John Holz discusses the best ways to deal with phosphorus in lakes that have been identified as being internally loaded with phosphorus.

Presentation 1: Algae Blooms in Prairie Lakes

Understanding and Management

Algae blooms are a common occurrence in Canadian prairie lakes and are problematic for many reasons. Their aesthetic impacts and potential toxicity impairs drinking water quality, water sports and recreation, quality of life and economics for shoreline communities as well as recreational fisheries. This presentation will provide an overview of current knowledge of algae blooms, in particular harmful blue-green algae (cyanobacteria) blooms, in the Canadian prairies, the factors that cause them and potential approaches to manage them to minimize their impact. We will provide examples of studies that help advance our understanding of blooms, and recommendations on how to translate existing and developing science into lake management action.

Presenter: Dr. Dörte Köster, Associated Environmental Consultants

Dr. Dörte Köster is a Senior Aquatic Scientist with Associated Environmental Consultants. She has over 20 years of experience investigating aquatic ecosystems across Canada, the United States, and Germany, with a focus on monitoring and modeling surface water quality and lake history (paleolimnology). She has an academic background in aquatic biology and lake research and currently her daily work includes water quality related studies on rivers, lakes and watersheds to manage wastewater effluent discharges, stormwater, and algae blooms. In her free time she serves as president of the Alberta Lake Management Society and Associate Editor of the Journal *Lake and Reservoir Management*.

Presentation 2: Utilizing Alum to Improve Surface Water Quality

Permanent, Safe and Cost Effective Phosphorus Inactivation

The association between poor water quality and excessive algal growth and the consequences including toxins, poor water clarity, foul odours, fish kills, recreational limitations and negative economic impact. When the source of the phosphorus is determined to be internal (from the lakebed sediments), phosphorus inactivation should be considered as part of a lake management plan.

The use of alum (aluminum sulphate) has a long history in water management and it can be a safe and cost effective way to manage algae growth through the limitation of phosphorus in lakes and reservoirs. This presentation will discuss the history of alum and what has been learned about the best way to apply. We will discuss how to determine if allum is the right tool for your lake. Determining dosage rates and the best application practices will also be shared.

Case studies detailing examples of successful applications will be provided. Other phosphorus inactivation tools will be examined and compared to alum.

Presenter: Dr. John Holz, HAB Aquatic Solutions

Dr. Holz is a co-founder of HAB Aquatic Solutions and has over 25 years of experience in surface water quality/aquatic habitat management and research. Dr. Holz has performed the role of project manager on 90 lake phosphorus inactivation projects.

While earning his PhD from the University of Nebraska-Lincoln (UNL), Dr. Holz's research advanced our understanding of water resource issues and developed improved management tools for lakes, streams and watersheds, including assessing/interpreting/predicting the response of water bodies to pollutants and the effectiveness of restoration techniques. Dr. Holz conducted research that advanced our ability to address numerous unique water quality challenges and pollutant effects. Specific areas of expertise include lake restoration and management, watershed management, biological indicators of water quality, phytoplankton ecology and management, nutrient inactivation (alum), determination of appropriate water quality goals, nutrient criteria development, water quality monitoring, water quality modeling, internal phosphorus loading, and determining the effectiveness of TMDLs using water quality and biological information. Dr. Holz was honored for his alum research advancements by the North American Lake Management Society in 1999 when he received their Technical Excellence Award in recognition for Outstanding Research in Lake Restoration, Protection and Management.

As a faculty member at UNL, Dr. Holz obtained \$7.95 million in funding to support water quality research, authored over 20 publications, taught courses in Limnology (the study of lakes and streams) and Lake and Reservoir Restoration, and served as a technical advisor to the U.S. Environmental Protection Agency (EPA) on water quality management issues in the U.S. Dr. Holz is a recognized leader in water quality/aquatic habitat management.