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Introduction

Millions of dollars are spent each year in Canada on protecting waterways from urban and agricultural pollutants, excess nutrient input and keeping fisheries healthy. Increasingly limited funding for research and monitoring has resulted in federal and provincial agencies with budgets that preclude extensive temporal and spatial sampling of many of these lakes, resulting in poorly understood water quality in the majority of Manitoba water bodies.

Since the 1970s, only two whole lake water quality studies on Lake Manitoba, the 11th largest freshwater lake in the Canada, have been conducted.

Lake Winnipegosis, the 21st largest freshwater in the world and 9th largest in Canada, and Waterhen Lake, the first freshwater fishery in North America to be certified sustainable have never had a whole lake water survey conducted.



Methods

Remotely sensed imagery has been shown to be a cost-effective way to monitor water quality on a broad scale. McCullough (2007) and Kling et al. (2011) demonstrated on Lake Winnipeg that surface algal biomass from derived chlorophyll concentration and total suspended solids (TSS) could be accurately calculated using an algorithm developed for a variety of satellite sensors.

Surface water samples taken from Lakes Winnipegosis, Manitoba and Waterhen will be analyzed for a variety of chemical parameters, including phosphorous, TSS and chlorophyll. Algae will be identified and any potential toxin producers will be tested. The data will be used to develop and calibrate a method to use satellite imagery as a way to calculate chlorophyll concentrations and therefore algae bloom concentrations in these lakes.

References

- Kling, H. J., S. B. Watson, G. K. McCullough, and M. P. Stainton. 2011. "Bloom Development and Phytoplankton Succession in Lake Winnipeg: A Comparison of Historical Records with Recent Data." *Aquatic Ecosystem Health & Management* 14 (2):219-24
- McCullough, G. K., 2007. MERIS/MODIS prediction of chlorophyll in Lake Winnipeg. Report to the Canadian Department of Fisheries and Oceans, Institute of Ocean Sciences, Nanaimo, British Columbia.

Lake Manitoba



Examples of algae found in 2016



Lake Winnipegosis



Summary

By combining satellite imagery with surface water sampling and analysis, scientists can learn more about how nutrients may be contributing to algal blooms. By testing water for algal toxins, we can also identify any potential toxin concerns in these lakes. These toxins cannot be removed by filtration or boiling, and can negatively impact the drinking water of First Nations.

Algae blooms that occur near First Nations traditional territories are a concern, since many residents may drink the water untreated while out on the land. In conjunction with the Lake Winnipeg Foundation's community-based monitoring program, participating First Nations community members will be trained on water quality sampling and sample processing techniques that can readily be adapted to sampling for potable water quality, enabling First Nations to monitor community priority areas.