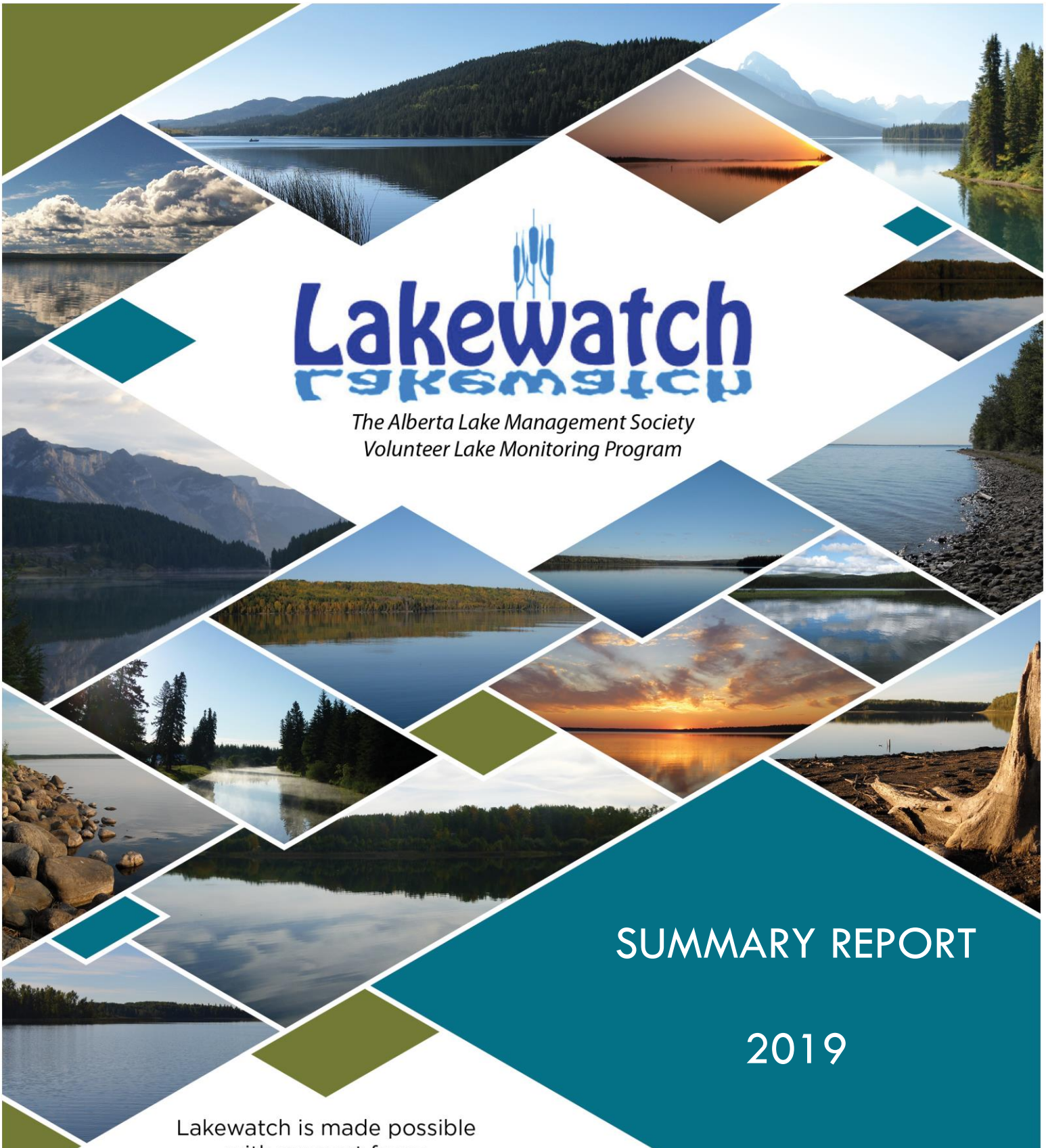

Lakewatch

The Alberta Lake Management Society
Volunteer Lake Monitoring Program

SUMMARY REPORT

2019

Lakewatch is made possible with support from:

Alberta Environment and Parks

Pigeon Lake Watershed Association

Lacombe County

LICA Environmental Stewards

ALBERTA LAKE MANAGEMENT SOCIETY'S LAKEWATCH PROGRAM

LakeWatch has several important objectives, one of which is to collect and interpret water quality data from Alberta's Lakes. Equally important is educating lake users about aquatic environments, encouraging public involvement in lake management, and facilitating cooperation and partnerships between government, industry, the scientific community and lake users. LakeWatch reports are designed to summarize basic lake data in understandable terms for the widest audience, and are not meant to be a complete synopsis of information about specific lakes. Additional information is available for many lakes that have been included in LakeWatch, and readers requiring more information are encouraged to seek those sources.

ALMS would like to thank all who express interest in Alberta's aquatic environments, and particularly those who have participated in the LakeWatch program. These leaders in stewardship give us hope that our water resources will not be the limiting factor in the health of our environment.

If you require data from this report, please contact ALMS for the raw data files.

ACKNOWLEDGEMENTS

The LakeWatch program is made possible through the dedication of its volunteers. We would also like to thank Sarah Davis Cornet, Caleb Sinn, and Pat Heney, who were summer technicians in 2019. Executive Director Bradley Peter and Program Coordinator Caitlin Mader were instrumental in planning and organizing the field program. This report was prepared by Pat Heney, Bradley Peter, and Caleb Sinn.

INTRODUCTION

In 2019, ALMS received funding from the Lakeland Industry and Community Association (LICA), the Pigeon Lake Watershed Association, Lacombe County, and Alberta Environment and Parks, to conduct LakeWatch, a volunteer based water quality monitoring program. Data presented below has not completed its final validation process.

SAMPLE RECORD

Three summer field technicians (Sarah Davis Cornet, Caleb Sinn, and Pat Heney) were hired in May of 2019 to conduct water quality sampling. ALMS completed a provincial park monitoring program at five lakes and a standard monitoring program at 21 lakes. From June through early October 2019, lakes were visited a maximum of four times each. In 2019, 97 of 104 scheduled trips were completed. This resulted in a completion rate of 93% (Table 1). Missed trips were a result of volunteer availability, boat mechanical errors, and weather.

VOLUNTEERS

In 2019, ALMS worked with 48 unique volunteers for a total of 433 volunteer hours spent sampling lakes. Each year, ALMS recognizes one volunteer or watershed stewardship group who has shown outstanding dedication and commitment to the LakeWatch program. This year, the Muriel Lake Basin Management Society was presented with the LakeWatch Volunteer of the Year Award.

LakeWatch Volunteer of the Year (2019) recipient Lyall Kortzman during a sampling trip on Muriel Lake.

Table 1. The LakeWatch sample completion record for 2019.

Program	Lakes	Trip 1	Trip 2	Trip 3	Trip 4
Base Lakes	Antler	20-Jun	11-Jul	8-Aug	30-Sep
	Calling	15-Jun	29-Jul	18-Aug	10-Sep
	Chestermere	27-Jun	22-Jul	9-Aug	6-Sep
	Halfmoon	10-Jun	5-Jul	9-Aug	6-Sep
	Thunder	11-Jun	9-Jul	14-Aug	12-Sep
	Upper Mann	5-Jun	4-Jul	15-Aug	
	Wabamun	12-Jun	10-Jul	13-Aug	13-Sep
	Lacombe	25-Jun	17-Jul	27-Aug	16-Sep
	Little Beaver	17-Jun	4-Jul	27-Aug	24-Sep
	Pigeon	6-Jun	15-Jul	19-Aug	12-Sep
	Buffalo		15-Aug	3-Sep	
LICA	Crane	14-Jun	13-Jul	14-Aug	24-Sep
	Kehewin	23-Jun	20-Aug	11-Sep	24-Sep
	Laurier	21-Jun	17-Jul	4-Sep	
	Marie	13-Jun	12-Jul	13-Aug	4-Oct
	Minnie	25-Jun	16-Jul	14-Aug	
	Moose	12-Jun	9-Jul	2-Aug	16-Sep
	Muriel	3-Jun	3-Jul	6-Aug	5-Sep
	Skeleton North	17-Jun	23-Jul	22-Aug	24-Sep
	Skeleton South	17-Jun	23-Jul		
	Vincent	20-Jun	23-Jul	15-Aug	20-Sep
Parks	Dilberry	12-Jun	22-Jul	12-Aug	9-Sep
	Elkwater	4-Jun	16-Jul	6-Aug	3-Sep
	Newell	26-Jun	23-Jul	8-Aug	5-Sep
	Reesor	4-Jun	16-Jul	6-Aug	3-Sep
	Spruce Coulee	5-Jun	17-Jul	7-Aug	4-Sep

RESULTS

While ALMS collects a large suite of water chemistry parameters, this report will highlight the variability which exists across only a few of our major parameters: Secchi Depth, Total Phosphorus, Chlorophyll-a, and Microcystin. The variation within these parameters does not necessarily reflect a degree of lake management, for many factors outside of human control also impact lake water quality. The depth of the lake, the size of the drainage basin, lake order, and the composition of bedrock and sediment are just some of the factors which affect lake water quality and should be taken into consideration when reading these results.

The 2019 ALMS team from left to right: Sarah Davis Cornet, Caleb Sinn, Patrick Heney, Bradley Peter, and Caitlin Mader.

WATER CLARITY AND SECCHI DEPTH

Water clarity is influenced by suspended materials both living and dead, as well as dissolved colored compounds in the water column. During the melting of snow and ice in spring, lake water can become turbid (cloudy) from silt transported into the lake. Lake water usually clears in late spring but then becomes more turbid with increased algal growth as the summer progresses. The easiest and most widely used measure of lake water clarity is the Secchi disk depth. Two times the Secchi disk depth equals the euphotic depth – the depth to which there is enough light for photosynthesis.

Average Secchi depths in 2019 ranged from a minimum of 0.31 m at Little Beaver Lake to a maximum of 4.90 m at Spruce Coulee Reservoir (Figure 1). Water clarity at Little Beaver, Antler, Skeleton North, and Thunder Lakes appears to be negatively impacted by algal blooms, and Secchi depth averages were significantly negatively correlated with average chlorophyll-*a* concentrations across lakes (Kendalls' Tau-b, τ_b= -0.58, *p-value* < 0.01).

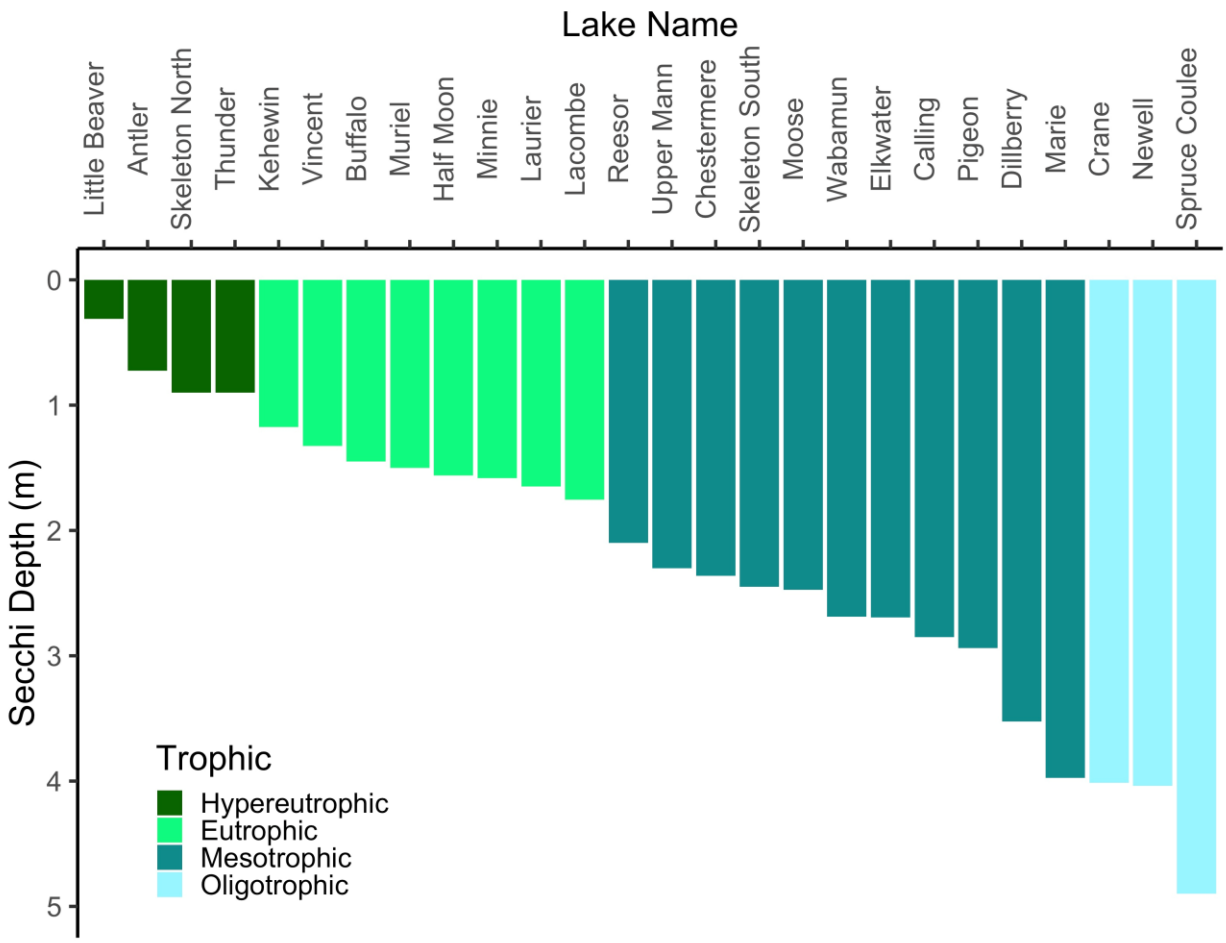

Figure 1. Average Secchi disk depth (m) values measured at 26 lakes sampled as part of the LakeWatch program during the summer of 2019.

WATER CHEMISTRY

ALMS measures a suite of water chemistry parameters. Phosphorus, nitrogen, and chlorophyll-a are important because they are indicators of eutrophication, or excess nutrients, which can lead to harmful algal/cyanobacteria blooms. One direct measure of harmful cyanobacteria blooms are Microcystins, a common group of toxins produced by cyanobacteria.

Average total phosphorus concentrations ranged from a minimum of 9.5 µg/L at Spruce Coulee Reservoir to a maximum of 465 µg/L at Little Beaver Lake (Figure 2).

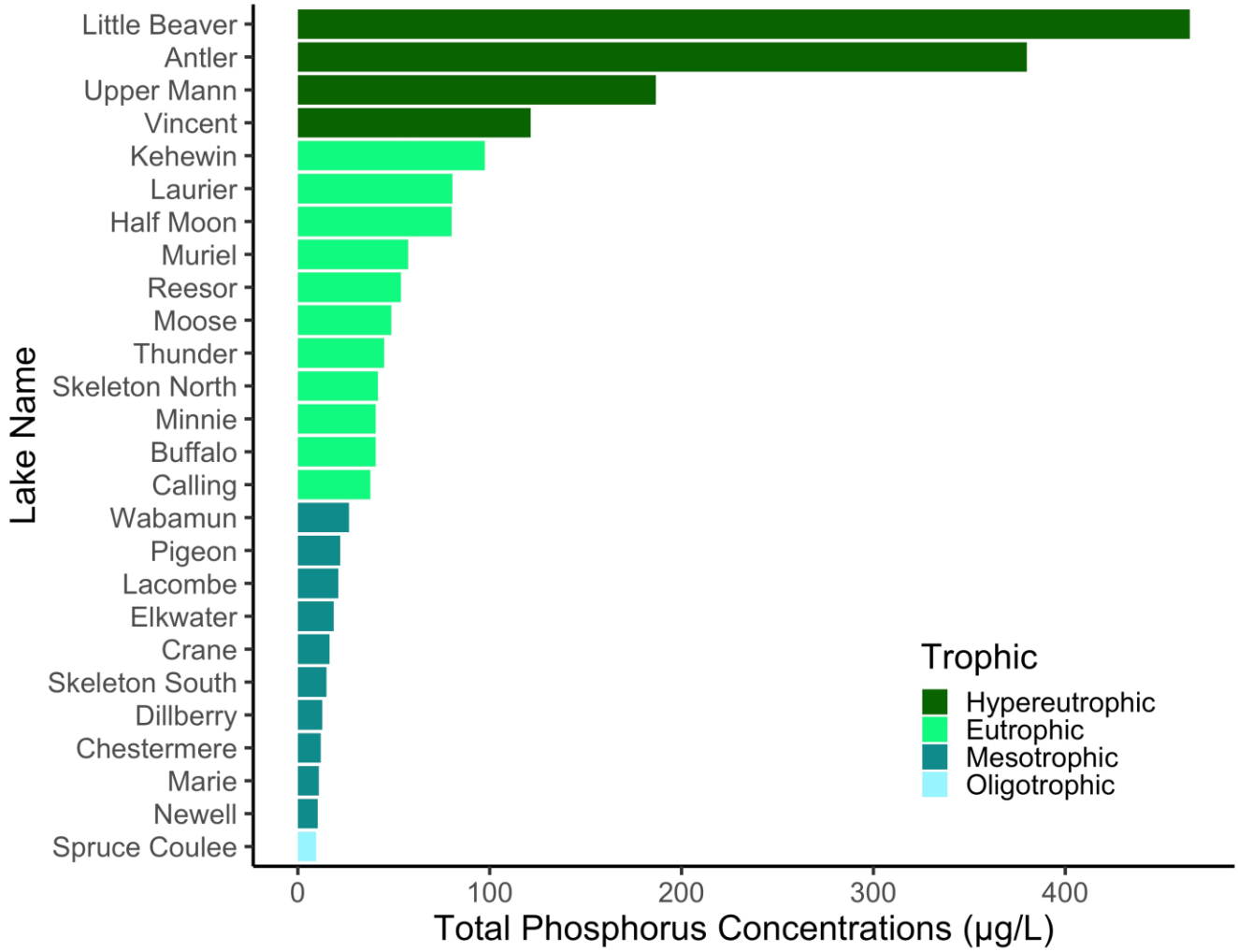

Figure 2. Average total phosphorus (TP) concentrations measured at 26 lakes sampled as part of the LakeWatch program during the summer of 2019.

CHLOROPHYLL-A

Chlorophyll-a is the green pigment found in plants and algae's that allows them to photosynthesize. Measuring the concentration of chlorophyll-a is a common way of testing how much algae is present in lake water, because all algae and cyanobacteria will contain it.

Average chlorophyll-*a* concentrations ranged from a minimum of 3.50 µg /L at Spruce Coulee Reservoir to a maximum of 275 µg /L at Antler Lake (Figure 3). Chlorophyll-*a* and TP averages were significantly correlated across lakes (Kendalls' Tau, τ= 0.96, *p-value* < 0.001).

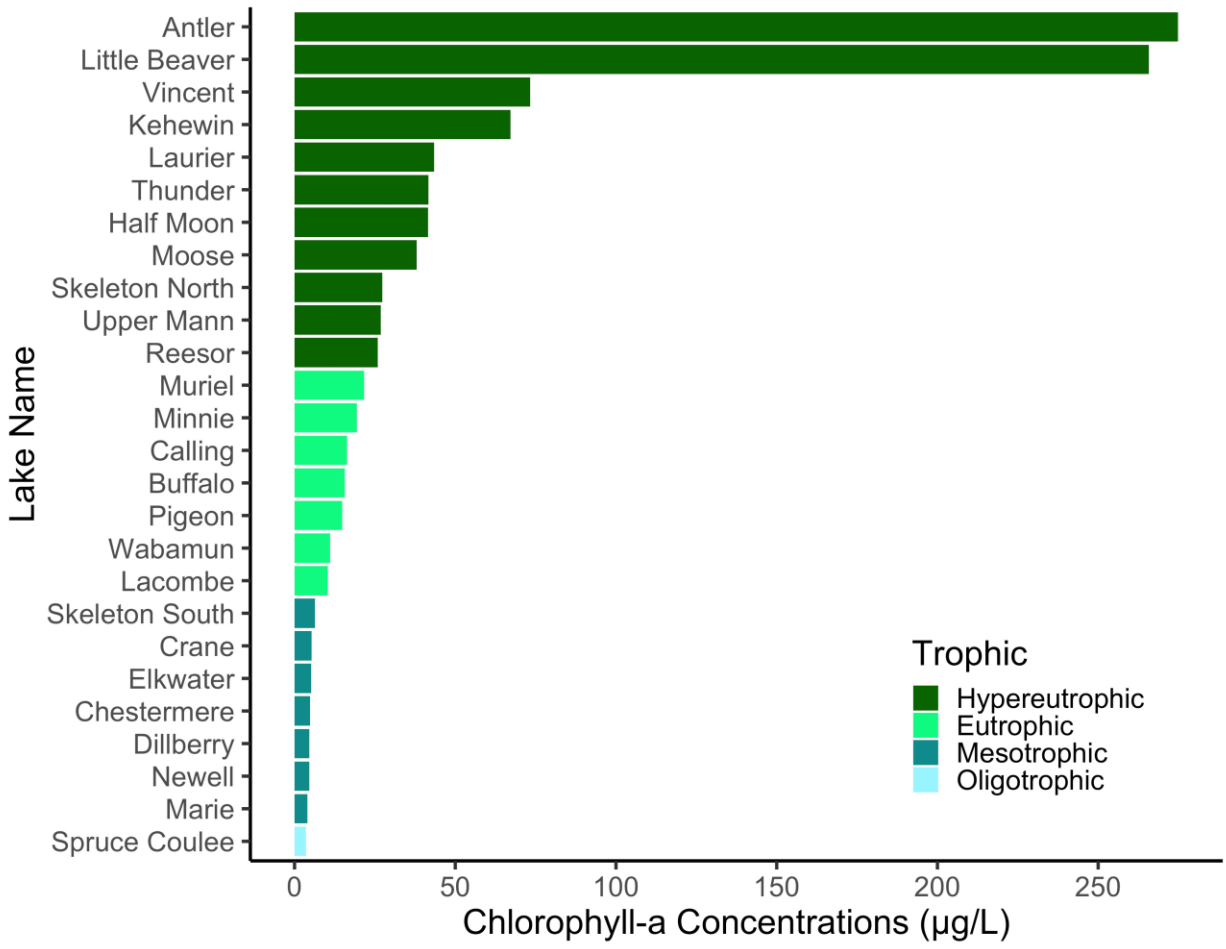

Figure 3. Average chlorophyll-*a* values measured at 26 lakes sampled as part of the LakeWatch program during the summer of 2019.

MICROCYSTIN

Microcystins are toxins produced by cyanobacteria (blue-green algae) which, when ingested, can cause severe liver damage. Microcystins are produced by many species of cyanobacteria which are common to Alberta's Lakes, and are thought to be the one of the most common cyanobacteria toxins. In Alberta, recreational guidelines for microcystin are set at 20 µg/L.

Average microcystin concentrations fell below the minimum detection limit of 0.1 µg/L at Lake Newell, Chestermere, Elkwater, and Marie Lakes and Spruce Coulee Reservoir (Figure 4). Microcystin was detected at every other lake, with the highest average concentration observed at Little Beaver Lake, measuring 10.8 µg /L. Little Beaver Lake was the only lake sampled in 2019 to measure higher than the recreational guideline of 20 µg /L, with a concentration of 25.93 µg /L in July.

Samples from discrete locations such as a surface grab sample from a thick bloom, or from a beach, may have toxin concentrations higher than the recreational guidelines, and caution should be observed when recreating in or around cyanobacteria blooms.

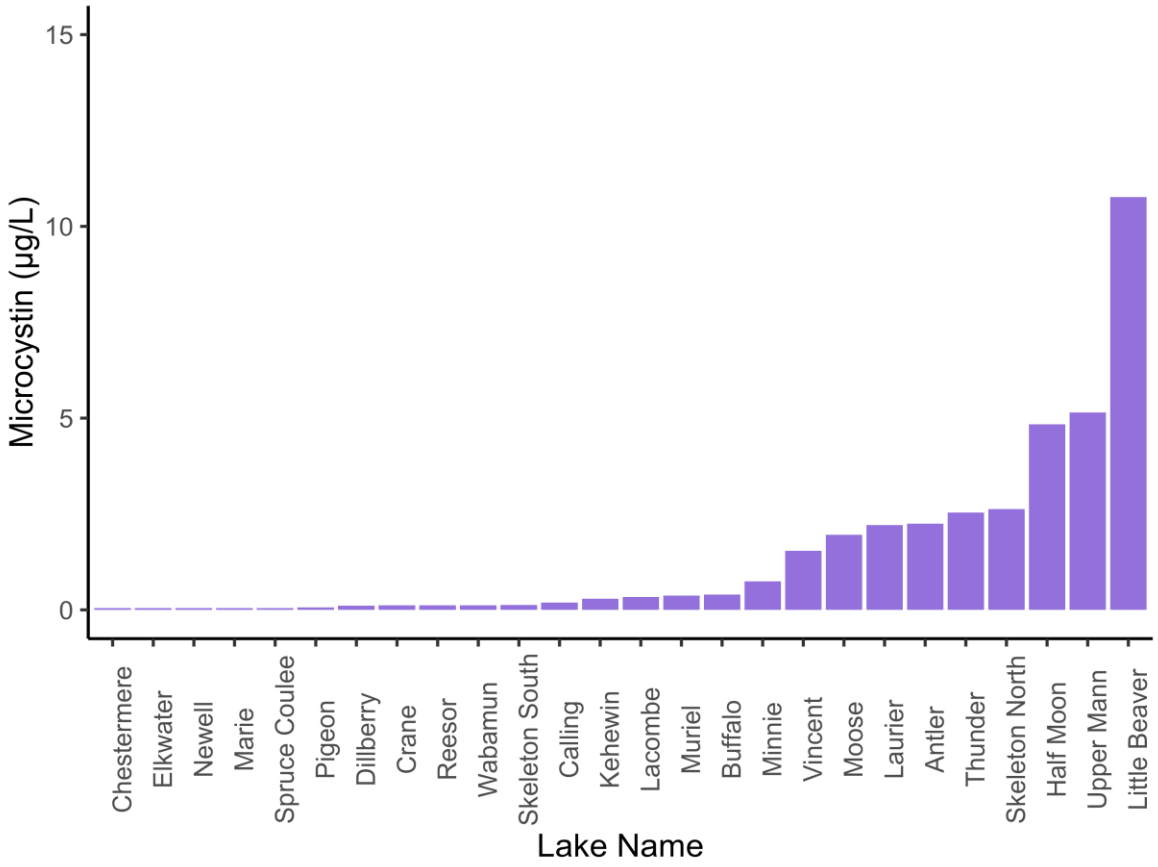

Figure 4. Average microcystin concentrations measured at 26 lakes sampled as part of the LakeWatch program during the summer of 2019.