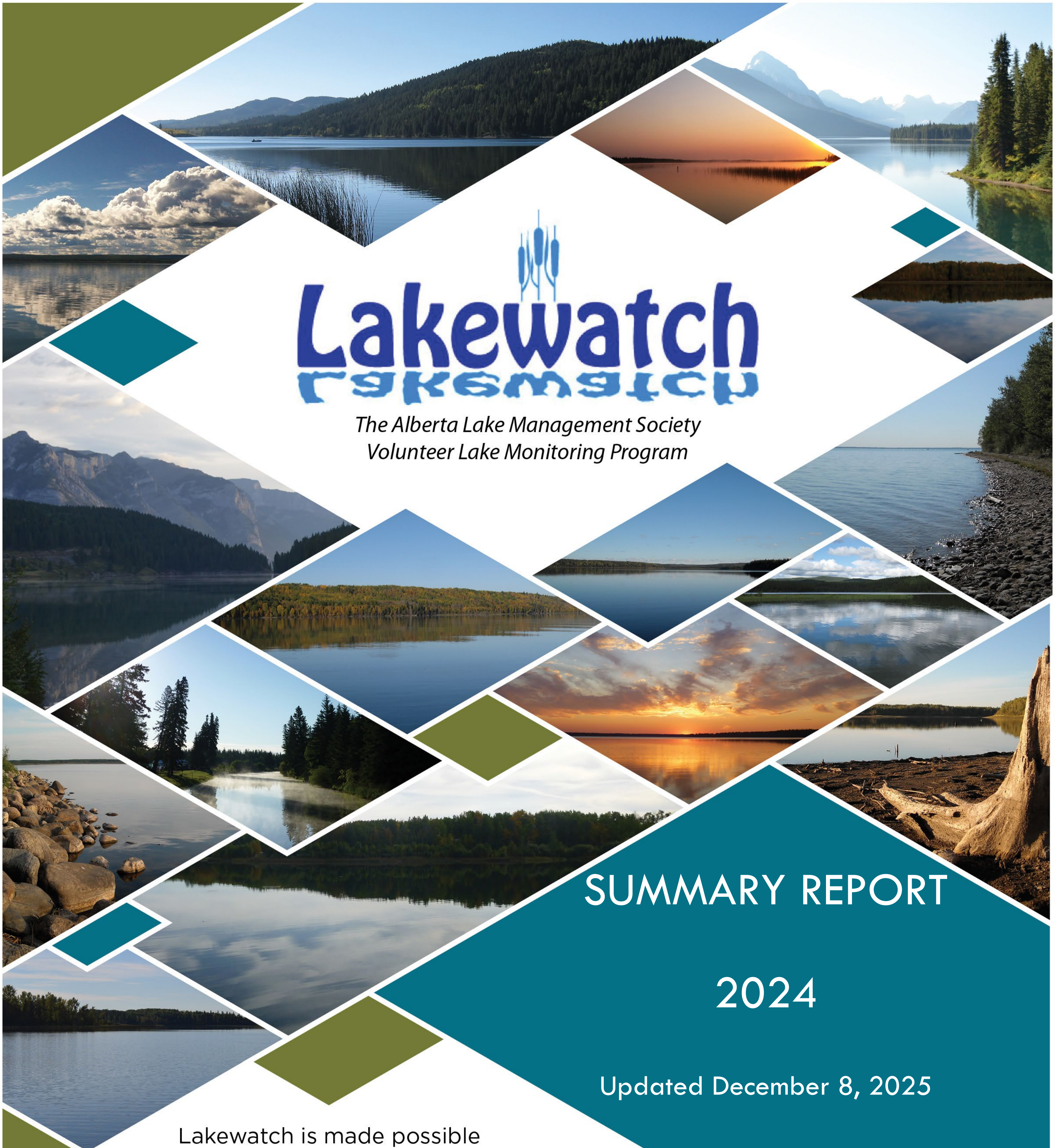


Lakewatch

The Alberta Lake Management Society
Volunteer Lake Monitoring Program

SUMMARY REPORT

2024

Updated December 8, 2025

Lakewatch is made possible
with support from:

Alberta

Lac La Biche County
welcoming by nature.

LICA ENVIRONMENTAL STEWARDS

PIGEON LAKE WATERSHED ASSOCIATION

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

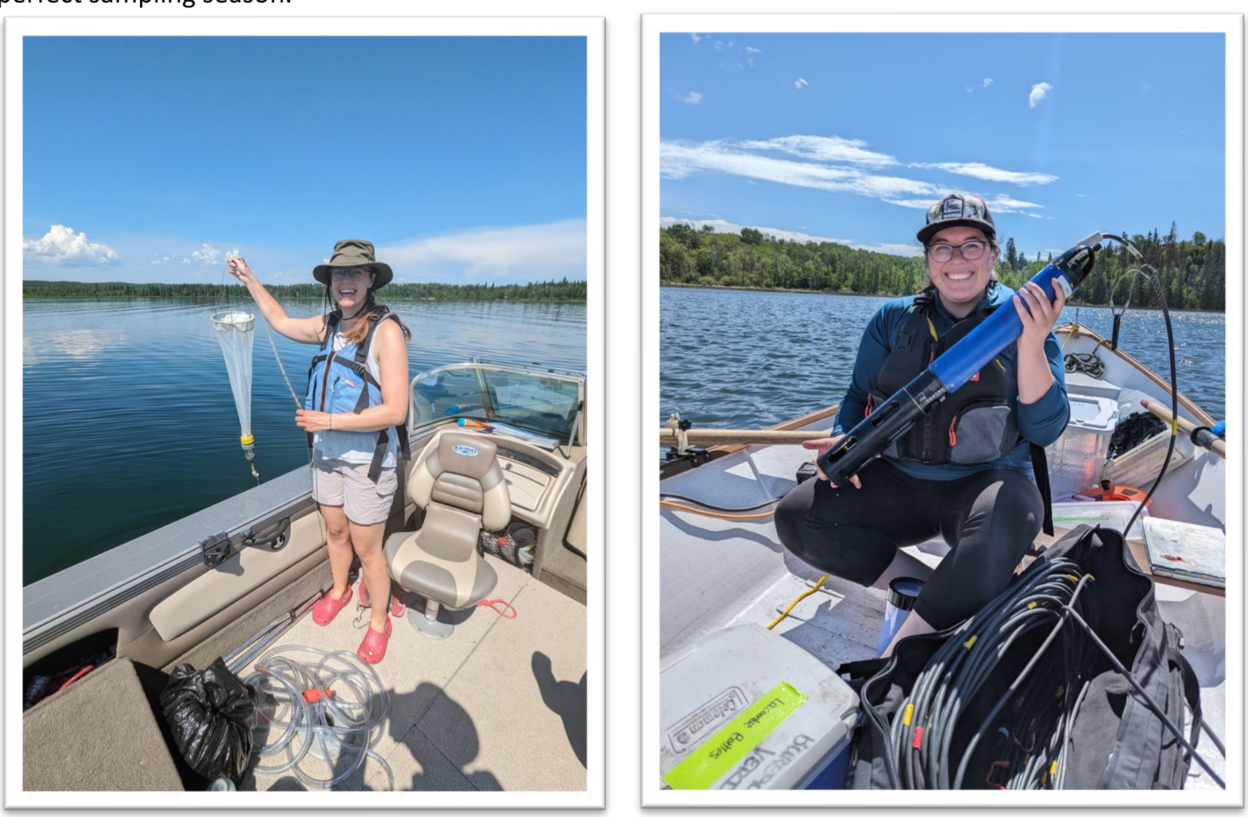
The LakeWatch program is made possible through the dedication of its volunteers. We would also like to thank Katherine Cundict and Jordyn Lajeunesse, who were summer technicians in 2024. Executive Director Bradley Peter and Program Manager Brittany Onysyk were instrumental in planning and organizing the field program. This report was prepared by Brittany Onysyk and Bradley Peter.

INTRODUCTION

In 2024, ALMS received funding from the Lakeland Industry and Community Association (LICA), the Pigeon Lake Watershed Association (PLWA), and Alberta Environment and Protected Areas to conduct LakeWatch, a volunteer-based participatory water quality monitoring program. This report is intended to briefly summarize sampling effort and results of key parameters including total phosphorus, total Kjeldahl nitrogen, microcystin, and water clarity.

SAMPLE RECORD

Two summer field technicians (Katherine Cundict and Jordyn Lajeunesse) were hired in May 2024 to conduct water quality sampling. ALMS completed a provincial park monitoring program at 5 lakes and a standard monitoring program at 21 lakes. From June through October 2024, lakes were visited four times each, with the exception a few lakes where missed trips occurred. In 2024, 99 of 104 scheduled trips were completed. This resulted in a completion rate of 95% (Table 1). It is rare to have a LakeWatch season with no missed trips – minor issues with weather and volunteer coordination resulted in five missed trips in 2024. However, the slightly lower number of lakes, requirement of four sampling events (down from five in past seasons), and the scheduling capability of the field technicians all cooperated to achieve a near-perfect sampling season.



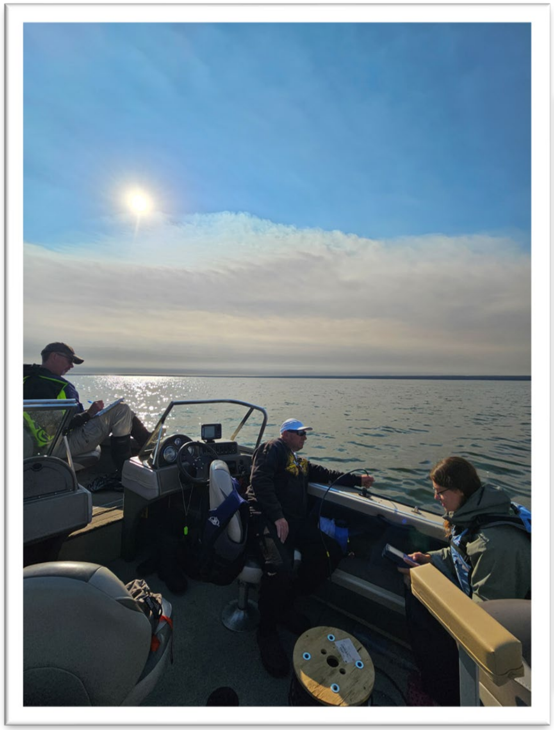
The 2024 LakeWatch Technicians - Katherine Cundict (left) and Jordyn Lajeunesse (right).

Table 1. The LakeWatch sample completion record for 2024.

Program	Lake	Trip 1	Trip 2	Trip 3	Trip 4
LICA	Elinor	25-Jun	22-Jul	09-Aug	MISSED
	Crane	27-Jun	17-Jul	14-Aug	10-Sep
	Lac Bellevue	14-Jun	16-Jul	13-Aug	16-Oct
	Muriel	20-Jun	MISSED	05-Sep	08-Oct
	Hilda	MISSED	18-Jul	15-Aug	16-Sep
	Moose	03-Jul	31-Jul	04-Sep	01-Oct
	Skeleton South	10-Jun	04-Jul	08-Aug	22-Aug
	Skeleton North	10-Jun	04-Jul	08-Aug	22-Aug
	Wolf Lake	26-Jun	18-Jul	15-Aug	16-Sep
	Minnie Lake	19-Jun	31-Jul	04-Sep	MISSED
PARKS	Upper Kan.	25-Jun	31-Jul	05-Sep	03-Oct
	Lower Kan.	25-Jun	31-Jul	05-Sep	03-Oct
	Jarvis	18-Jun	09-Jul	21-Aug	24-Sep
	Gregg	18-Jun	09-Jul	22-Aug	24-Sep
	Beauvais	26-Jun	30-Jul	04-Sep	02-Oct
CONTRACT	Pigeon	21-Jun	16-Aug	05-Sep	17-Sep
BASE LAKES	Chestermere	04-Jul	01-Aug	30-Aug	27-Sep
	Calling	11-Jun	10-Jul	01-Aug	06-Sep
	Wizard Lake	09-Jun	21-Jul	02-Sep	22-Sep
	Wabamun Lake	11-Jun	16-Jul	19-Aug	03-Sep
	Thunder Lake	20-Jun	15-Jul	12-Aug	16-Sep
	Lake Isle	15-Jun	20-Jul	17-Aug	21-Sep
	Lacombe	14-Jun	28-Jul	15-Aug	13-Sep
	Lac La Nonne	28-Jun	29-Jul	30-Aug	MISSED
	Half Moon	17-Jun	09-Jul	06-Aug	03-Sep
	Gull Lake	13-Jun	18-Jul	14-Aug	10-Sep

VOLUNTEERS

In 2024, ALMS worked with 38 unique LakeWatch volunteers, for a total of 436 volunteer hours spent sampling lakes over the season. Volunteers provide invaluable local knowledge about their lake that is used to contextualize lake conditions and inform safe lake sampling. Each year, ALMS volunteers show outstanding dedication and commitment to the LakeWatch program, and ALMS has the privilege of recognizing a volunteer, or a group of volunteers, to receive the Volunteer of the Year Award. In 2024, Owen Larson from Calling Lake was presented with the ALMS Volunteer of the Year Award for his commitment to sampling Calling Lake throughout the year and his recruitment of other community members to participate in sampling.



ALMS Volunteer of the Year 2024 recipient, Owen Larson (far left), participating in lake monitoring through ALMS LakeWatch program. Owen is joined by Bert and Ron (pictured) as well as other volunteers throughout the season.

RESULTS

While ALMS collects a large suite of water chemistry parameters, this report will highlight the variability which exists between lakes across only a few of our major parameters: euphotic depth, total phosphorus, chlorophyll-a, and microcystin. Please note that 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; lake depth, drainage basin size, 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. Results are also presented as seasonal averages for comparability – seasonal trends (and in some cases, historical trends where enough data for a historical trend analysis is available) for the parameters presented below are available in each lake's individual 2024 LakeWatch Reports. Results are categorized into trophic status, or degree of lake productivity. More information on trophic status, along with class criteria, can be found in 'A Brief Introduction to Limnology'.

The 2024 LakeWatch season captured a range of lake types situated in the central, northeastern, and southern portions of the province. The lakes are located in boreal, parkland, grasslands, and foothills natural regions of the province. The 2024 season also included a lake system (Skeleton Lake) which has morphologically distinct basins that were sampled separately. This allows for the opportunity to investigate the differences between basins, which are unique from each other in morphology (depth, surface area). Interestingly, the basins of Skeleton Lake diverged primarily in water clarity and microcystin levels, indicating that algal and cyanobacteria communities differ significantly between basisn.

WATER CLARITY AND EUPHOTIC DEPTH

Water clarity is influenced by suspended materials both living and dead, as well as dissolved coloured 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, 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 – the depth to which a checkered disk disappears. Two times the Secchi disk depth equals the euphotic depth – the depth to which there is enough light for photosynthesis to occur.

Average euphotic depths in 2024 ranged from a minimum of 1.04 m at Skeleton Lake North to a maximum of 13.40 m at Lower Kananaskis Lake (Figure 1). Lake profile depth, or the depth of the location where the Secchi depth measurement was taken, is also presented for context. Euphotic depth averages were significantly correlated with average chlorophyll-*a* concentrations across lakes ($p < 0.001$). This means that water clarity appeared to be primarily associated with the growth of cyanobacteria and algae. Lacombe Lake, Lac Bellevue, and Chestermere Lake displayed average euphotic depths that were almost as deep as the average lake profile depth (Figure 1). This means that light was likely reaching the bottom sediments across the majority of depths of the lake through the summer, likely having a large influence on the lake's aquatic plant distribution, and benthic (lake bottom) algae and cyanobacteria communities.

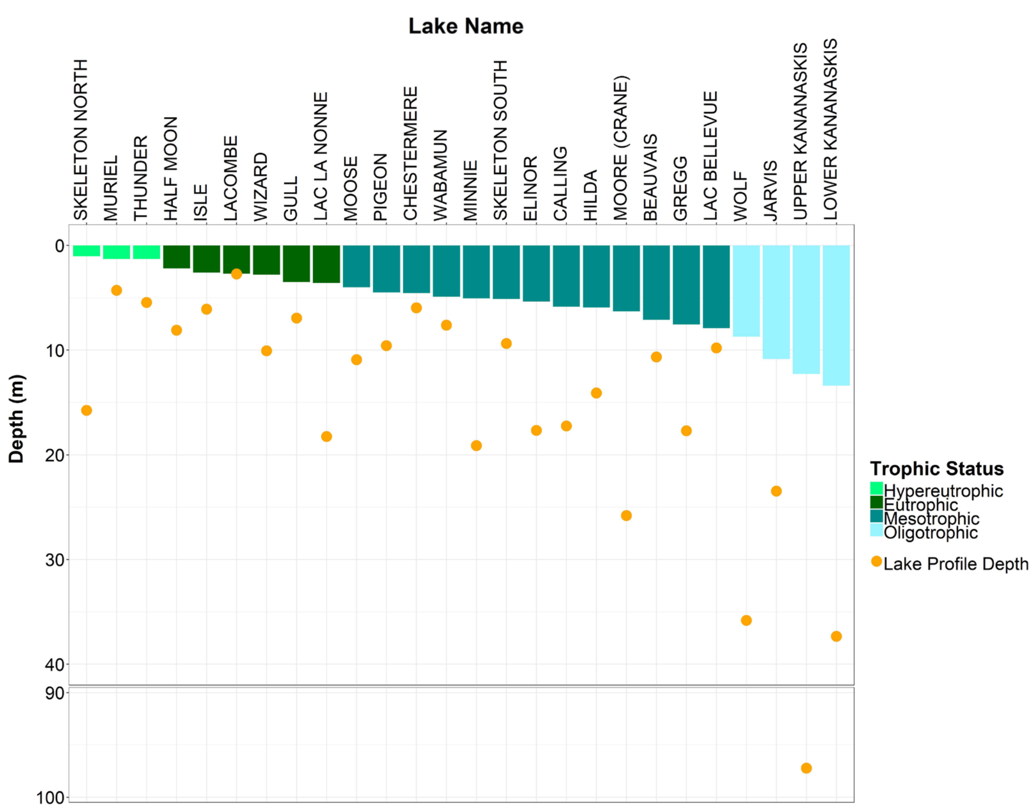


Figure 1. Average euphotic depth (m) values and lake profile depth measured at 26 lakes sampled as part of the LakeWatch program during the summer of 2024. Note a scale break on the y-axis allows for visualization of the deep Kananaskis reservoirs.

WATER CHEMISTRY – Total Phosphorus

Phosphorus and chlorophyll-a are important parameters because they are indicators of eutrophication, or excess nutrients, which can lead to harmful algal and/or cyanobacteria blooms. Some lakes in Alberta have naturally high levels of phosphorus due to nutrient-rich geology, while others experience eutrophication resulting from human-related activities. High levels of phosphorus promote cyanobacteria growth, which is measured by assessing chlorophyll-a concentrations. Absolute values of phosphorus and chlorophyll-a alone do not point to human-caused eutrophication or naturally elevated nutrients, however the trajectory of those parameters over time, coupled with other lake information, may indicate whether the nutrient and chlorophyll-a levels are natural or human-caused.

Average total phosphorus (TP) concentrations ranged from a minimum of 1.5 μg/L at Upper Kananaskis Lake to a maximum of 316.7 μg/L at Lac la Nonne (Figure 2). TP averages were significantly correlated with average chlorophyll-*a* concentrations across lakes ($p < 0.001$).

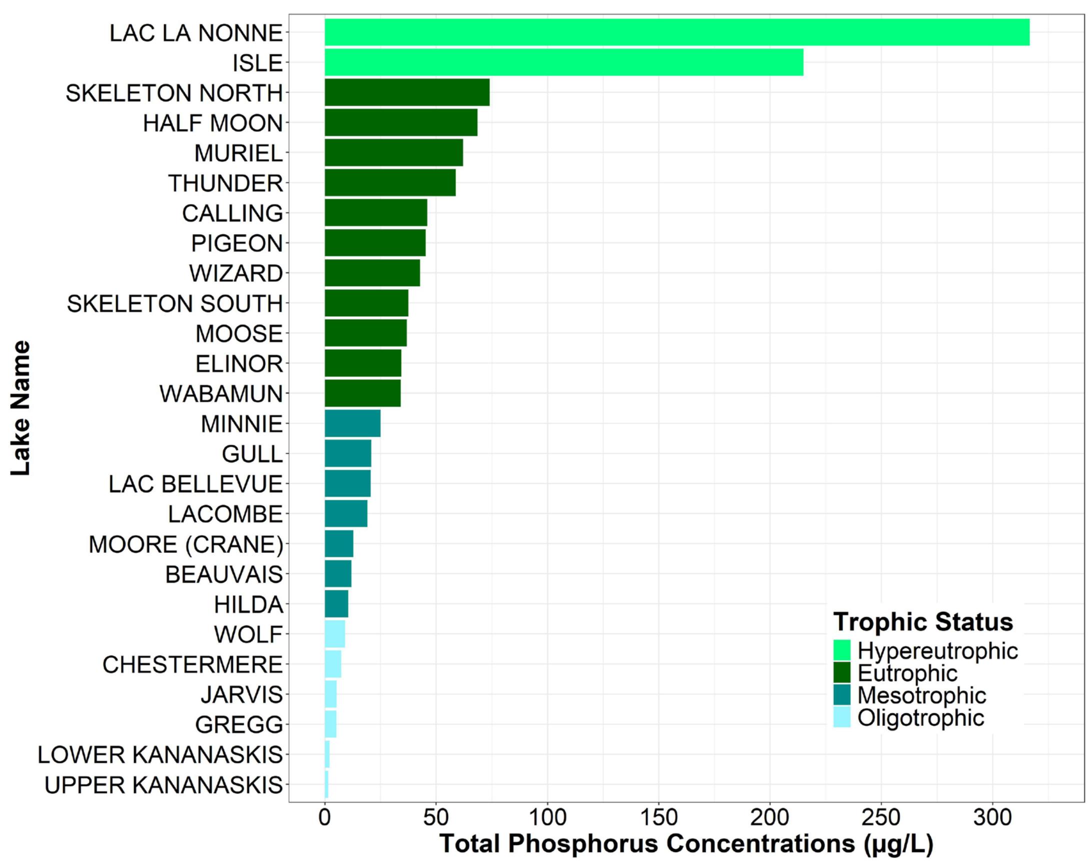


Figure 2. Average total phosphorus concentrations measured at 26 lakes sampled as part of the LakeWatch program during the summer of 2024.

WATER CHEMISTRY – Chlorophyll-a

Chlorophyll-a is the green pigment found in plants, algae, and cyanobacteria that allows them to photosynthesize. Measuring the concentration of chlorophyll-a is a proxy for how much algae and cyanobacteria is present in lake water, because all algae and cyanobacteria will produce chlorophyll-a to support photosynthesis.

Average chlorophyll-*a* concentrations ranged from a minimum of 1.65 μg/L at Lower Kananaskis Lake to a maximum of 173.13 μg/L at Lac la Nonne (Figure 3). Chlorophyll-*a* and total Kjeldahl nitrogen averages were significantly correlated across lakes ($p < 0.001$).

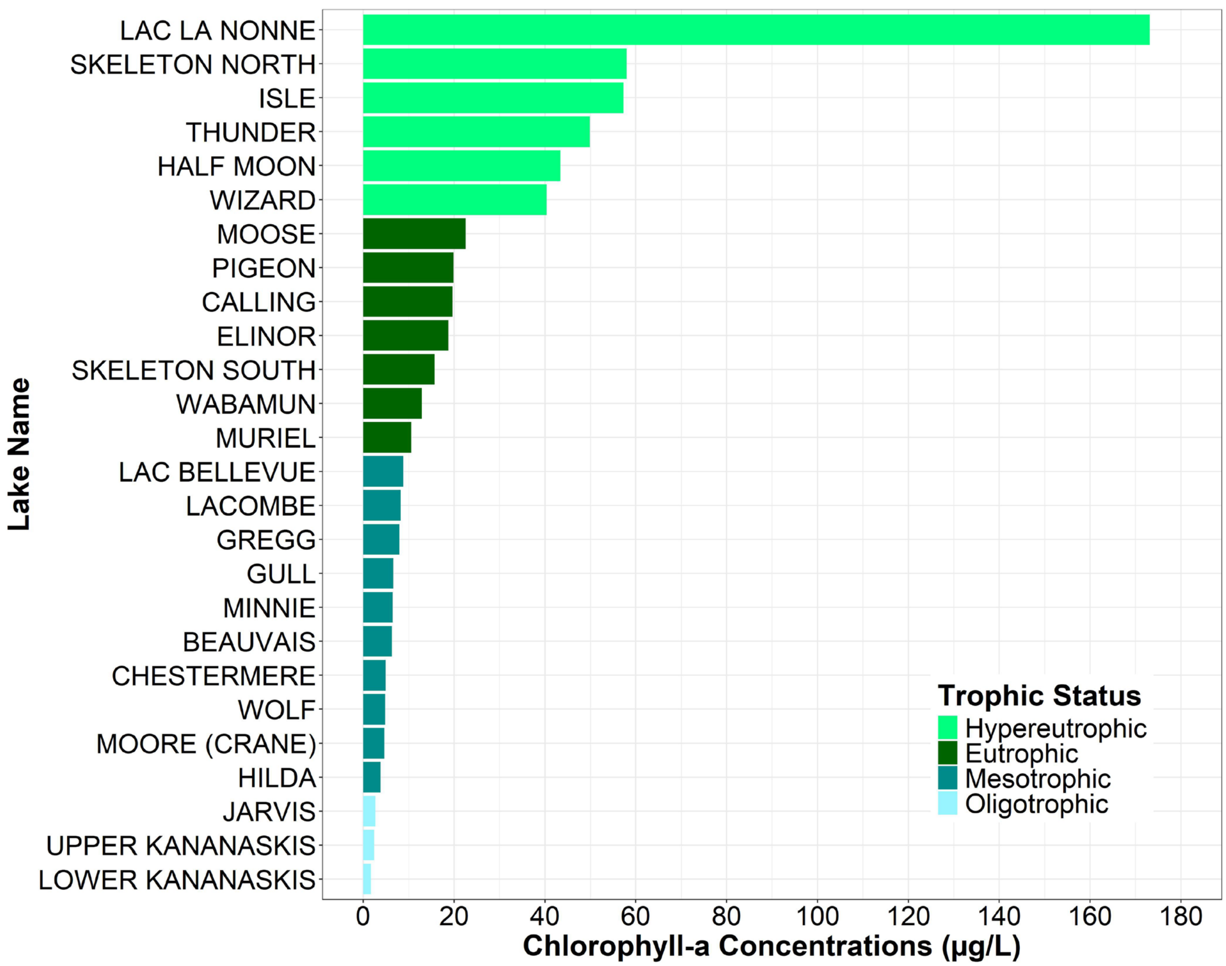


Figure 3. Average chlorophyll-*a* concentrations measured at 26 lakes sampled as part of the LakeWatch program during the summer of 2024.

WATER CHEMISTRY – Microcystin

Microcystins are toxins produced by cyanobacteria which, when ingested by mammals, can cause severe liver damage. Microcystins are produced by many species of cyanobacteria common to Alberta's Lakes and are thought to be one of the most common cyanobacteria toxins. In Alberta, recreational guidelines for microcystin are set at 10 μg/L, and as of 2021, the laboratory detection limit (the lowest level to which microcystin can be confidently detected by the analysis technique) is 0.1 μg/L.

Average microcystin concentrations fell below the minimum detection limit of 0.1 μg/L at Beauvais Lake, Chestermere Lake, Gregg Lake, Jarvis Lake, Upper & Lower Kananaskis Lakes, Wolf Lake, Hilda Lake, Moore (Crane) Lake, and Calling Lake (Figure 4). Microcystin was detected at every other lake, with the highest average concentration observed at Skeleton Lake North, measuring 9.65 μg /L. Skeleton Lake North was the only lake sampled in 2024 to measure on average higher than the recreational guideline of 10 μg /L, which occurred during the June and July sampling events. 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.

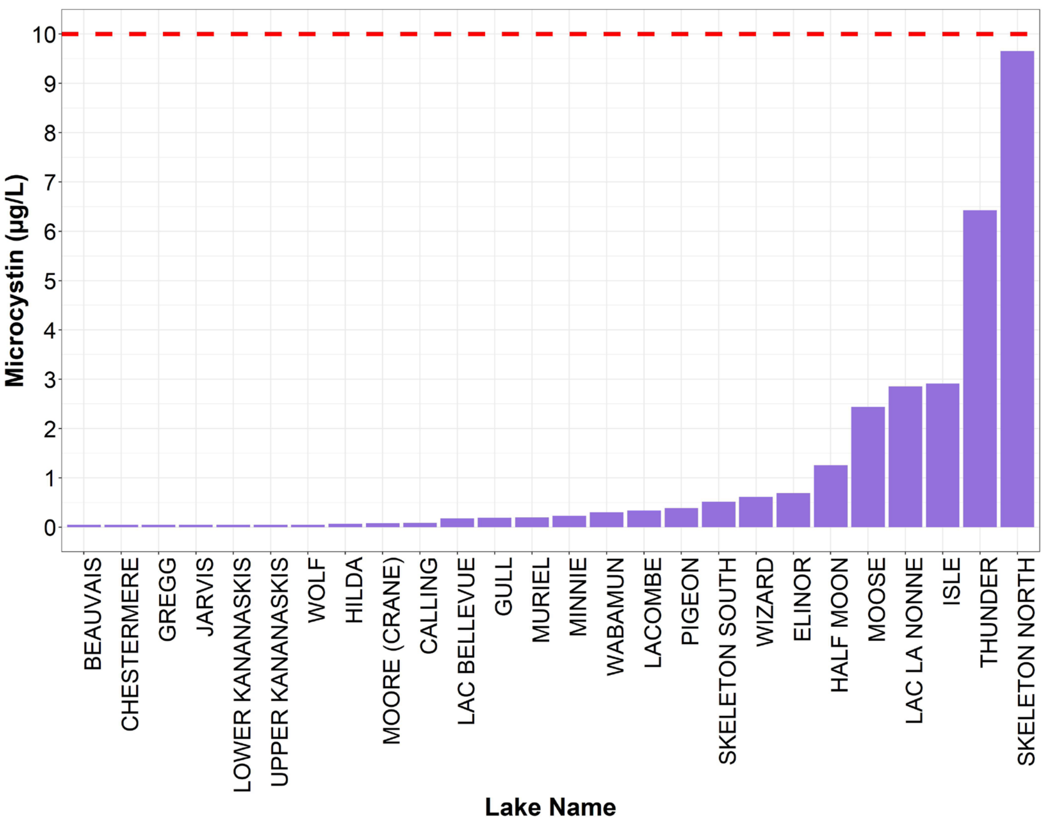


Figure 4. Average microcystin concentrations measured at 26 lakes sampled as part of the LakeWatch program during the summer of 2024. The red dashed line indicates the recreational guideline of 10 μg/L.

WATER CHEMISTRY – Total Kjeldahl Nitrogen

As with phosphorus, nitrogen is a nutrient that primary producers require in order to grow. Some lakes in Alberta have naturally high levels of nitrogen due to nutrient-rich geology, while others experience eutrophication resulting from human-related activities. High levels of nitrogen may promote excessive cyanobacteria growth, although generally only if phosphorus levels are not limiting. Total Kjeldahl nitrogen represents the sum of organic forms of nitrogen, along with ammonia and ammonium.

Average total Kjeldahl nitrogen (TKN) concentrations ranged from a minimum of 0.07 mg/L at Upper Kananaskis Lake to a maximum of 3.24 mg/L at Muriel Lake (Figure 5). TKN averages and TP averages were significantly correlated across lakes ($p < 0.001$).

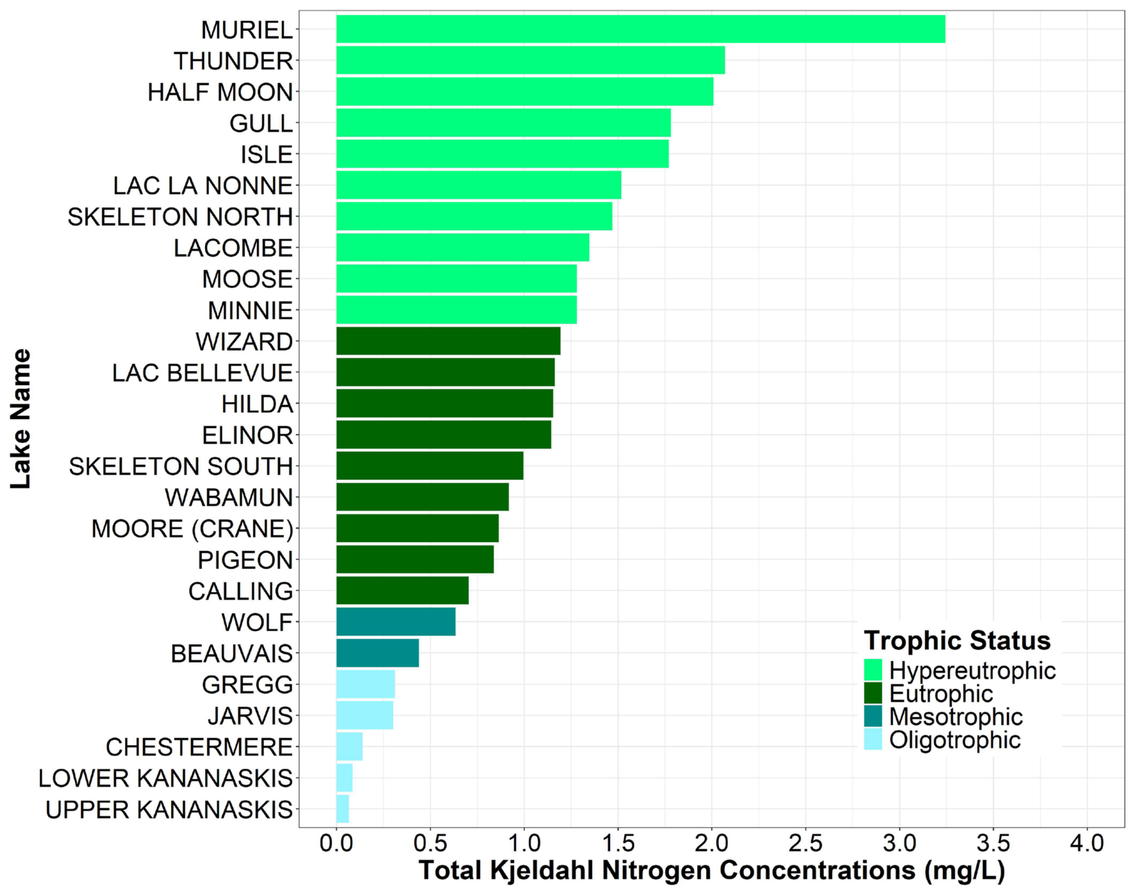


Figure 5. Average total Kjeldahl nitrogen concentrations measured at 26 lakes sampled as part of the LakeWatch program during the summer of 2024.