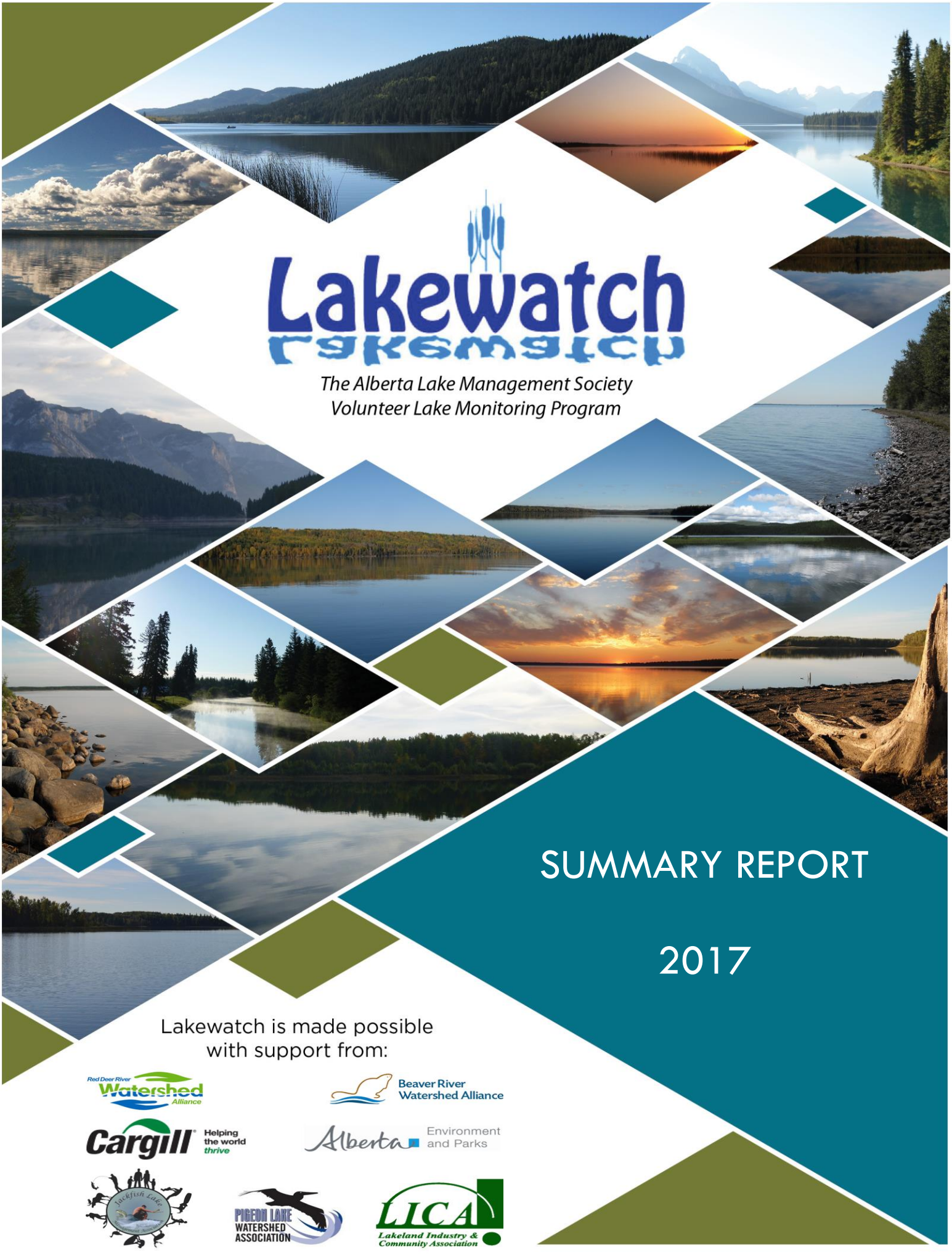

Lakewatch

The Alberta Lake Management Society
Volunteer Lake Monitoring Program

SUMMARY REPORT

2017

Lakewatch is made possible with support from:

Red Deer River Watershed Alliance
Beaver River Watershed Alliance
Cargill Helping the world thrive
Alberta Environment and Parks
Jackfish Lake
Pigeon Lake Watershed Association
LICA Lakeland Industry & Community Association

ALBERTA LAKE MANAGEMENT SOCIETY'S LAKEWATCH PROGRAM

LakeWatch has several important objectives, one of which is to collect and interpret water quality data on Alberta Lakes. Equally important is educating lake users about their aquatic environment, 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 a lay 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 people prove that ecological apathy can be overcome and give us hope that our water resources will not be the limiting factor in the health of our environment.

This report has been prepared with un-validated data.

ACKNOWLEDGEMENTS

The LakeWatch program is made possible through the dedication of its volunteers. We would also like to thank Elashia Young and Melissa Risto who were summer technicians in 2017. Executive Director Bradley Peter and LakeWatch Coordinator Laura Redmond were instrumental in planning and organizing the field program. This report was prepared by Laura Redmond and Bradley Peter.

INTRODUCTION

In 2017, ALMS received funding from the Beaver River Watershed Alliance through the Lakeland Industry and Community Association (LICA), the Red Deer River Watershed Alliance, the Pigeon Lake Watershed Association, the Jackfish Lake Management Association, Cargill, 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

Two summer field technicians (Elashia Young and Melissa Risto) and our LakeWatch Coordinator (Laura Redmond) conducted water quality sampling during the ice-off season of 2017. Each lake was to be visited four or five times throughout the summer, and in 2017, 135 of 145 scheduled trips were completed. This resulted in a completion rate of 94% (Table 1). Missed trips were a result of volunteer availability and unsafe weather. In 2017, two Long Lakes were monitored. Throughout the report, the Long Lake southeast of Athabasca will be referred to as Long Lake, and the Long Lake south of Boyle with the Provincial Park on its western shore will be referred to as Long PP.

VOLUNTEERS

In 2017, ALMS worked with 45 unique volunteers for a total of 486 volunteer hours spent sampling lakes. Each year, ALMS recognizes one volunteer who has shown outstanding dedication and commitment to the LakeWatch program over the years. This year, Orest Kitt of Skeleton Lake North was presented with the LakeWatch Volunteer of the Year Award. Orest has volunteered with the LakeWatch program for nearly 13 years.

Volunteer of the Year recipient, Orest Kitt, and LakeWatch Technician, Elashia Young at Skeleton Lake.

Table 1- The LakeWatch sample completion record for 2017. * Indicates only 4 sampling trips scheduled.

Lake	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5
Alix	19-Jun	31-Jul	16-Aug	28-Aug	15-Sep
Antler	23-Jun	31-Jul	23-Aug	4-Oct	*
Birch	12-Jun	7-Jul	4-Aug	11-Sep	*
Burnstick	5-Jun	4-Jul	1-Aug	18-Aug	7-Sep
Calling	16-Jun	22-Jul	Missed Trip	5-Oct	*
Crane	15-Jun	26-Jul	10-Aug	29-Aug	11-Sep
Crimson	18-Jun	17-Jul	17-Aug	27-Sep	*
Garner	Missed Trip	27-Jul	29-Aug	Missed Trip	Missed Trip
Glennifer	Missed Trip	12-Jul	6-Aug	21-Aug	5-Sep
Gregoire	26-Jun	26-Jul	23-Aug	24-Sep	*
Half Moon	7-Jun	5-Jul	3-Aug	6-Sep	*
Haunted	18-Jun	31-Jul	16-Aug	28-Aug	15-Sep
Island	12-Jun	10-Jul	20-Aug	22-Sep	*
Jackfish	18-Jun	18-Jul	28-Aug	27-Sep	*
Kehewin	27-Jun	27-Jul	16-Aug	7-Sep	Missed Trip
Lac Bellevue	24-Jun	14-Jul	12-Aug	16-Sep	*
Laurier	15-Jun	7-Jul	4-Aug	18-Aug	1-Sep
Lessard	20-Jun	18-Jul	22-Aug	12-Sep	*
Long PP	25-Jun	14-Jul	21-Aug	24-Sep	*
Long Island	7-Jun	6-Jul	14-Aug	14-Sep	*
Long	15-Jun	14-Jul	24-Aug	18-Sep	*
Minnie	12-Jun	10-Jul	8-Aug	21-Aug	25-Sep
Miquelon	Missed Trip	11-Jul	14-Aug	22-Sep	*
Moose	29-Jun	18-Jul	9-Aug	27-Aug	20-Sep
Muriel	27-Jun	19-Jul	4-Aug	29-Aug	Missed Trip
Narrow	15-Jun	14-Jul	24-Aug	18-Sep	*
Pigeon	30-Jun	28-Jul	11-Aug	25-Aug	15-Sep
Pine	24-Jun	19-Jul	11-Aug	30-Aug	26-Sep
Skeleton North	5-Jun	29-Jun	25-Jul	14-Aug	5-Sep
Skeleton South	23-Jun	12-Jul	14-Aug	28-Aug	13-Sep
Steele	23-Jun	28-Jul	25-Aug	19-Sep	*
Touchwood	28-Jun	27-Jul	17-Aug	Missed Trip	22-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. Results from the 32 standard lakes have been summarized below.

LakeWatch technician Elashia Young, LakeWatch Coordinator Laura Redmond and Executive Director Bradley Peter on training day in June 2017.

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 depth across 2017 lakes ranged from a minimum of 0.30 m in Antler Lake to a maximum of 5.70 m in Gleniffer Lake. Secchi depth only moderately correlated with chlorophyll-*a* (r= -0.52, p-value= 0.002) indicating that on average, Secchi depth decreased with increasing algal biomass. However, this relationship is not strong.

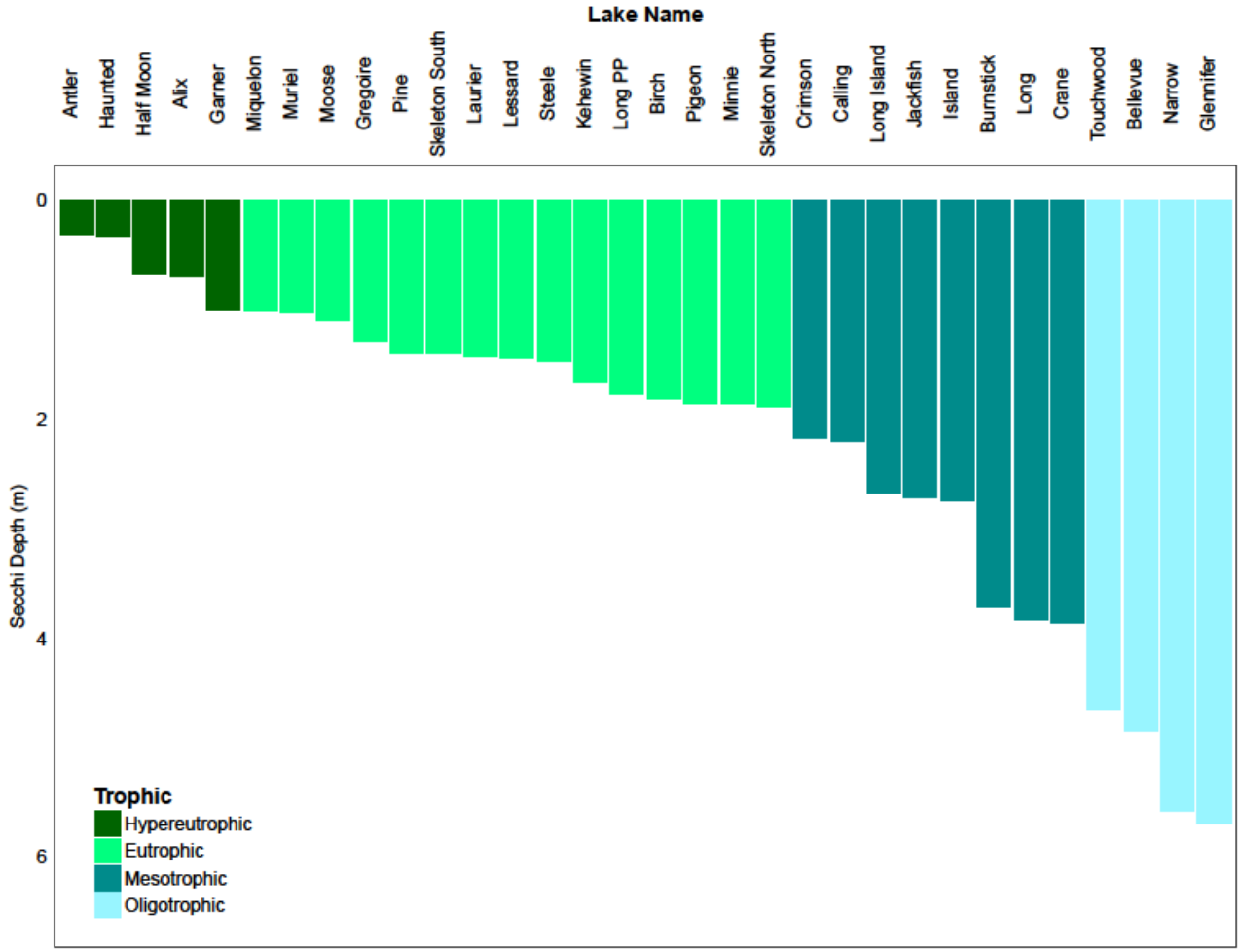

Figure 1: Average Secchi depth measurements (metres) across 32 LakeWatch lakes sampled in 2017.

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 (TP) ranged from 4.0 µg/L in Gleniffer Lake to 412 µg/L in Antler Lake (Figure 2). LakeWatch lakes of 2017 were classified as oligotrophic to hypereutrophic. Average chlorophyll-*a* concentrations ranged from a minimum of 0.95 µg/L in Gleniffer Lake to 238 µg/L in Antler Lake (Figure 3).

Average total phosphorus (TP) and average chlorophyll-*a* were significantly correlated (r= 0.86, p-value= 2.55 x 10^{-10}) indicating that algal biomass was related to total phosphorus concentrations. In some cases, this relationship is more complicated. For example, Miquelon Lake has high TP concentrations but low Chlorophyll-*a* concentrations because its brackish waters inhibits most algae growth.

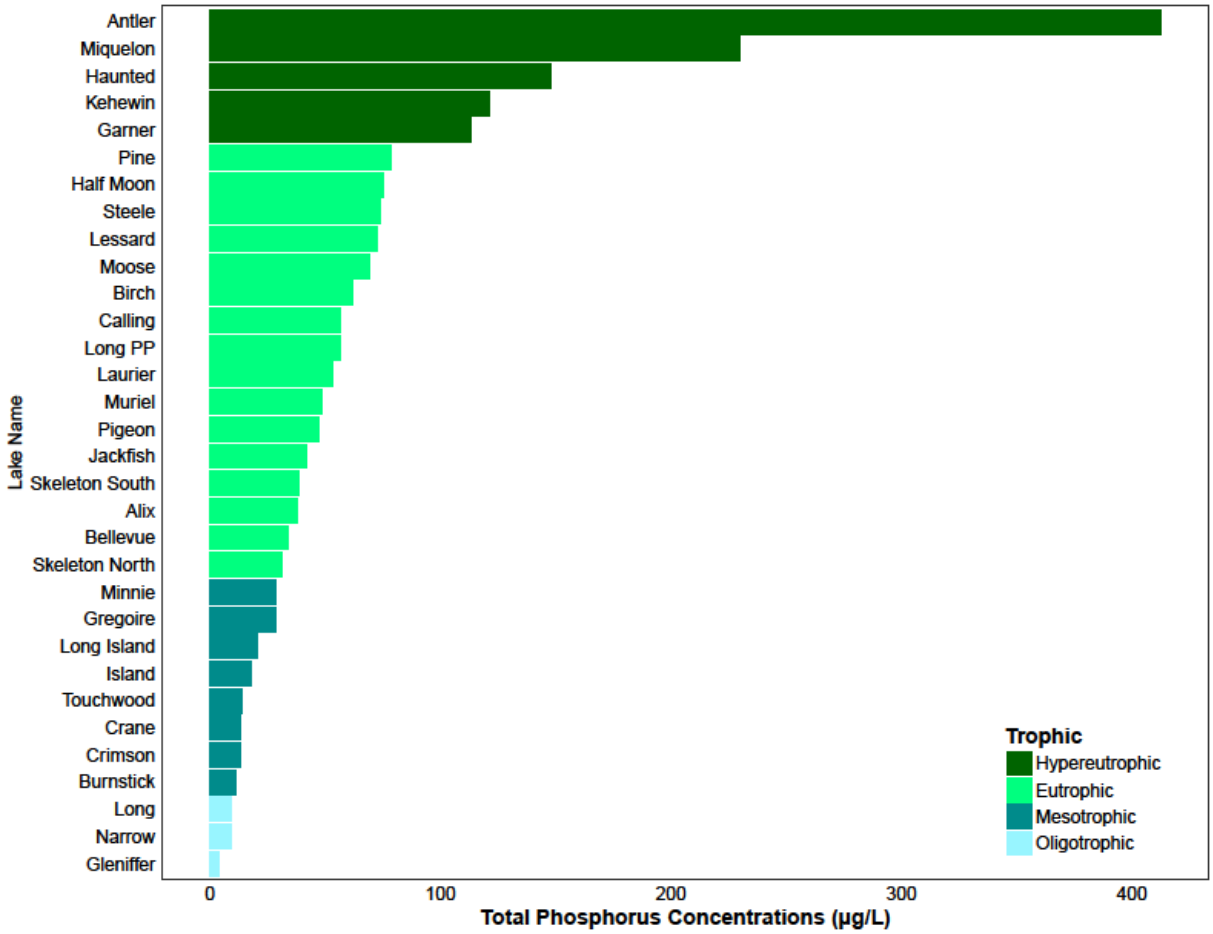

Figure 2: Average Total Phosphorus (TP) concentrations (µg/L) across 32 LakeWatch lakes sampled in 2017.

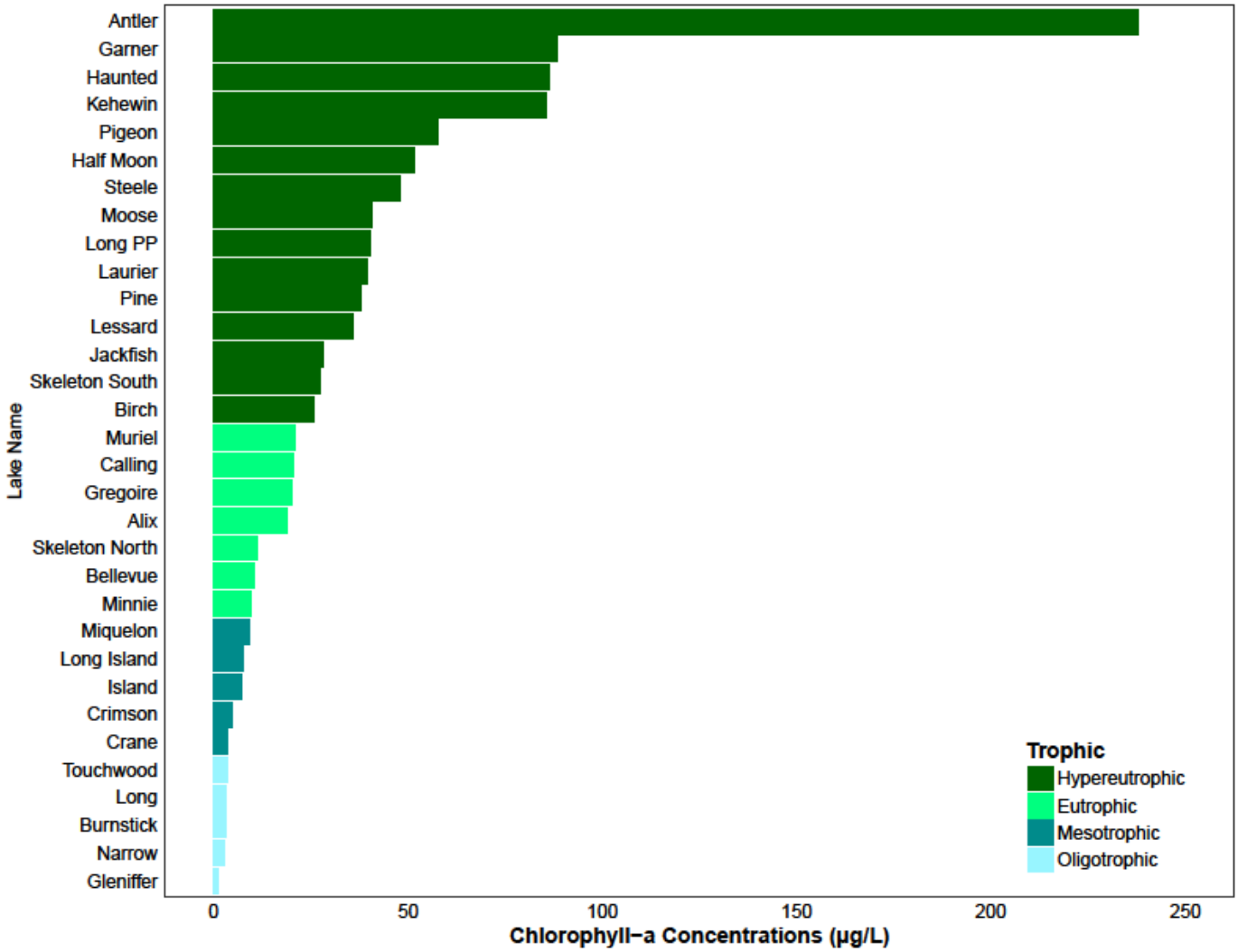

Figure 3: Average Chlorophyll-*a* concentrations (µg/L) across 32 LakeWatch lakes sampled in 2017.

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 levels remained below the recreational guideline of 20 µg/L. However, Antler Lake had a microcystin concentration of 41 µg/L on August 23, putting it at over double the guideline on this sampling date. Garner Lake and Haunted Lake microcystin levels were also above the guideline on August 29 and August 16, respectively. Microcystin levels were minimal in Gleniffer, Long, Narrow, Touchwood and Skeleton North, falling below the detection limit.

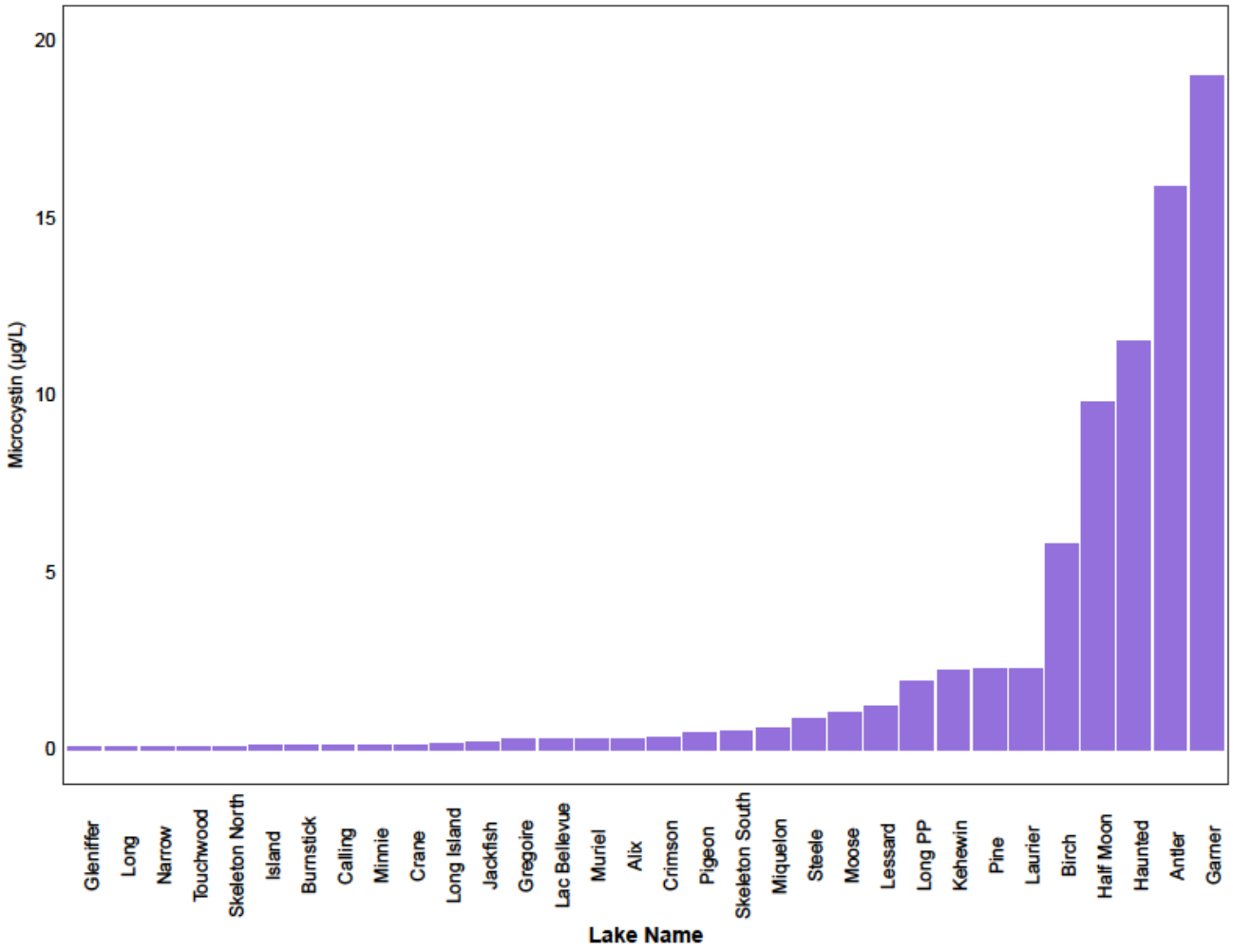

Figure 4: Average microcystin concentrations (µg/L) across 32 LakeWatch lakes sampled in 2017.