Lakewatch

THE ALBERTA LAKE MANAGEMENT SOCIETY
VOLUNTEER LAKE MONITORING PROGRAM

2015 LAKEWATCH PROGRAM SUMMARY REPORT

COMPLETED WITH SUPPORT FROM:

Beaver River Watershed Alliance

aemera.org

LICA
Lakeland Industry & Community Association

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Purpose

This report is a summary of the data collected during the 2015 LakeWatch season. While ALMS collects a large suite of water chemistry parameters, this report will attempt to 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.

Volunteers

Figure 1: LakeWatch Volunteer of the Year recipient Ron Young with LakeWatch Technician Ageleky Bouzetos.

The LakeWatch program is made possible through the dedication of its volunteers and funding from the Lakeland Industry and Community Association (LICA), Environment Canada, the Pigeon Lake Watershed Association (PLWA), the Beaver River Watershed Alliance, and the Alberta Environmental Monitoring Evaluation and Reporting Agency (AEMERA).

In 2015, ALMS worked with nearly 100 unique volunteers for a total of 380 volunteer hours spent sampling lakes. Each year, ALMS recognizes one volunteer who has shown outstanding dedication and commitment to the LakeWatch program. This year, Ron Young of Crane Lake was presented with the LakeWatch Volunteer of the Year Award (Figure 1). A write-up of Ron Young was published on the ALMS website at http://alms.ca/lakewatch-volunteers/.

If you are interested in volunteering with the LakeWatch program, contact ALMS at 780-702-2567 or programs@alms.ca.

Lake Whiting

Lake whiting is a phenomenon which results in lakes appearing a glacial blue or green colour. This event is most likely caused by blooms of autotrophic picoplankton (APP) – microscopic photosynthesing algae and bacteria. Blooms of APP cause calcium precipitation on their outer walls which results in a 'lake whiting' effect. These events are most common in mesotrophic lakes.

In 2015, lake whiting was observed at Crane Lake (Figure 2) and Lac Sante. It is likely that autotrophic picoplankton (APP) was the cause of these whitening events as spikes in dissolved oxygen concentrations partway through lake profiles or high chlorophyll-*a* concentrations are indicative of high photosynthetic activity. It is yet unknown what results in these seemingly harmless blooms.

Figure 2: The glacial colour indicative of a lake whiting event observed at Crane Lake in 2015.

Sample Record

In 2015, ALMS received funding from the Lakeland Industry and Community Association (LICA), Environment Canada, the Pigeon Lake Watershed Association (PLWA), and the Alberta Environmental Monitoring Evaluation and Reporting Agency (AEMERA), to conduct LakeWatch, a volunteer based water quality monitoring program.

Three summer field technicians (Mohamad Youssef, Ageleky Bouzetos, and Laticia MacDonald) were hired in May of 2015 to conduct the water quality sampling. Each lake was to be visited five times throughout the summer, and, in 2015, 149 of 155 scheduled trips were completed. This resulted in a completion rate of 96% (Table 1). Each technician missed two trips as a result of volunteer availability.

Table 1: The LakeWatch sample completion record for 2015.

Lake	Trip 1	Trip 2	Trip 3	Trip 4	Trip 5
Chestermere	29-Jun	21-Jul	12-Aug	26-Aug	23-Sep
Crane	10-Jun	8-Jul	5-Aug	18-Aug	4-Oct
Dilberry	26-Jun	12-Jul	9-Aug	28-Aug	15-Sep
Elinor	14-Jun	2-Jul	10-Aug	26-Aug	19-Sep
Elkwater	15-Jun	13-Jul	10-Aug	31-Aug	14-Sep
Goose	17-Jun	15-Jul	10-Aug	Missed Trip	9-Sep
Gull	17-Jun	13-Jul	10-Aug	31-Aug	14-Sep
Hanmore	15-Jun	13-Jul	9-Aug	19-Aug	21-Sep
Hardisty	23-Jul	Missed Trip	5-Aug	20-Aug	11-Sep
Hubbles	12-Jun	13-Jul	9-Aug	19-Aug	21-Sep
Iosegun	14-Jun	6-Jul	11-Aug	30-Aug	28-Sep
Isle	6-Jun	4-Jul	15-Aug	29-Aug	26-Sep
Lac la Nonne	23-Jun	21-Jul	4-Aug	18-Aug	8-Sep
Lac Sante	26-Jun	2-Jul	10-Aug	26-Aug	19-Sep
Lacombe	27-Jun	18-Jul	2-Aug	16-Aug	12-Sep
Laurier	1-Jun	29-Jun	29-Jul	17-Aug	2-Sep
Lessard	29-Jun	20-Jul	8-Aug	29-Aug	27-Sep
Matchayaw	7-Jun	5-Jul	8-Aug	27-Aug	12-Sep
McLeod	26-Jun	26-Jul	7-Aug	23-Aug	6-Sep
Minnie	9-Jun	8-Jul	4-Aug	18-Aug	8-Sep
Moose	23-Jun	7-Jul	12-Aug	2-Sep	18-Sep
Muriel	15-Jun	20-Jul	31-Jul	22-Aug	11-Sep
Newell	25-Jun	14-Jul	11-Aug	28-Aug	25-Sep
Pigeon	23-Jun	27-Jul	19-Aug	1-Sep	19-Sep
Pine	21-Jun	8-Jul	3-Aug	6-Sep	Missed Trip
Pinehurst	24-Jun	24-Jul	7-Aug	27-Aug	30-Sep
Reesor	15-Jun	13-Jul	10-Aug	30-Aug	13-Sep
Skeleton North	4-Jun	3-Jul	11-Aug	31-Aug	22-Sep
Skeleton South	4-Jun	3-Jul	Missed Trip	5-Sep	Missed Trip
Smoke	1-Jun	7-Jul	11-Aug	31-Aug	Missed Trip
Spruce Coulee	15-Jun	13-Jul	10-Aug	31-Aug	13-Sep

Secchi Depth:

> *Secchi disk depth is a measure of water clarity and can act as an indicator of suspended particles, such as algae or sediments, or of dissolved materials, such as dissolved organic carbon.*

Average Secchi depths in 2015 ranged from a minimum of 0.58 m at Hardisty Lake to a maximum of 5.05 m at Lac Sante (Figure 3). Water clarity at Hardisty Lake appears to be most negatively impacted by suspended sediments rather than cyanobacteria blooms.

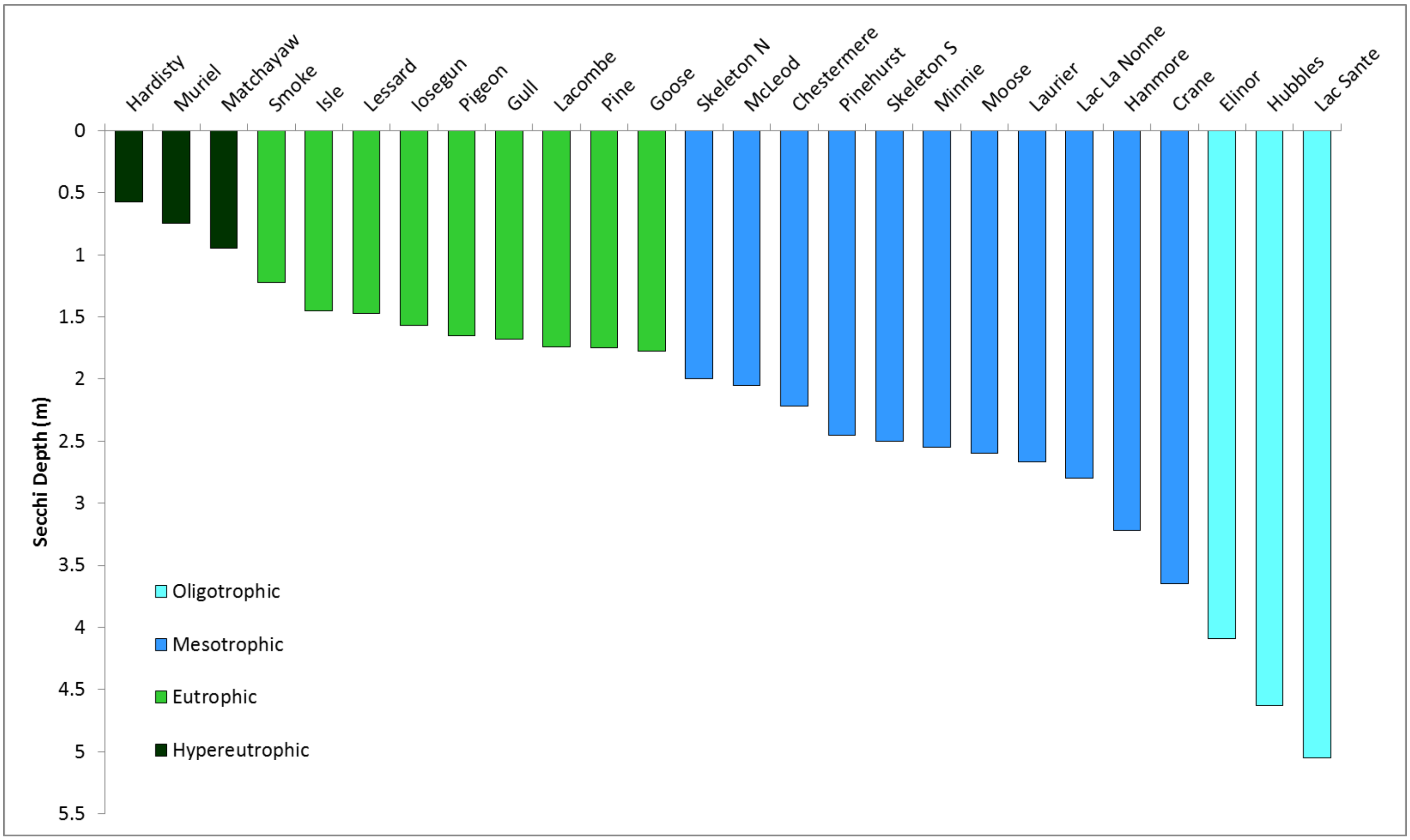

Figure 3: Average Secchi disk depths measured during the summer of 2015.

Total Phosphorus:

Average total phosphorus (TP) is a measure of both inorganic and organic particulate and dissolved forms of phosphorus. While phosphates are not toxic to people or animals, they are an important determinant of the degree of biological production in a lake. Thus, phosphorus may directly influence the amount of algae and cyanobacteria in a lake, and, indirectly, water clarity. In Alberta, phosphorus levels tend to be naturally elevated due to phosphorus-rich sediments and soils, though human activities may increase the amount of phosphorus that enters a lake. In addition, the internal-cycling of nutrients within a lake is strongly influenced by factors such as dissolved oxygen concentrations.

Average total phosphorus ranged from a minimum of 12.0 ug/L at Hanmore Lake to a maximum of 204 ug/L at Lac la Nonne (Figure 4). Concentrations at Muriel Lake (100.5 ug/L) seemed unusually high in comparison to historical averages.

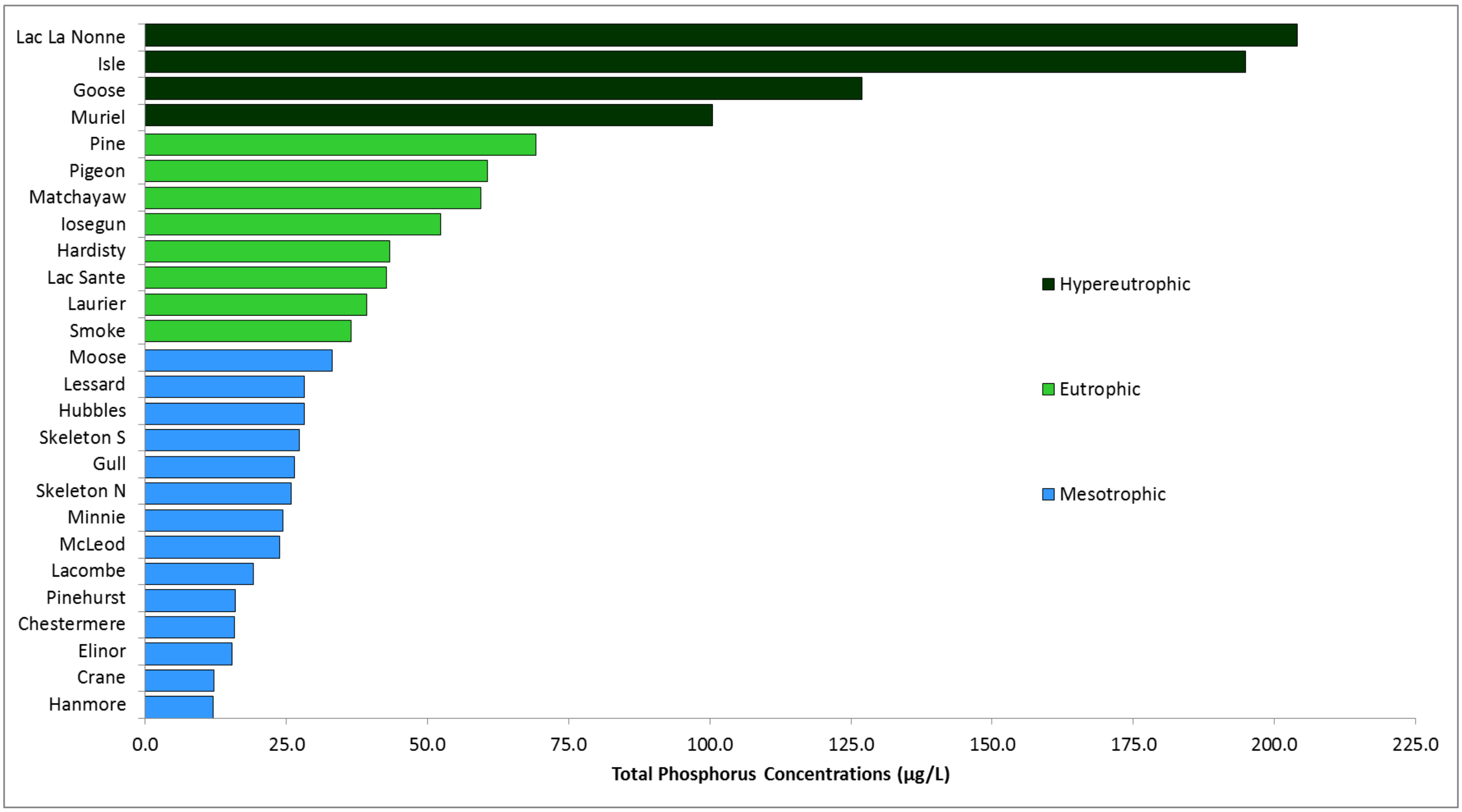

Figure 4: Average total phosphorus concentrations measured in the summer of 2015.

Chlorophyll-a:

> *Chlorophyll-a is an important pigment used by algae and cyanobacteria for photosynthesis. Thus, the concentration of chlorophyll-a acts as an indirect measure of algal biomass or productivity. The concentration of chlorophyll-a can also act as an indirect measure of water clarity, as large algae/cyanobacteria blooms frequently diminish water clarity in Alberta's lakes.*

Average chlorophyll-*a* concentrations ranged from a minimum of 2.9 ug/L at Hanmore Lake to a maximum of 73.9 ug/L at Isle Lake (Figure 5). The relationship between chlorophyll-*a* and total phosphorus appears weakest at Lac Sante, which had concentrations of 5.1 ug/L and 42.8 ug/L, respectively. This may be related to the presence of Lake Whiting events at Lac Sante. Such events were also observed at Crane Lake in 2015.

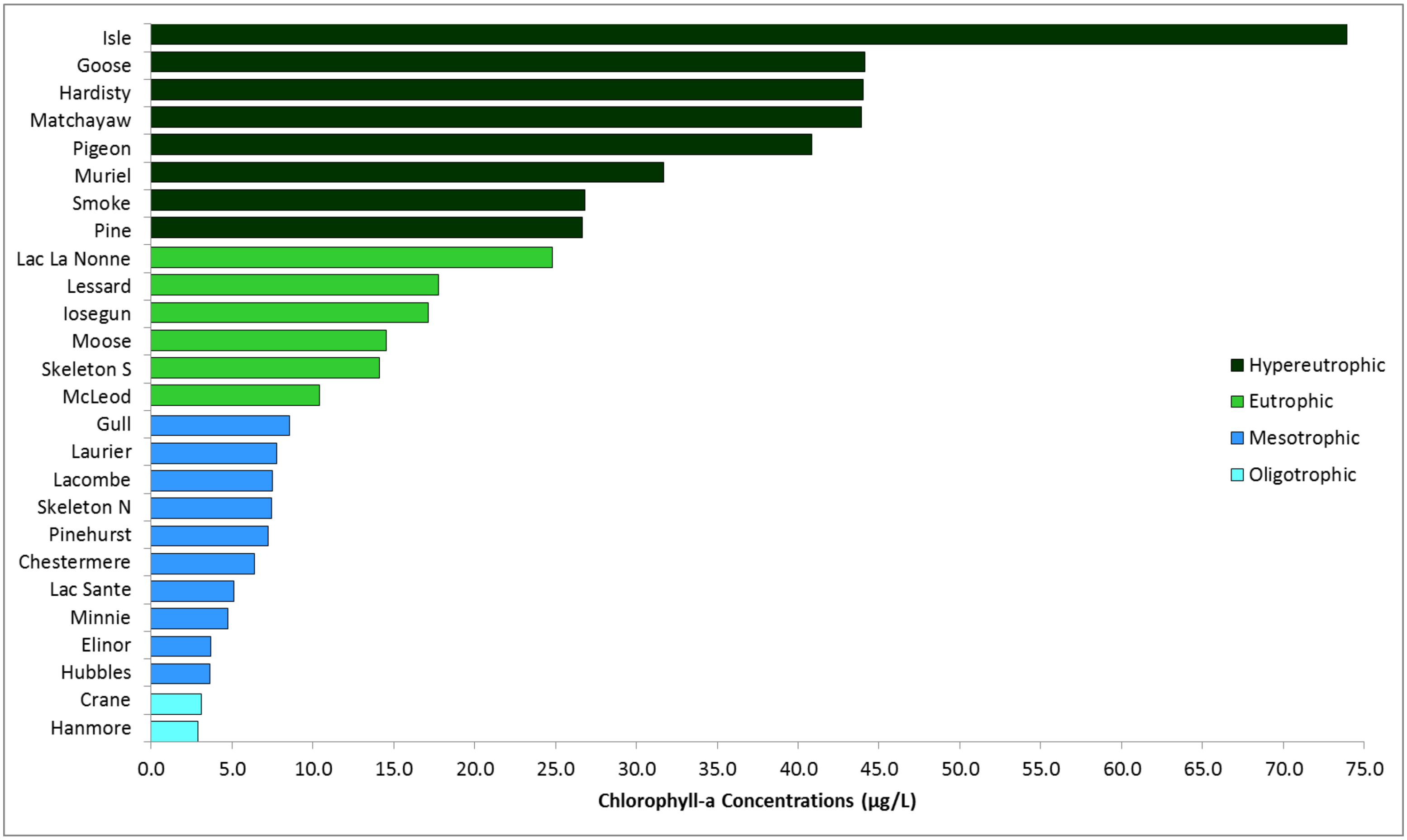

Figure 5: Average chlorophyll-*a* concentrations measured in the summer of 2015.

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. It is advised that the public avoid recreating in cyanobacteria blooms.

Microcystin concentrations collected by ALMS are not suitable for advisory purposes: samples collected by ALMS are compiled from ten points around the lake and results may be diluted compared to a single grab sample collected at a recreational beach. Average microcystin concentrations fell below the minimum detection limit at Chestermere Lake, Elinor Lake, Hanmore Lake, Hubbles Lake, Matchayaw Lake, and Pinehurst Lake (Figure 6). Microcystin was detected at every other lake, with the highest average concentration observed at Muriel Lake, measuring 16.25 ug/L.

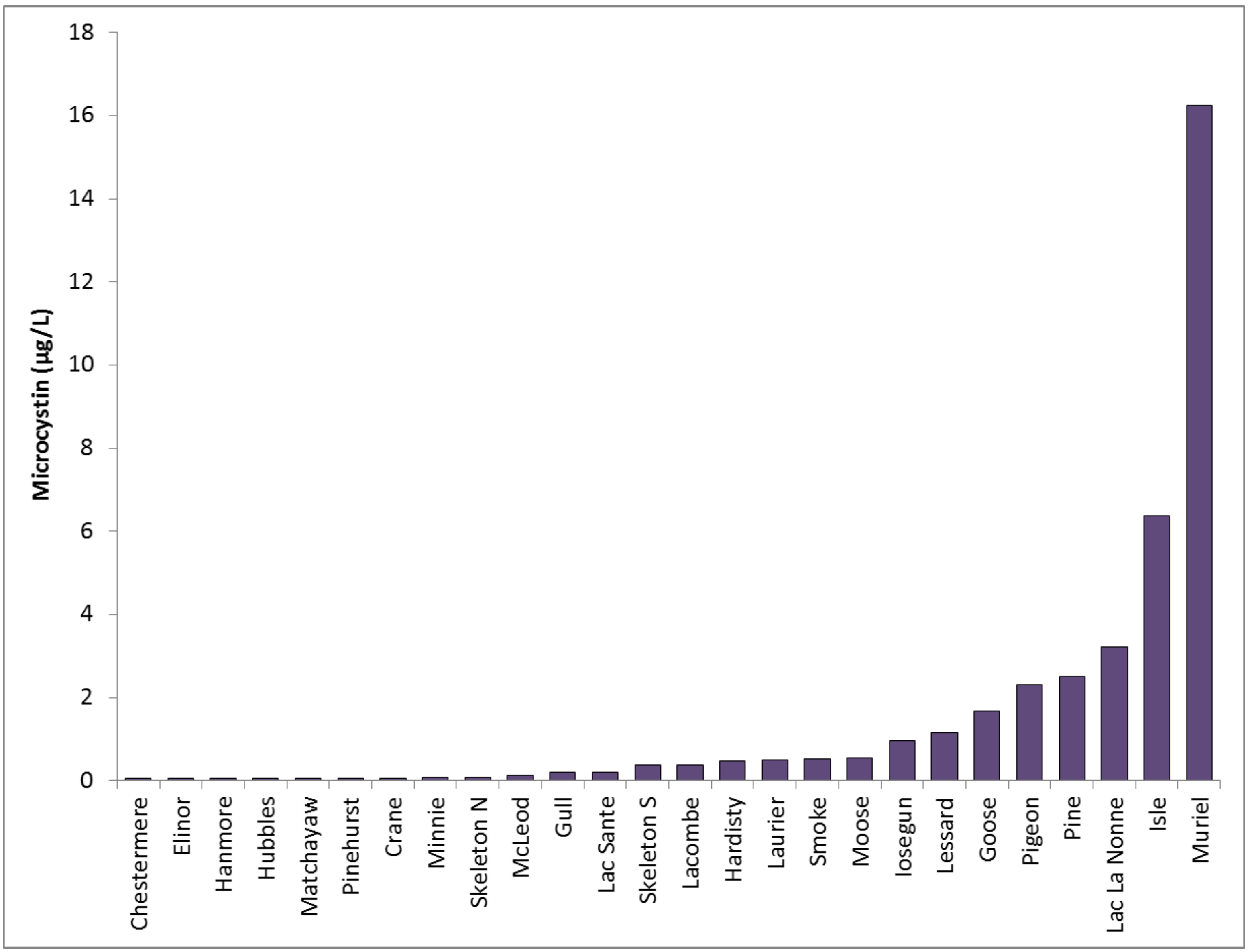

Figure 6: Average microcystin concentrations measured during the summer of 2015.