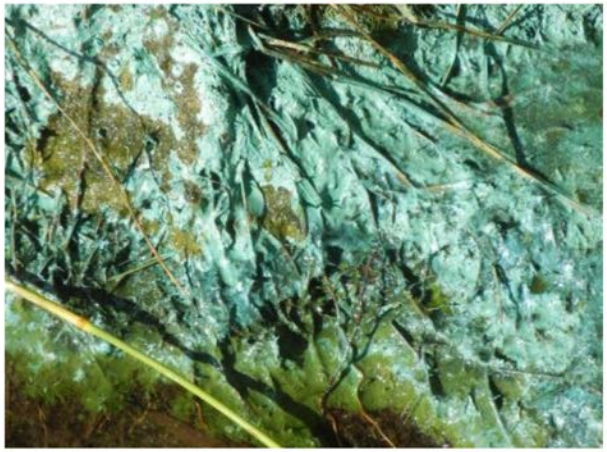
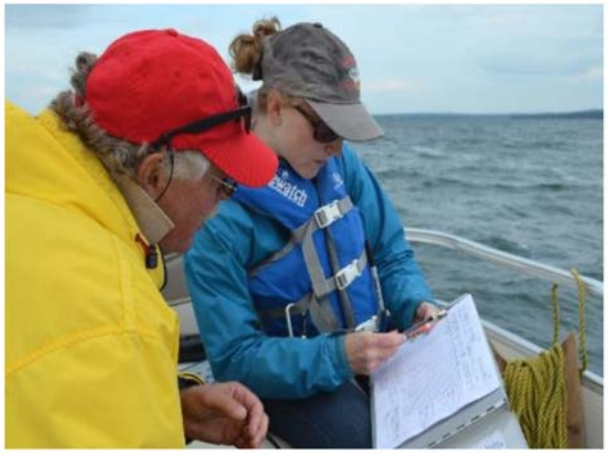
ALMS Program Updates

September 29, 2018

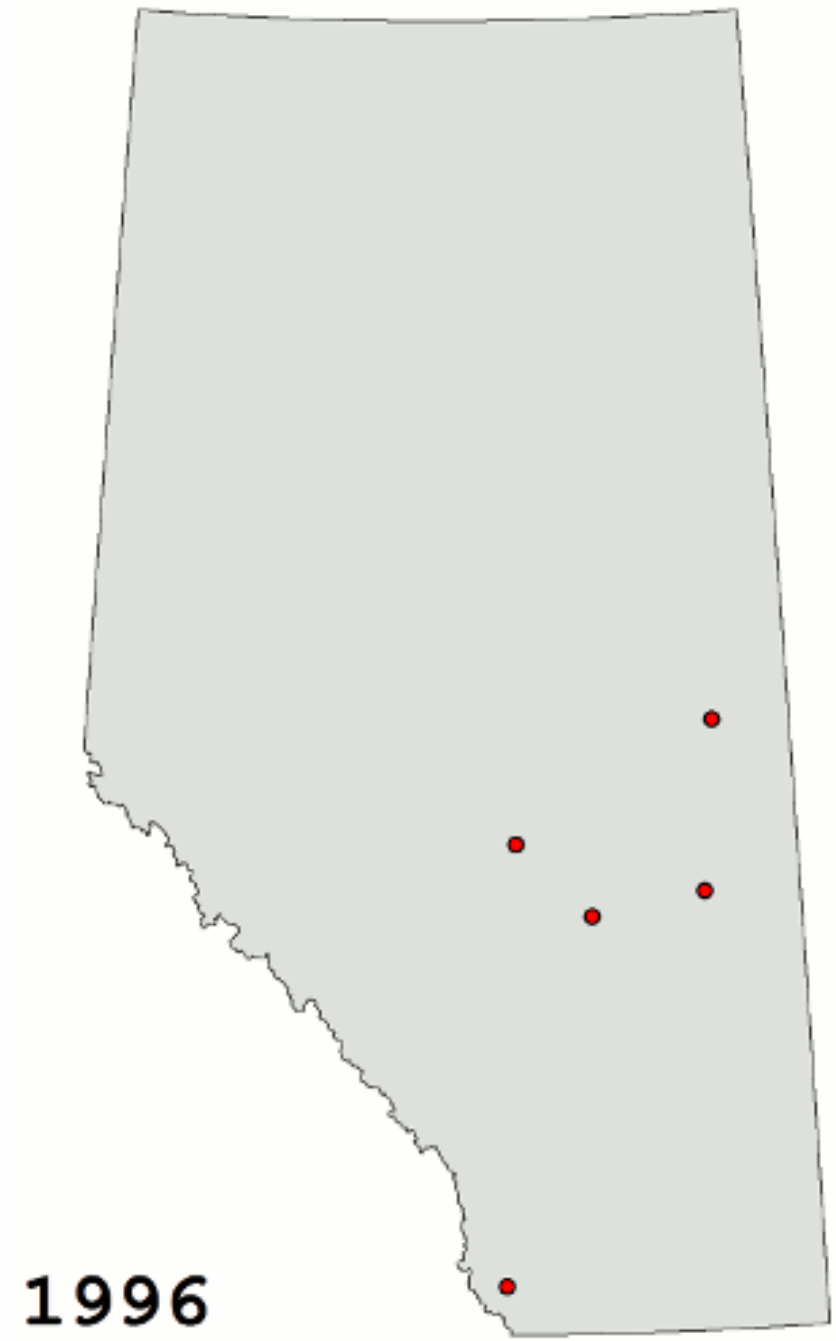
Bradley Peter, P. Biol.



ALMS



Lakewatch



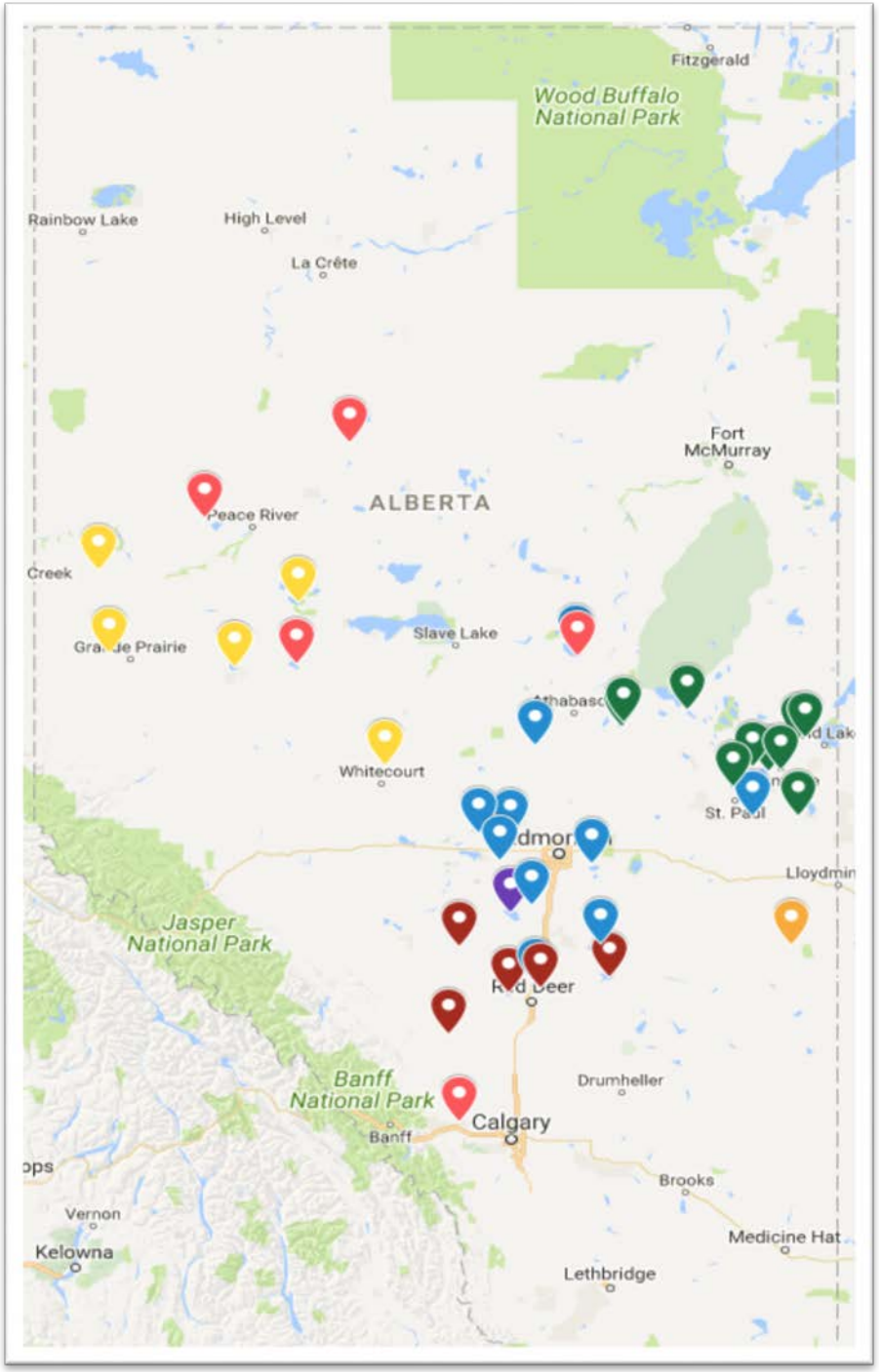
2018

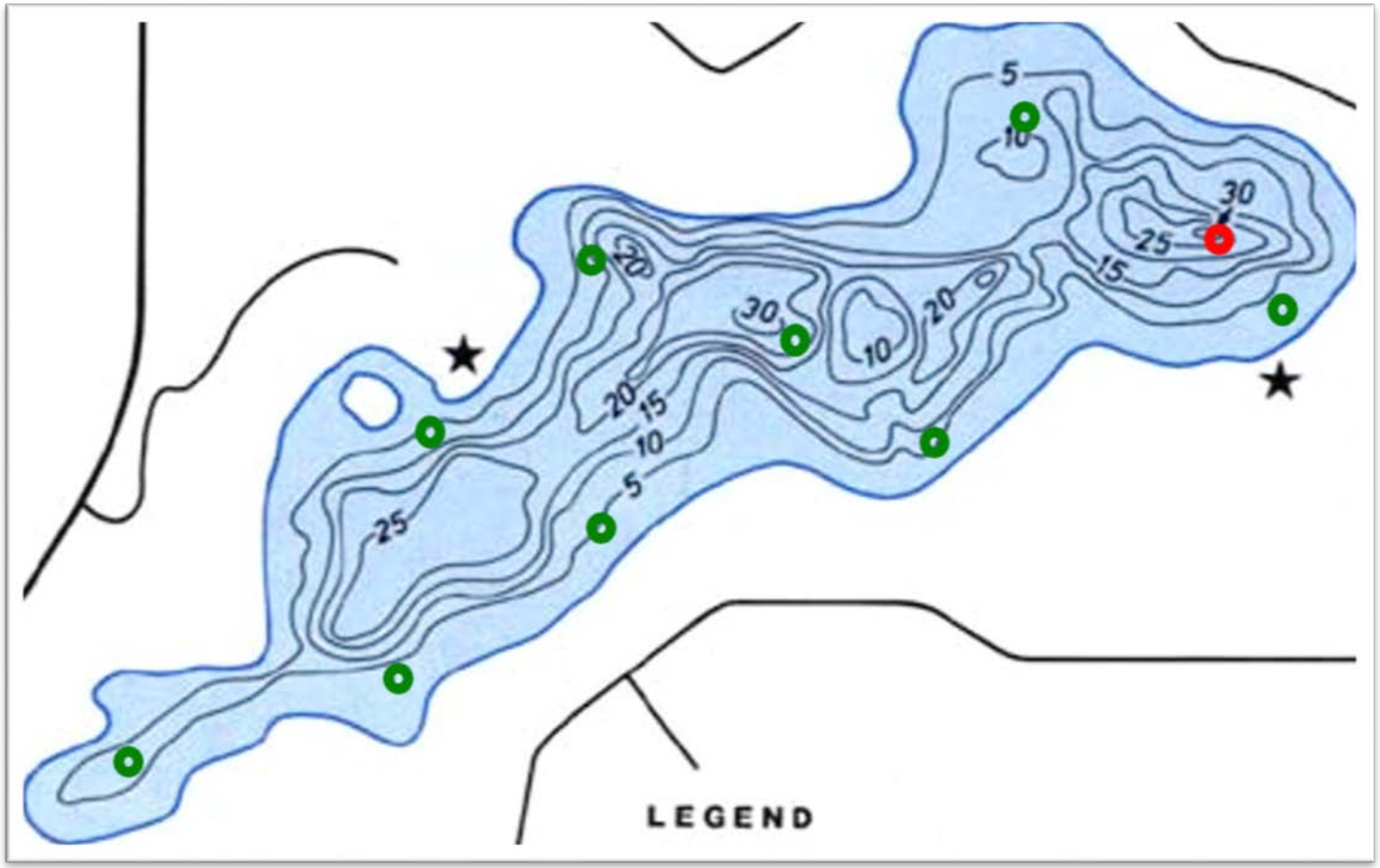
593 Volunteer Hours

139 Lake Monitoring Trips

Lakewatch

- 10 Base Lakes
- 5 Parks Lakes
- 10 LICA
- 5 RDRWA
- 1 PLWA
- 1 MD Wainwright
- 5 LakeKeepers





Profile:

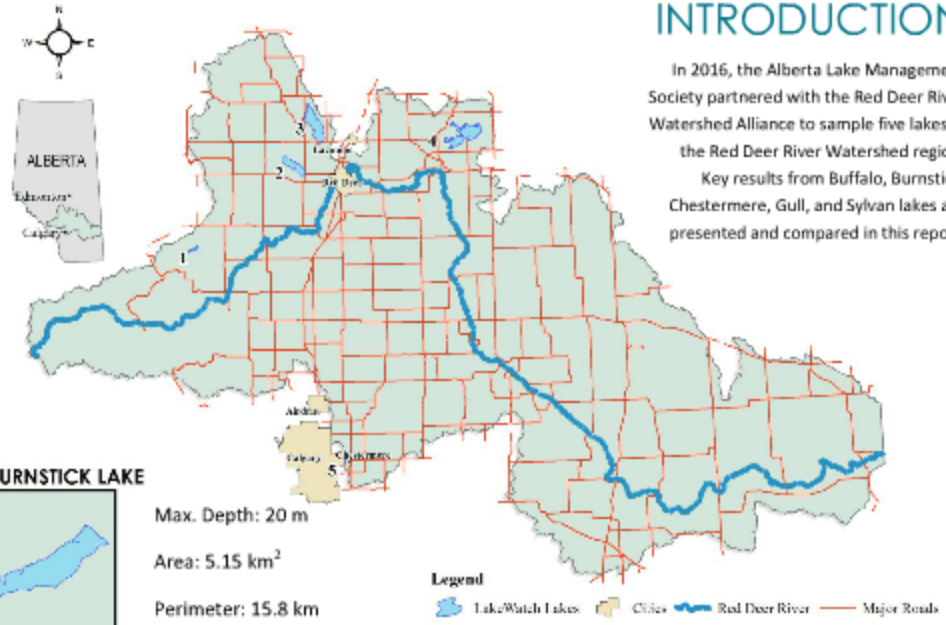
Temperature
Dissolved Oxygen
Conductivity
Redox
pH

Composite:

Nutrients (TKN, TP…)
Ions (Ca, Mg…)
Metals (As, Al, Fe…)
Microcystin
Chlorophyll-*a*
Invasive Species

INTRODUCTION

In 2016, the Alberta Lake Management Society partnered with the Red Deer River Watershed Alliance to sample five lakes in the Red Deer River Watershed region. Key results from Buffalo, Burnstick, Chestermere, Gull, and Sylvan lakes are presented and compared in this report.



1. BURNSTICK LAKE

Max. Depth: 20 m

Area: 5.15 km^2

Perimeter: 15.8 km

Sample Dates				
Jun 5	Jul 14	Aug 5	Aug 26	Sep 16

2. SYLVAN LAKE

Max. Depth: 18.3 m

Area: 42.8 km^2

Perimeter: 36.5 km

Sample Dates				
Jun 14	Jul 12	X	Aug 30	X

3. GULL LAKE

Max. Depth: 8 m

Area: 80.6 km^2

Perimeter: 55.1 km

Sample Dates				
X	Jul 25	Aug 16	Sep 7	Sep 22

4. BUFFALO LAKE

Max. Depth: 6.5 m

Area: 93.5 km^2

Perimeter: 117.7 km

Sample Dates				
Jun 24	Jul 18	X	Sep 1	Sep 13

5. CHESTERMERE LAKE

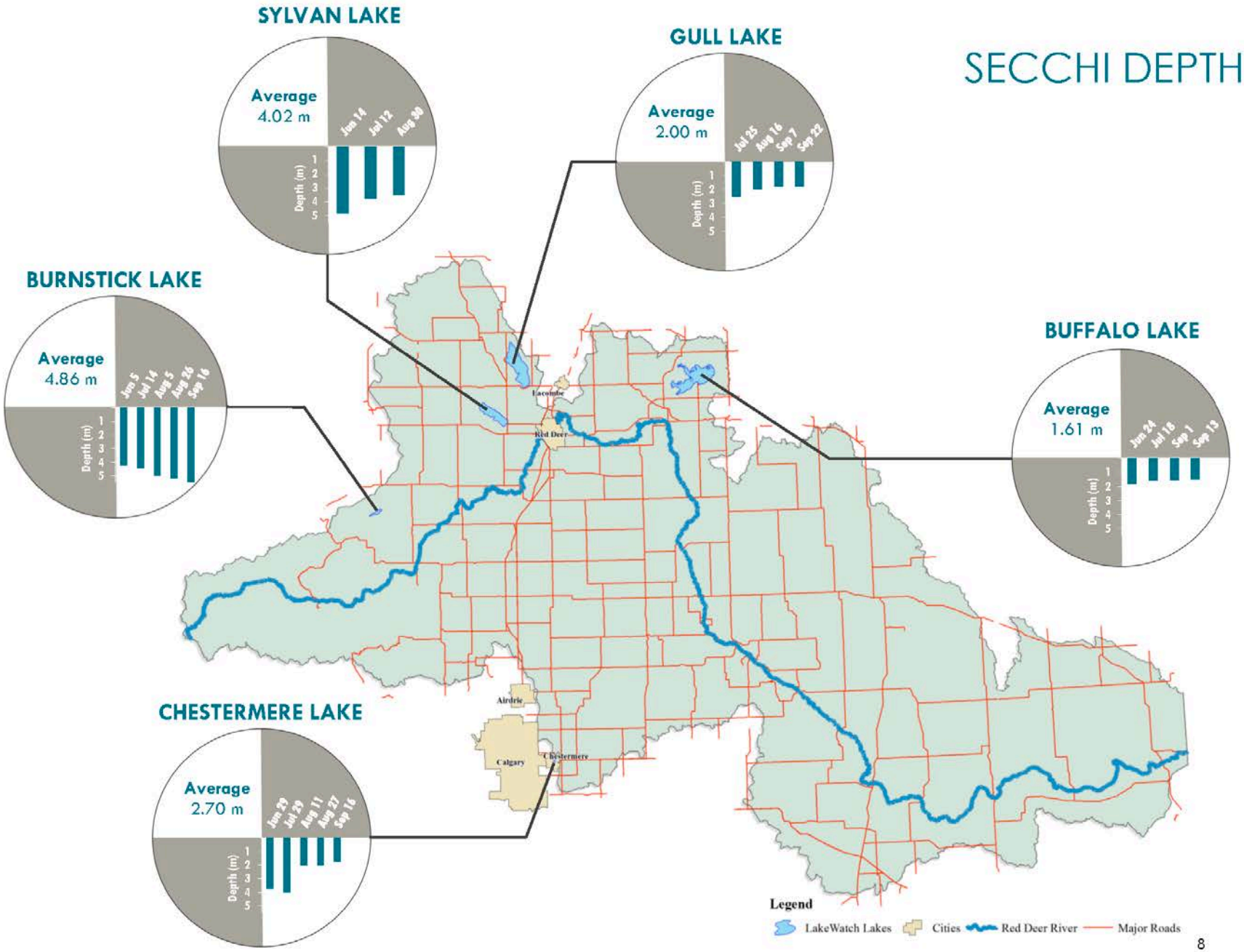
Max. Depth: 7 m

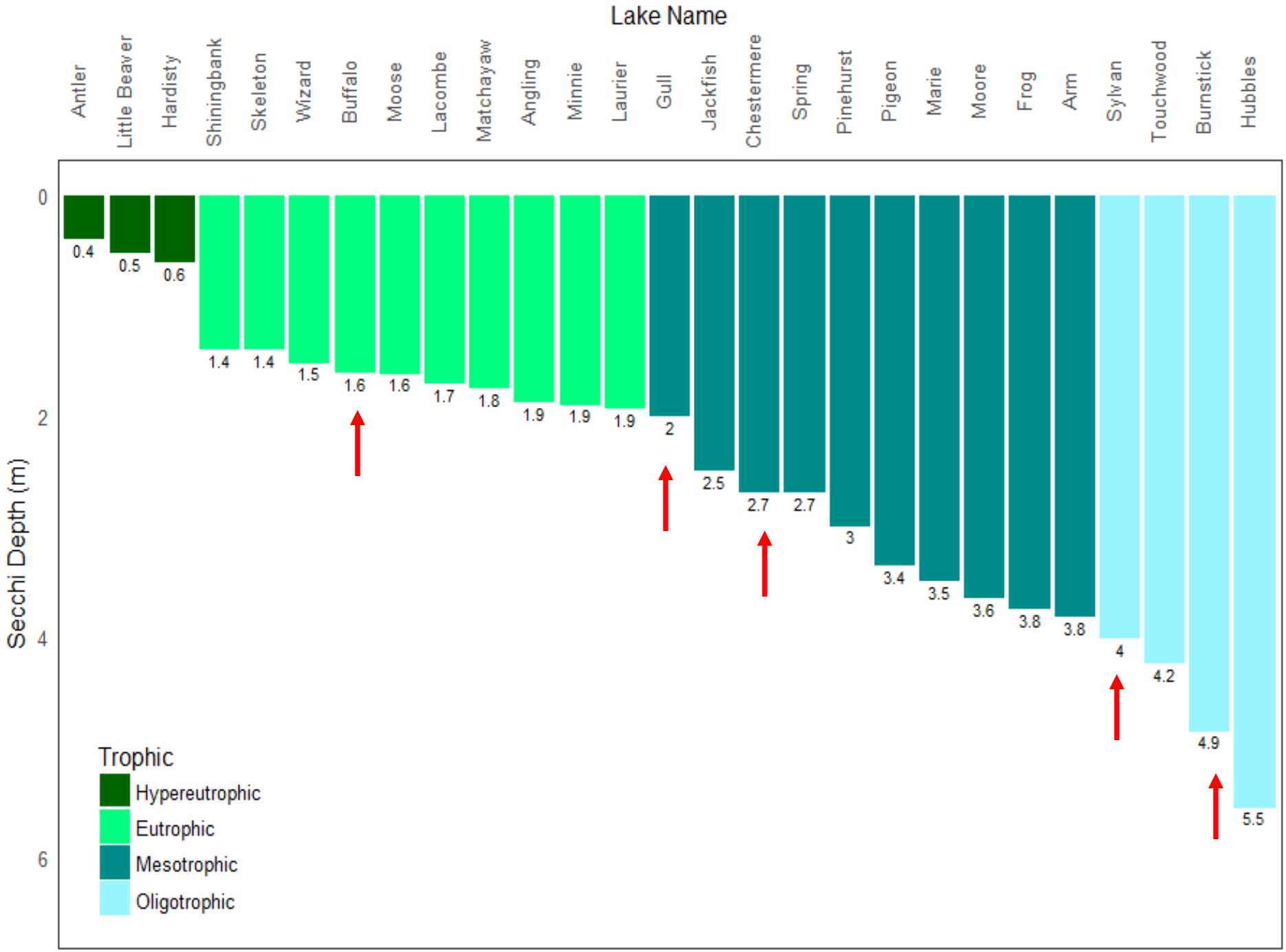
Area: 2.65 km^2

Perimeter: 9.3 km

Sample Dates				
Jun 29	Jul 29	Aug 11	Aug 27	Sep 16

SECCHI DEPTH



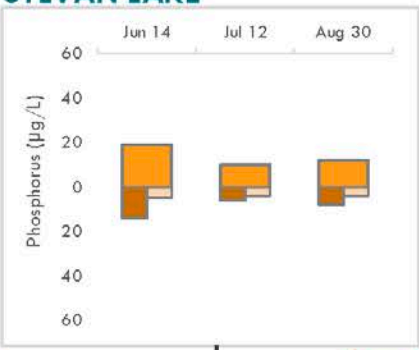

Lake Name
Antler
Little Beaver
Hardisty
Shiningbank
Skeleton
Wizard
Buffalo
Moose
Lacombe
Matchayaw
Angling
Minnie
Laurier
Gull
Jackfish
Chestermere
Spring
Pinehurst
Pigeon
Marie
Moore
Frog
Arm
Sylvan
Touchwood
Burnstick
Hubbles
Secchi Depth (m)
0
2
4
6
0.4
0.5
0.6
1.4
1.4
1.5
1.6
1.6
1.7
1.8
1.9
1.9
1.9
2
2.5
2.7
2.7
3
3.4
3.5
3.6
3.8
3.8
4
4.2
4.9
5.5
Trophic
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic

TOTAL PHOSPHORUS

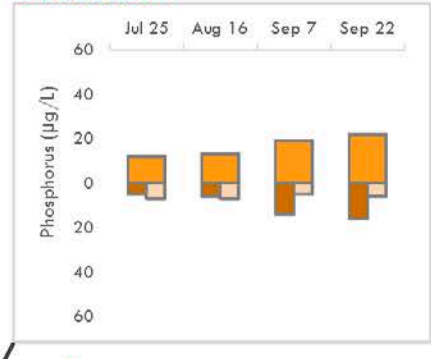
BREAKDOWN BY DATE

Total Phosphorus (TDP + TPP)
Total Dissolved Phosphorus (TDP)
Total Particulate Phosphorus (TPP)

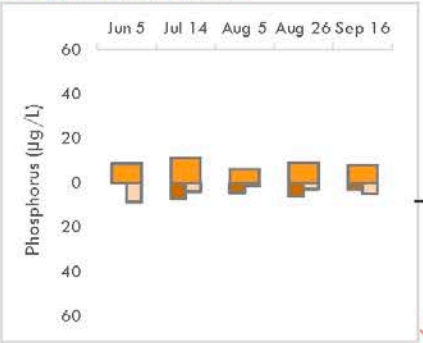
SYLVAN LAKE



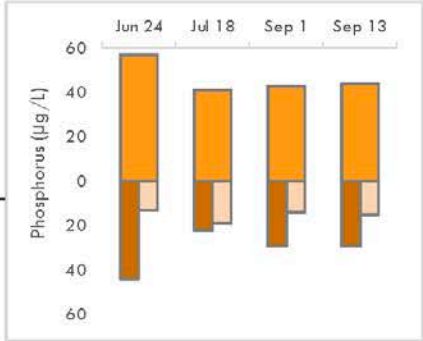
GULL LAKE



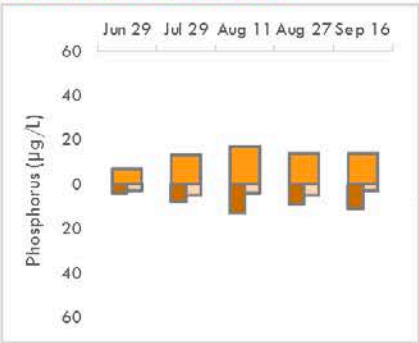
BURNSTICK LAKE

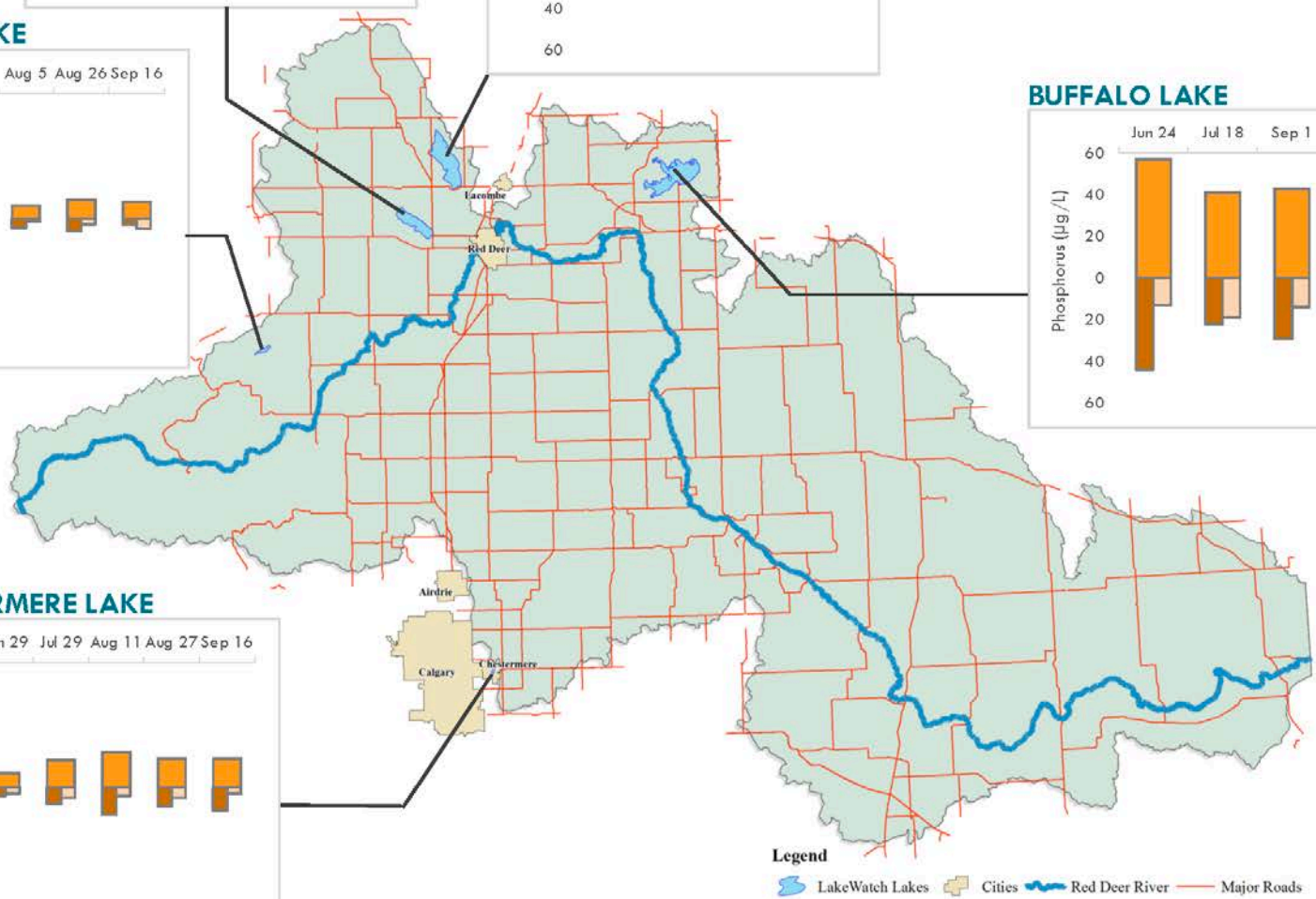


BUFFALO LAKE



CHESTERMERE LAKE

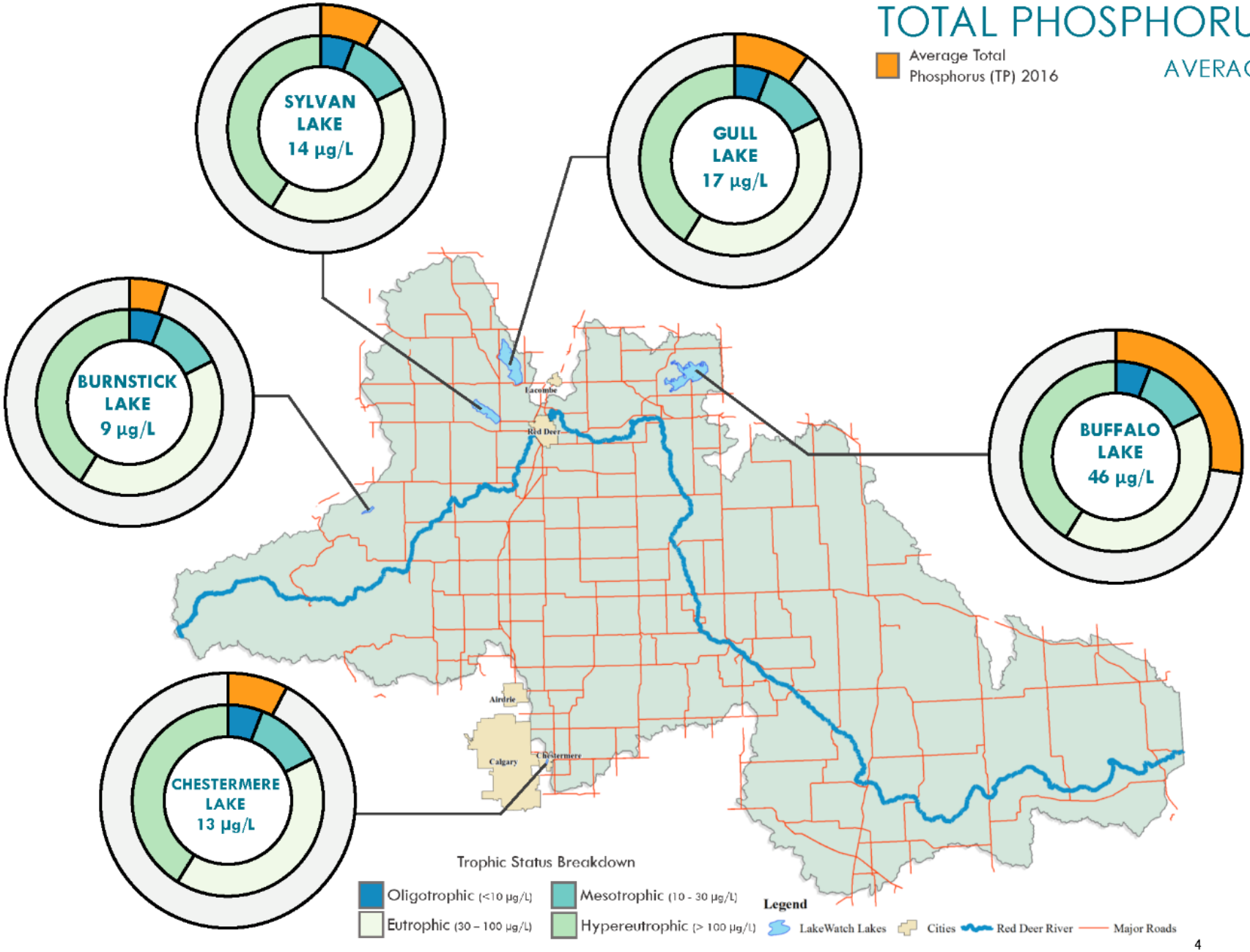


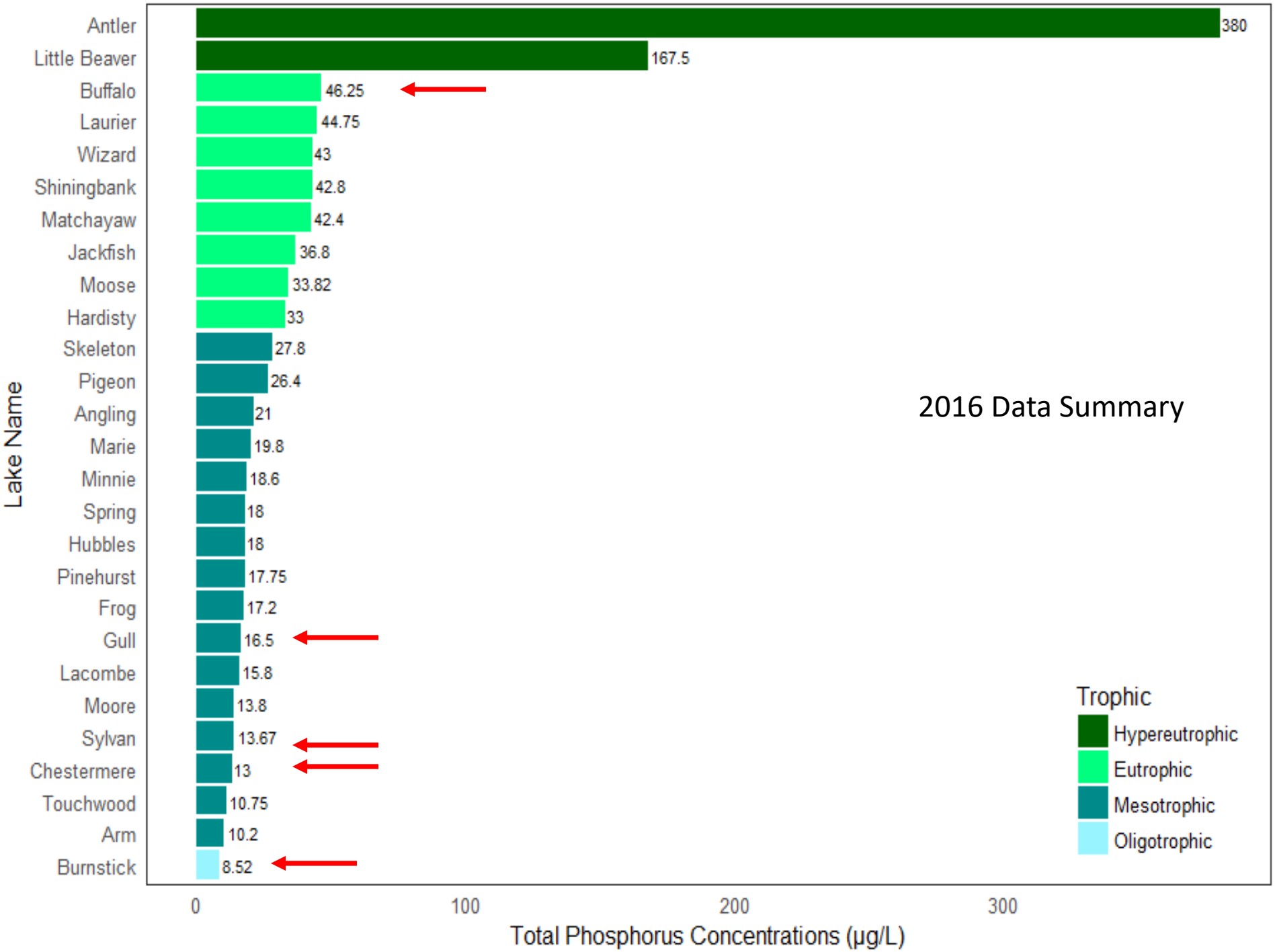


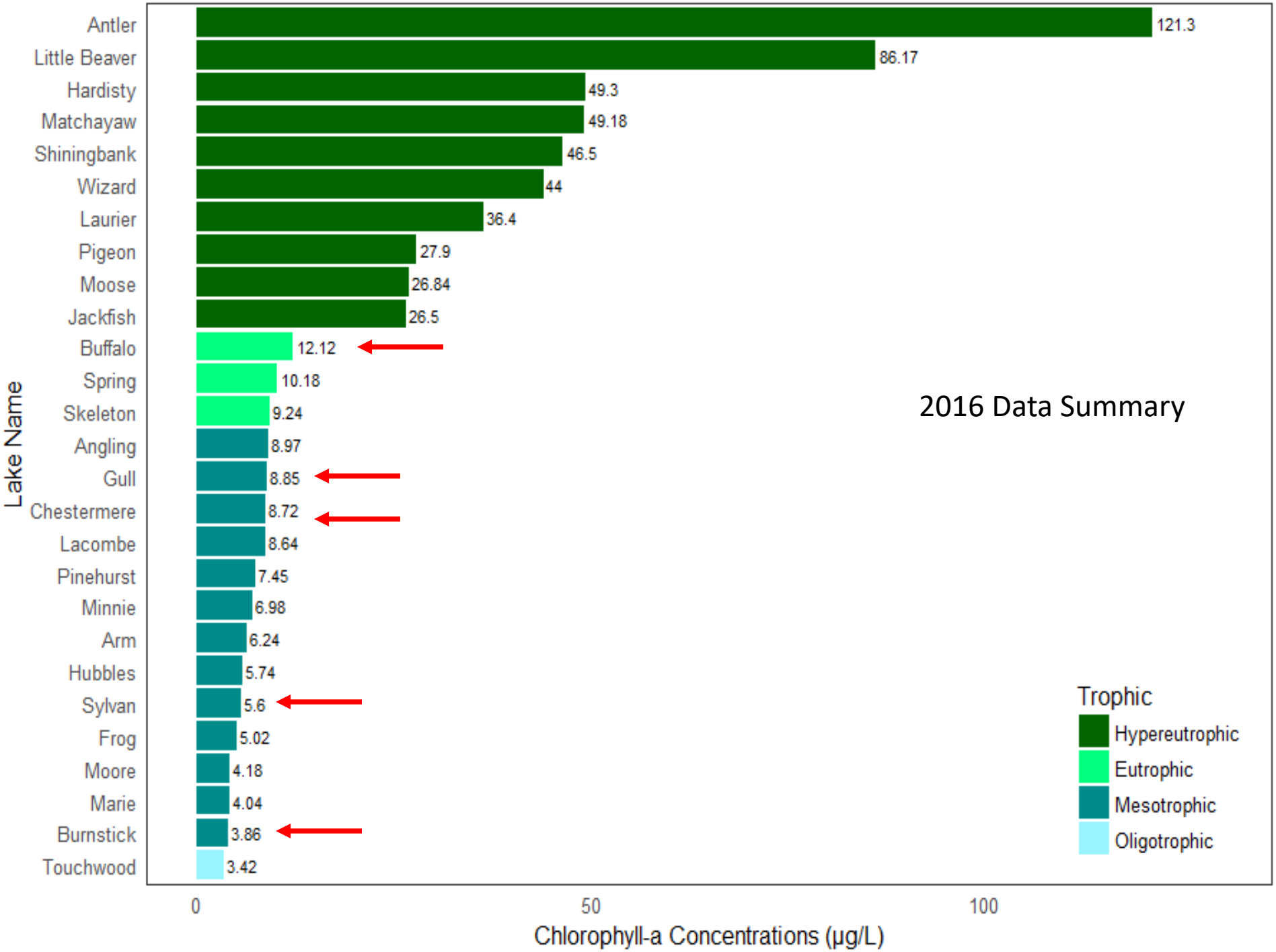
TOTAL PHOSPHORUS

Average Total Phosphorus (TP) 2016

AVERAGE



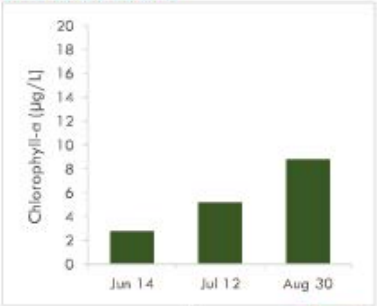

2016 Data Summary
Lake Name
Antler 380
Little Beaver 167.5
Buffalo 46.25
Laurier 44.75
Wizard 43
Shiningbank 42.8
Matchayaw 42.4
Jackfish 36.8
Moose 33.82
Hardisty 33
Skeleton 27.8
Pigeon 26.4
Angling 21
Marie 19.8
Minnie 18.6
Spring 18
Hubbles 18
Pinehurst 17.75
Frog 17.2
Gull 16.5
Lacombe 15.8
Moore 13.8
Sylvan 13.67
Chestermere 13
Touchwood 10.75
Arm 10.2
Burnstick 8.52
0
100
200
300
Total Phosphorus Concentrations (µg/L)
Trophic
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic


2016 Data Summary
Lake Name
Antler
Little Beaver
Hardisty
Matchayaw
Shiningbank
Wizard
Laurier
Pigeon
Moose
Jackfish
Buffalo
Spring
Skeleton
Angling
Gull
Chestermere
Lacombe
Pinehurst
Minnie
Arm
Hubbles
Sylvan
Frog
Moore
Marie
Burnstick
Touchwood
121.3
86.17
49.3
49.18
46.5
44
36.4
27.9
26.84
26.5
12.12
10.18
9.24
8.97
8.85
8.72
8.64
7.45
6.98
6.24
5.74
5.6
5.02
4.18
4.04
3.86
3.42
0
50
100
Chlorophyll-a Concentrations (µg/L)
Trophic
Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic

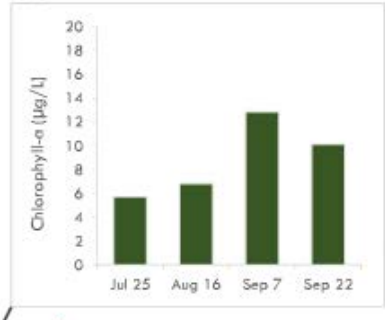
CHLOROPHYLL - A

BREAKDOWN BY DATE

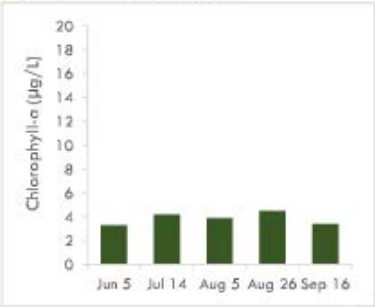
SYLVAN LAKE



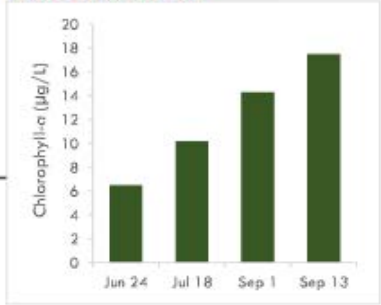
GULL LAKE

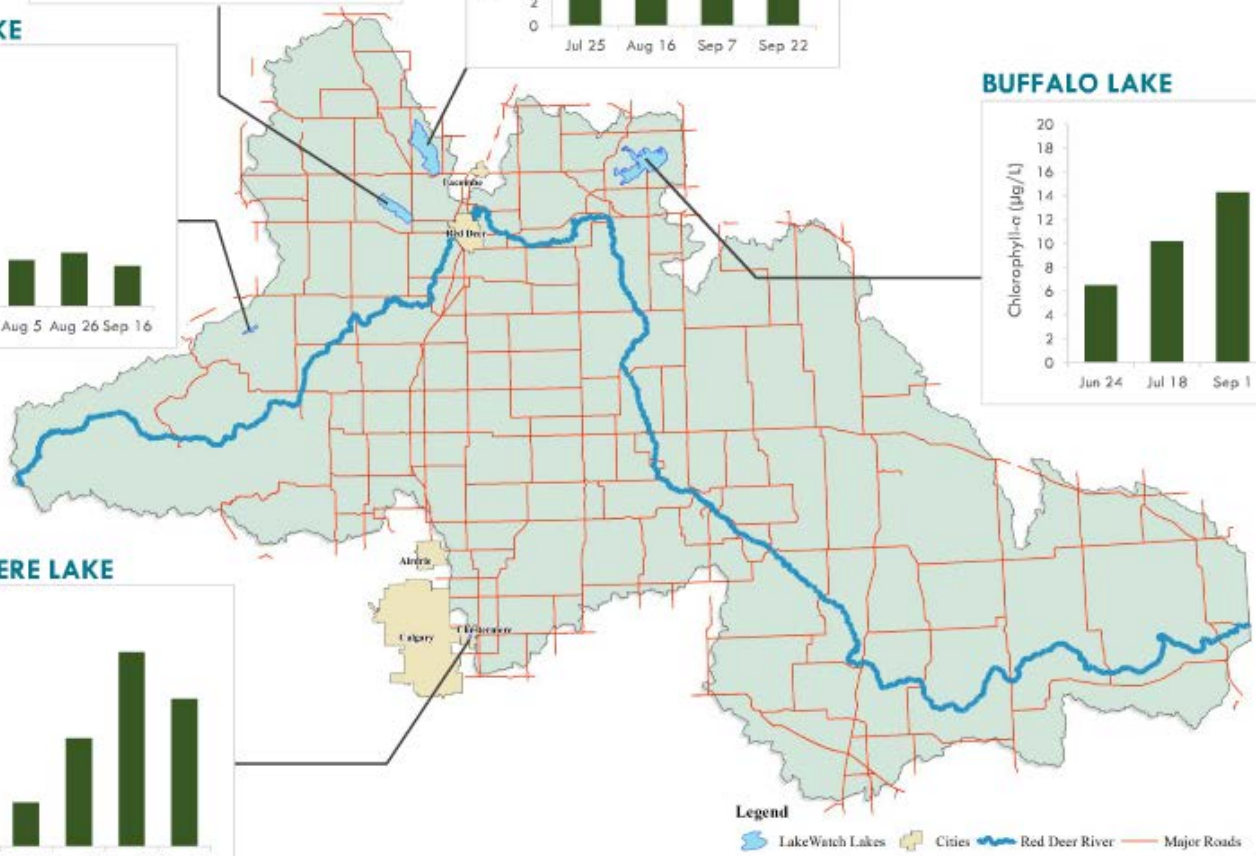


BURNSTICK LAKE

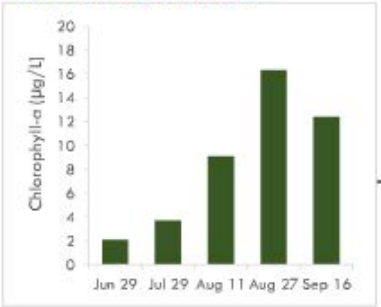


BUFFALO LAKE





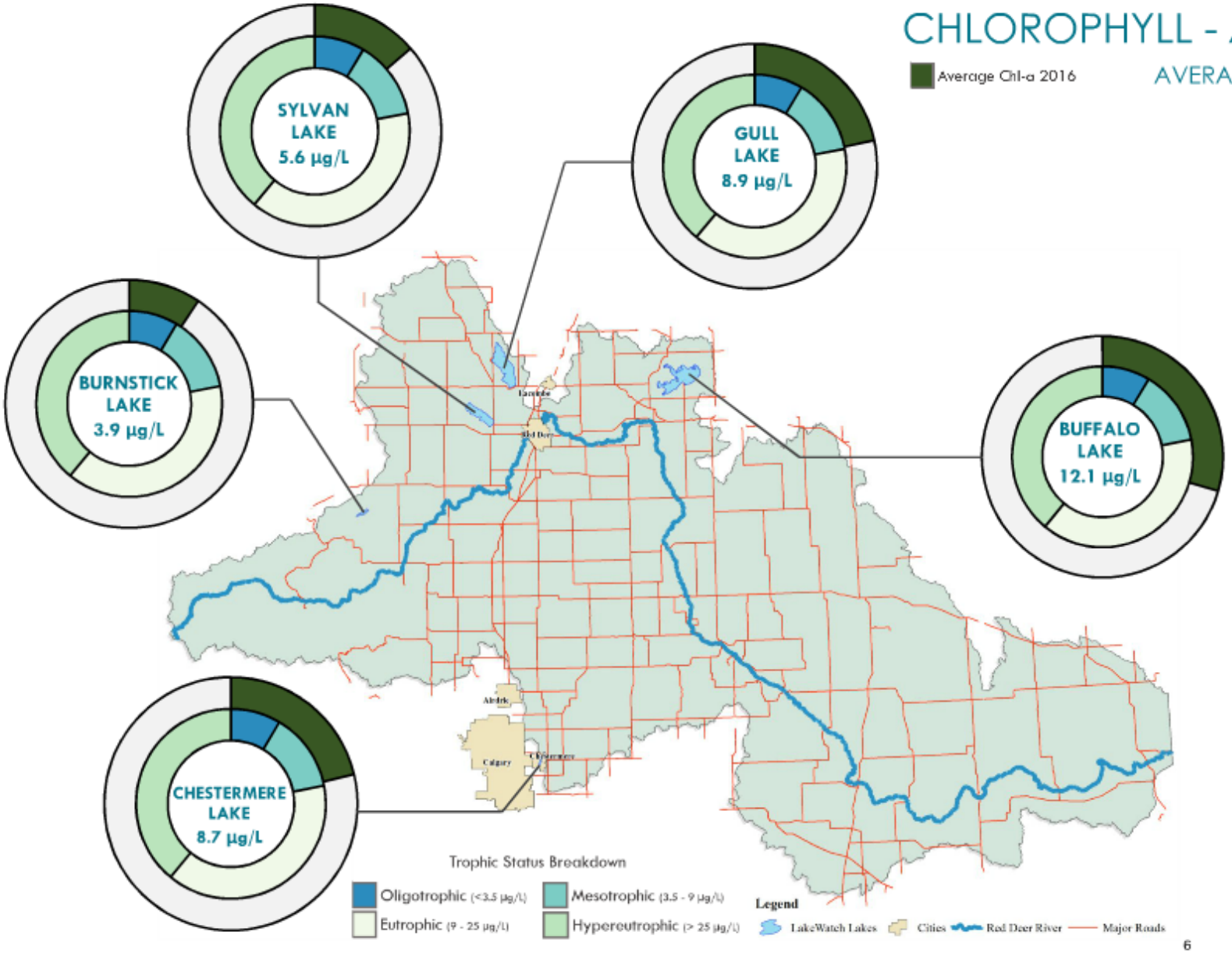
CHESTERMERE LAKE

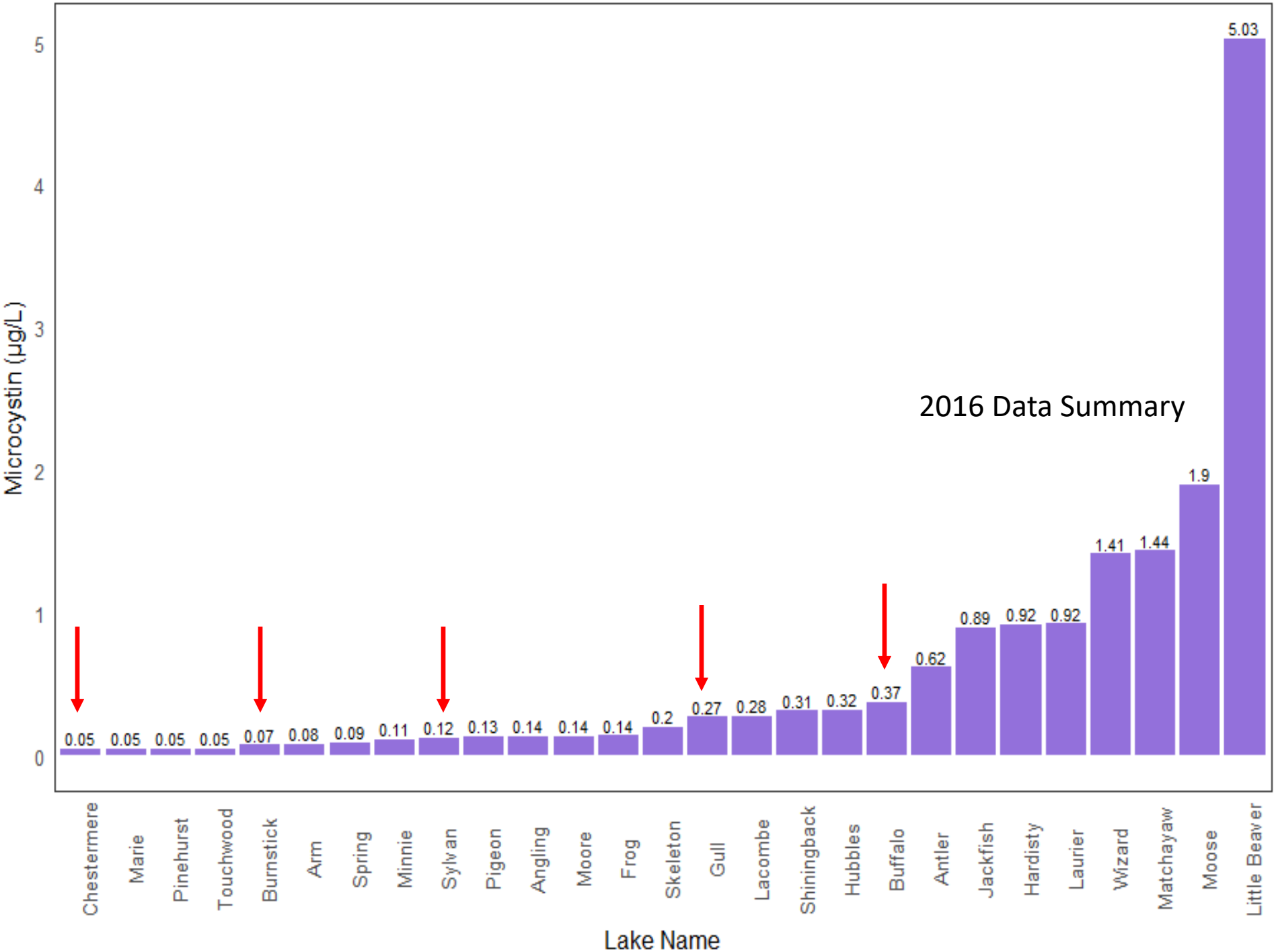


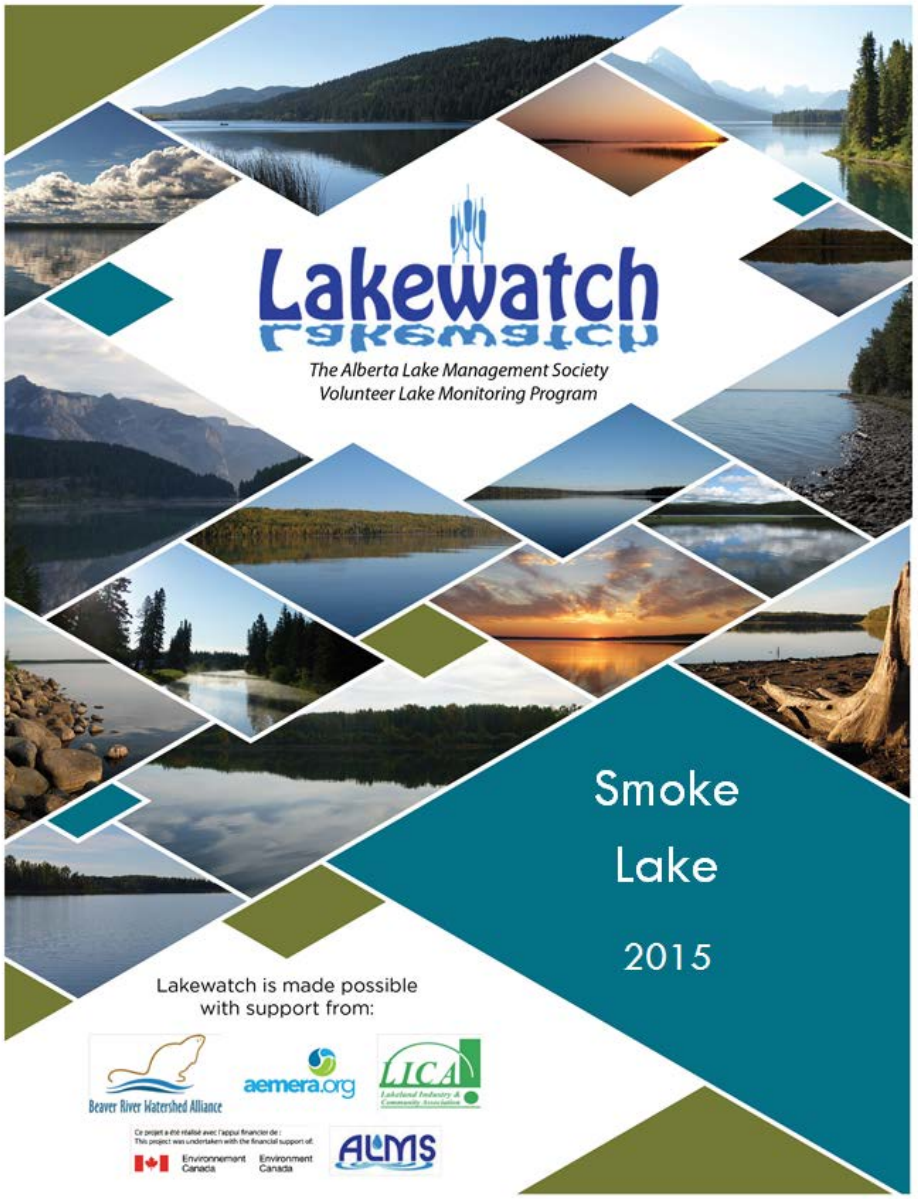
CHLOROPHYLL - A

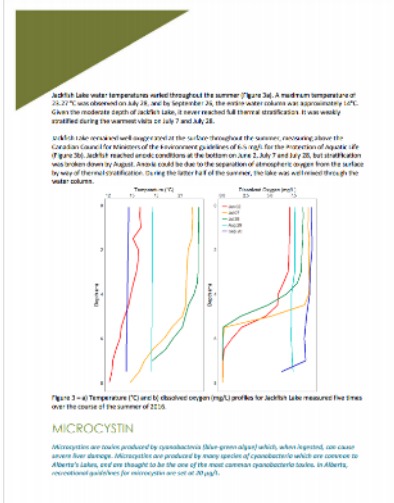
Average Chl-a 2016

AVERAGE




2016 Data Summary
Microcystin (µg/L)
0
1
2
3
4
5
0.05
0.05
0.05
0.05
0.07
0.08
0.09
0.11
0.12
0.13
0.14
0.14
0.14
0.2
0.27
0.28
0.31
0.32
0.37
0.62
0.89
0.92
0.92
1.41
1.44
1.9
5.03
Chestermere
Marie
Pinehurst
Touchwood
Burnstick
Arm
Spring
Minnie
Sylvan
Pigeon
Angling
Moore
Frog
Skeleton
Gull
Lacombe
Shiningback
Hubbles
Buffalo
Antler
Jackfish
Hardisty
Laurier
Wizard
Matchayaw
Moose
Little Beaver
Lake Name





Jackfish Lake water temperatures varied throughout the summer (Figure 3a). A maximum temperature of 24.27 °C was observed on July 28, and by September 26, the entire water column was approximately 10°C. Given the moderate depth of Jackfish Lake, it never reached full thermal stratification. It was weakly stratified during the warmest visits on July 7 and July 28.

Jackfish Lake remained well oxygenated at the surface throughout the summer, meaning above the Canadian Council for Ministers of the Environment guideline of 6.5 mg/L for the protection of aquatic life (Figure 3b). Jackfish reached anoxic conditions at the bottom on June 2, July 7 and July 28, but stratification was broken down by August. Anoxia could be due to the separation of atmospheric oxygen from the surface by way of thermal stratification. During the latter half of the summer, the lake was well mixed through the water column.

Figure 3 – a) Temperature (°C) and b) dissolved oxygen (mg/L) profiles for Jackfish Lake measured five times over the course of the summer of 2016.

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 microcystins are set at 20 µg/L.

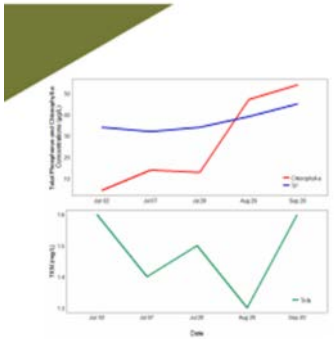
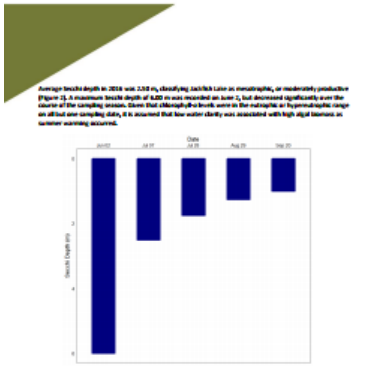


Figure 1 – Total Phosphorus (TP), Total Kjeldahl Nitrogen (TKN), and Chlorophyll-a concentrations measured five times over the course of the summer at Jackfish Lake.

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.

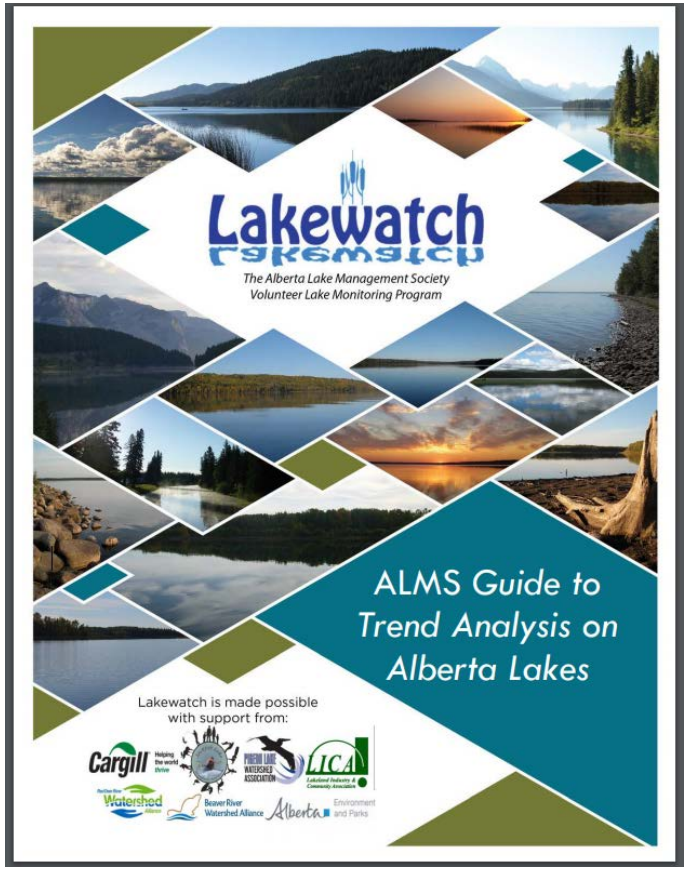


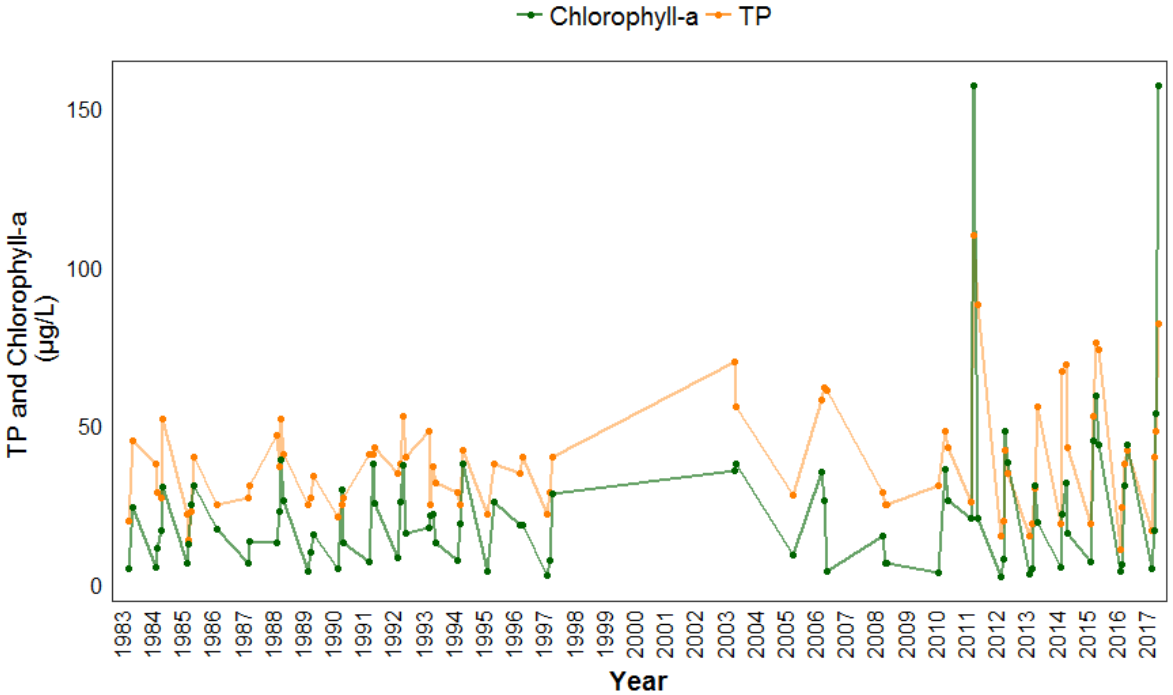
Average Secchi depth in 2016 was 2.52 m, classifying Jackfish Lake as mesotrophic, or moderately productive (Figure 2). A maximum Secchi depth of 4.20 m was recorded on June 2, but decreased significantly over the course of the sampling season. Given that chlorophyll-a levels were in the eutrophic or hypereutrophic range on all but one sampling date, it is assumed that low water clarity was associated with high algal biomass in summer warming months.

Figure 2 – Secchi depth values measured five times over the course of the summer at Jackfish Lake in 2016.

WATER TEMPERATURE AND DISSOLVED OXYGEN

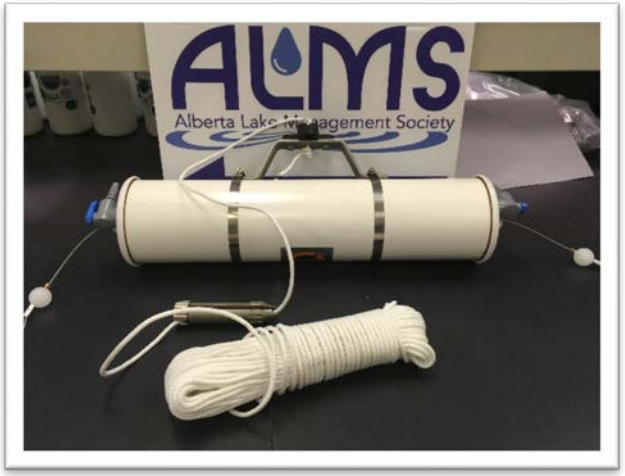
Water temperature and dissolved oxygen profiles in the water column can provide information on water quality and fish habitat. The depth of the thermocline is important in determining the depth to which dissolved oxygen from the surface can be mixed. Please refer to the end of this report for descriptions of technical terms.


Lakewatch
The Alberta Lake Management Society
Volunteer Lake Monitoring Program
ALMS Guide to Trend Analysis on Alberta Lakes
Lakewatch is made possible with support from:
Cargill
LICA
Beaver River Watershed Alliance
Alberta Environment and Parks


Chlorophyll-a
TP
TP and Chlorophyll-a (µg/L)
0
50
100
150
1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
Year

TDS (mg/L)
160
180
200
1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
Year

This project supported with funding from



LakeKeepers

LakeKeepers

Snipe Lake

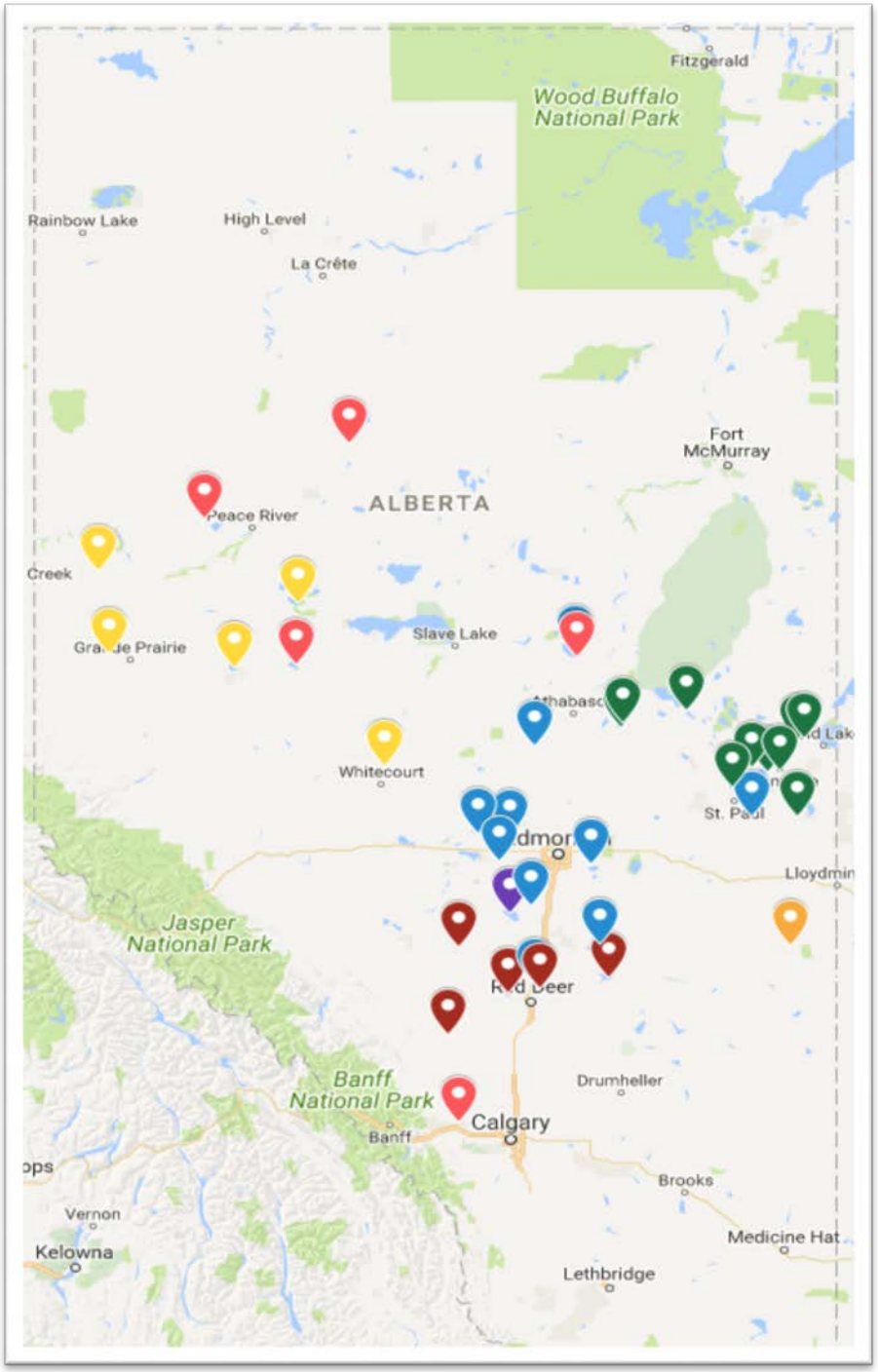
Haig Lake

Figure 8 Lake

Calling Lake

Ghost Reservoir

Under Ice Monitoring?



LakeKeepers

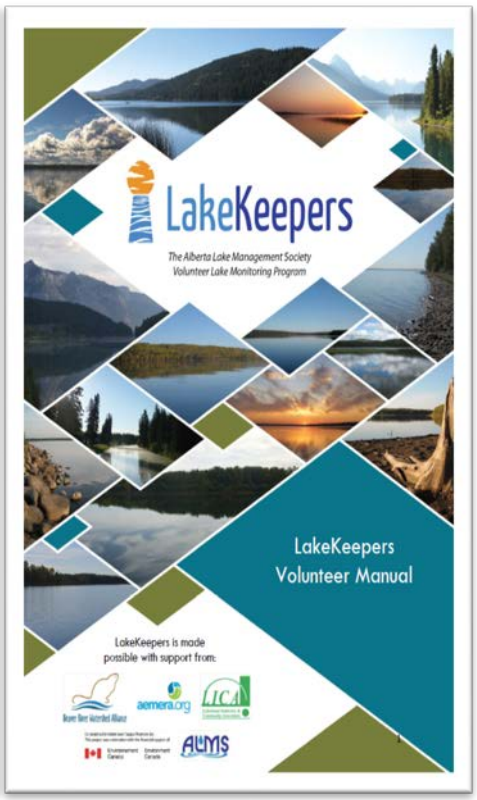
This project supported with funding from

alberta ecotrust

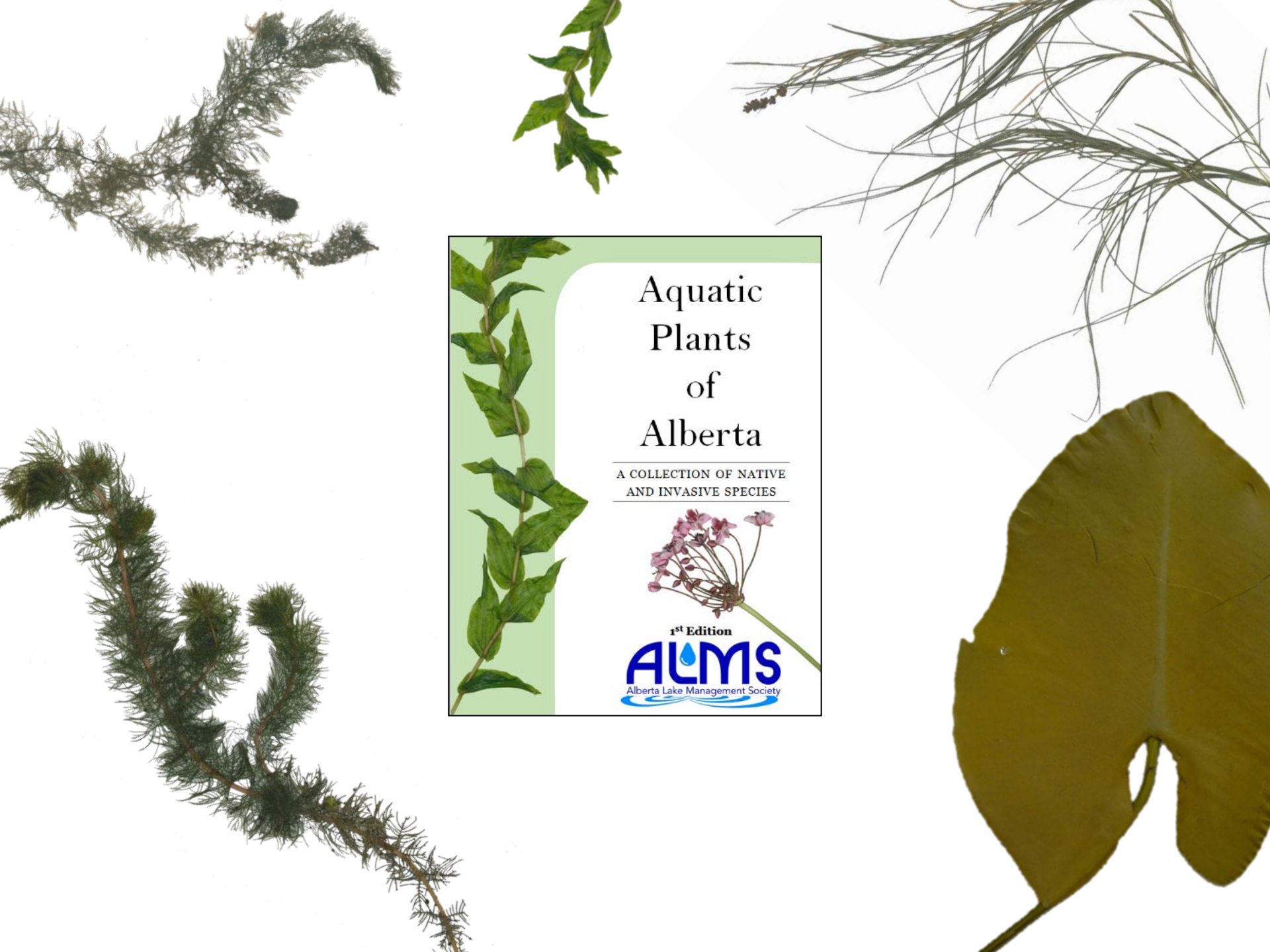
EQUIPMENT

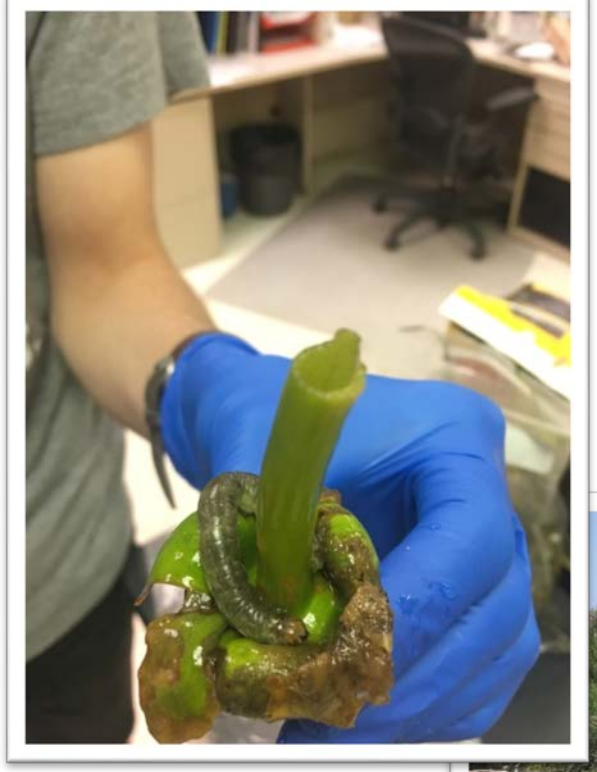
VOLUNTEERS

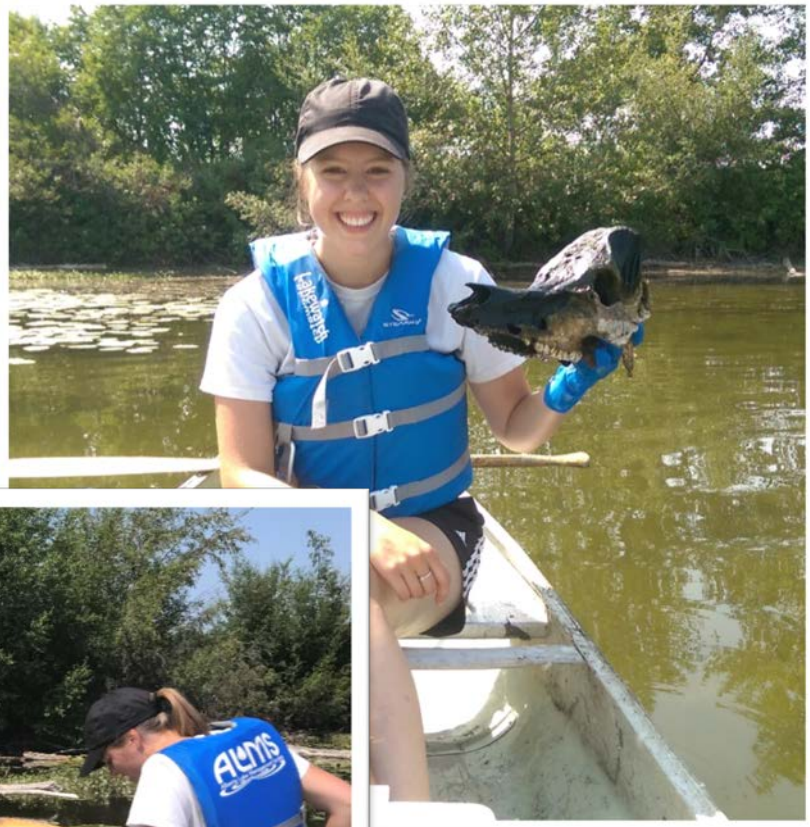
LAB ANALYSIS



REPORTING


Aquatic
Plants
of
Alberta
A COLLECTION OF NATIVE
AND INVASIVE SPECIES
1st Edition
ALMS
Alberta Lake Management Society



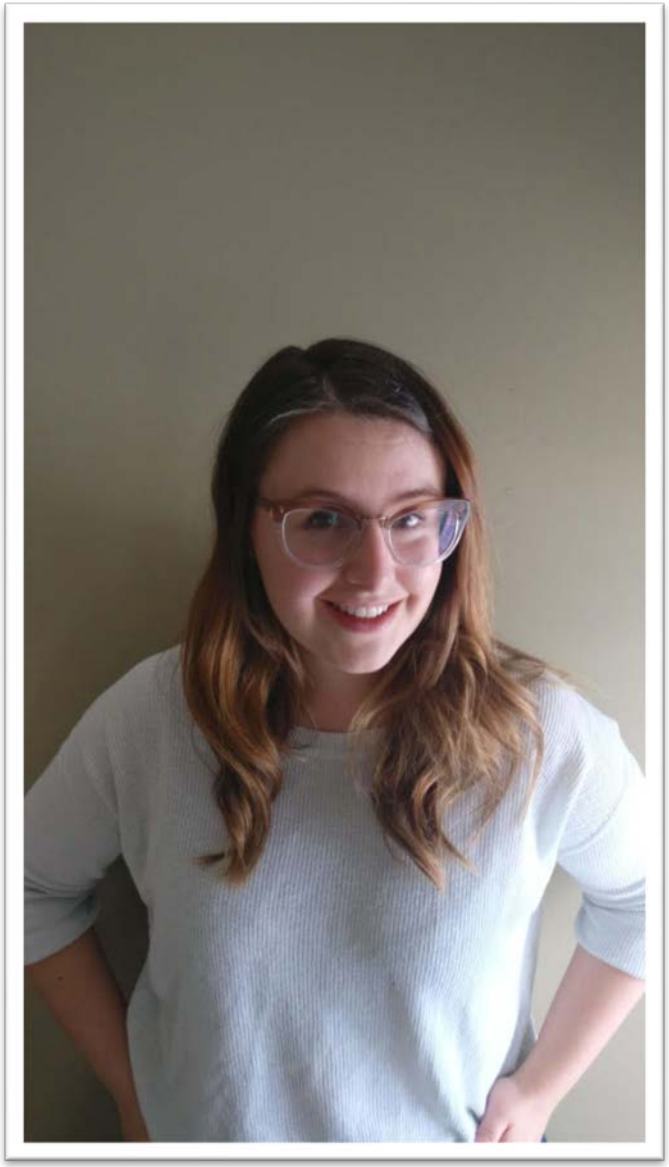


Culvert Monitoring at Little Beaver Lake

Alberta Lake Management Society

November 2018 AGM

"Development, Implementation, and Assessment of qPCR Field Diagnostic Methodologies within a Citizen Science Framework for Monitoring Biological Hazards in Recreational Water"



Sydney Rudko

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