

## 2020 Lake Partner Program Results Total Phosphorus, Secchi Depth and Calcium

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### Why measure phosphorus levels in lake water?

Phosphorus is regarded as the chemical that is most responsible for increased plant and algal growth in freshwater lakes. Sources of phosphorus include shoreline erosion, fertilizers, wildlife, septic systems, sewage treatment plants and pets. Limited fertilizer use and a well-vegetated shoreline are good ways to limit your phosphorus input and keep our lakes clear. The Ontario Ministry of the Environment, Conservation and Parks issued the following guidelines for total phosphorus in our lakes:

- To avoid nuisance concentrations of algae in lakes, average total phosphorus concentrations for the ice-free period should not exceed 20 µg/L (equal to 20 parts per billion, ppb).
- A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 10 µg/L or less.

### 2020 Lake Partner Program Results

2020, KLSA's twentieth year of water quality testing, was like no other. Due to the COVID-19 pandemic, the Dorset Environmental Sciences Centre (DESC) was closed in March 2020 and the Lake Partner Program (LPP) was temporarily suspended. However, the notice of the suspension was issued by the Federation of Ontario Cottagers' Associations (FOCA) and not directly to LPP volunteer testers. Volunteers who did not hear about the suspension continued to collect samples and send them in. These samples were received and analysed by LPP. The suspension was lifted late in 2020 and volunteers were asked by LPP to collect an October sample and to send in any Secchi measurements that may have been collected during the year. Because of these circumstances, the 2020 Total Phosphorus, Secchi Depth and Calcium data sets for the Kawartha Lakes are much smaller than usual.

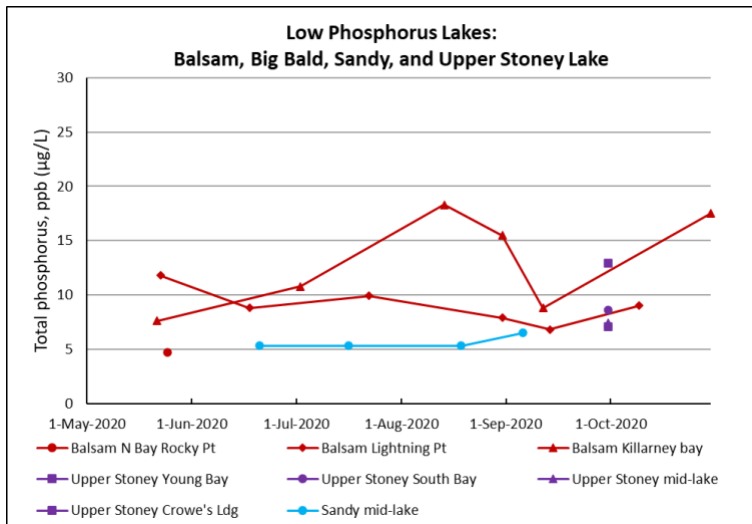
Thank you to all our volunteer testers who were able to collect samples and measurements in 2020. The LPP program has been fully reinstated in 2021 and we encourage all LPP volunteers to continue testing to extend the value of these long-term data sets. If you are unable to continue testing, please let any director in KLSA know, so we can help you find a replacement. The program is free, and kits are mailed to you along with instructions. We have fairly complete coverage of the Kawartha Lakes, but many volunteers would welcome an assistant. **Also, we are looking for a tester for south Sturgeon Lake and for the middle of Chemong Lake. Please let us know if you are interested.**

In 2020, total phosphorus (TP) was measured at 20 sites on 11 lakes, most only in October but at 7 of the sites, four to six times samples were collected between May and October. Samples were analyzed by the Ministry of the Environment, Conservation and Parks' Lake Partner Program. The TP data for hundreds of LPP sites on Ontario lakes can be found on the Federation of Ontario Cottagers' Associations (FOCA) website or in the Province of Ontario's Data Catalogue.

2020 started with a snowy January, but moderate temperatures and little snow through the rest of the winter resulted in an early and modest spring flood. A wet May was followed by a very dry, hot June resulting in higher-than-normal lake water temperatures. Due to COVID-19 pandemic restrictions, the Trent-Severn Waterway remained closed and fewer people visited our lakes. How did these factors affect Total Phosphorus concentrations in our lakes in 2020 compared to previous years? We wish we could tell you, but unfortunately there is not enough data to allow meaningful comparisons to be made as in past years.

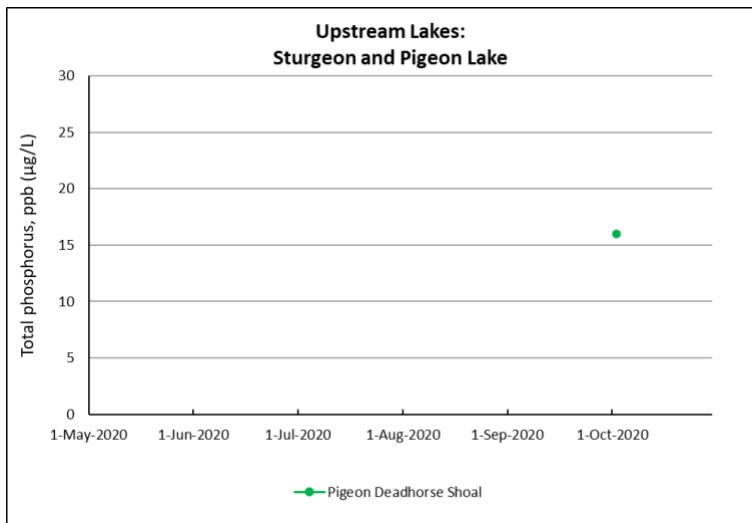
### Lake to Lake Phosphorus Results

The complete tables of TP measurements, Secchi depths and Calcium levels are presented in Appendix F. In general, the results were similar to results from previous years. For consistency with past years, we present the results in graphical form grouped by the type of lake, Low Phosphorus Lakes, Upstream Lakes, Midstream Lakes and Downstream Lakes.



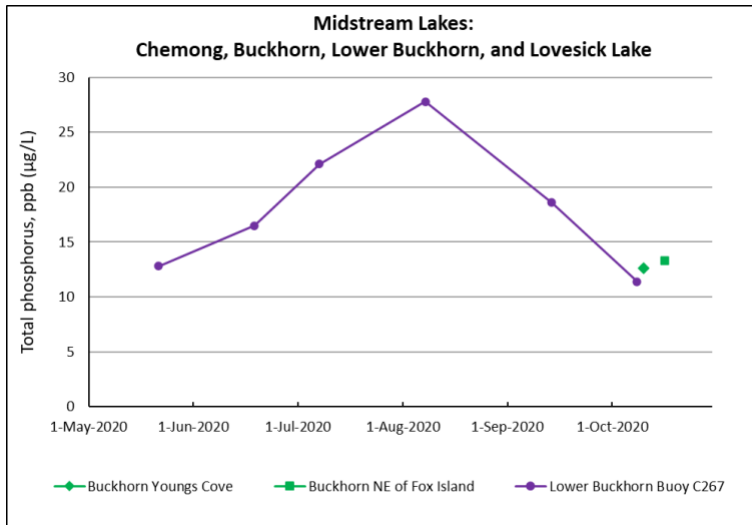
### Low Phosphorus Lakes

The low phosphorus lakes traditionally have low, stable TP levels, being fed with low phosphorus water from the north. The high readings in 2020 at Balsam Lake's South Bay/Killarney Bay site are unusual.



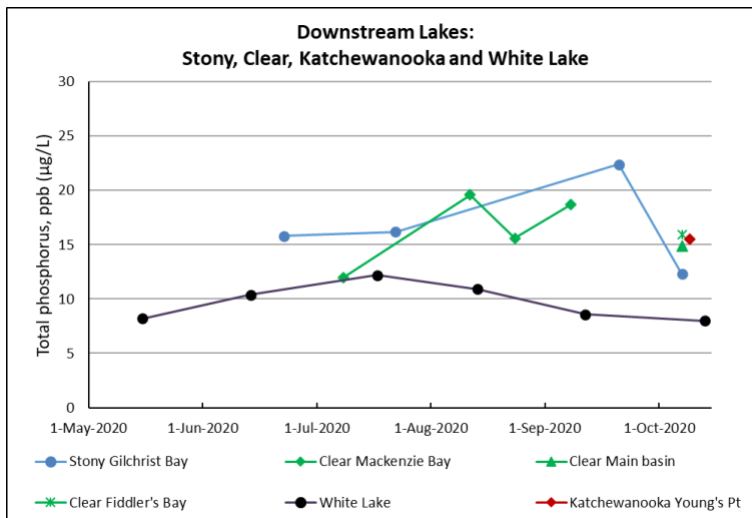
### Upstream Lakes

Sturgeon Lake receives low-phosphorus water from the Fenelon River to the north and high phosphorus water from the Scugog River to the south. Pigeon Lake receives water from Sturgeon Lake moderated by lesser inflows from the Bald Lakes and Nogies Creek to the north and the Pigeon River to the south. Only one site was measured once in October on these lakes in 2020.



### Midstream Lakes

Of ten sites usually measured on these lakes, only one was sampled throughout 2020 and two more in October only.



### Downstream Lakes

Higher phosphorus water flowing into Stony Lake from the midstream lakes is diluted with low phosphorus water from Upper Stony Lake resulting in moderate levels of phosphorus in Clear and Katchewanooka Lakes. White Lake receives water from Stony Lake's Gilchrist Bay via the Indian River. However, its phosphorus levels are generally lower than Stony Lake, believed to be due to the presence of springs in White Lake.

## Appendix F: 2020 Phosphorus, Secchi Depth and Calcium Data

### Total Phosphorus (TP) Measurements

In 2020 volunteers tested 20 sites in 11 Kawartha lakes. Results are listed below. A number of TP measurements are in bold type. These were considered outliers and were not used to calculate the TP average.

STN	Site ID	Lake Name	Site Description	Date	TP1 (µg/L)	TP2 (µg/L)	Avg.TP (µg/L)
6902	2	BALSAM LAKE	N Bay Rocky Pt.	25-May-20	3.6	5.8	4.7
6902	5	BALSAM LAKE	NE end-Lightning Pt	23-May-20	11.4	12.2	11.8
6902	5	BALSAM LAKE	NE end-Lightning Pt	18-Jun-20	8.4	9.2	8.8
6902	5	BALSAM LAKE	NE end-Lightning Pt	23-Jul-20	9.8	10.0	9.9
6902	5	BALSAM LAKE	NE end-Lightning Pt	31-Aug-20	7.4	8.4	7.9
6902	5	BALSAM LAKE	NE end-Lightning Pt	14-Sep-20	6.8	6.8	6.8
6902	5	BALSAM LAKE	NE end-Lightning Pt	10-Oct-20	10.4	7.6	9.0
6902	7	BALSAM LAKE	South B-Killarney B	22-May-20	8.2	7.0	7.6
6902	7	BALSAM LAKE	South B-Killarney B	03-Jul-20	<b>56.8</b>	10.8	10.8
6902	7	BALSAM LAKE	South B-Killarney B	14-Aug-20	18.6	18.0	18.3
6902	7	BALSAM LAKE	South B-Killarney B	31-Aug-20	16.6	14.4	15.5
6902	7	BALSAM LAKE	South B-Killarney B	12-Sep-20	9.4	8.2	8.8
6902	7	BALSAM LAKE	South B-Killarney B	31-Oct-20	19.2	15.8	17.5
363	1	BIG CEDAR LAKE	Mid Lake, deep spot	06-Oct-20	7.2	7.0	7.1
7131	9	BUCKHORN LAKE (U)	Young's Cove, Deep Spot	11-Oct-20	12.2	13.0	12.6
7131	10	BUCKHORN LAKE (U)	NE of Fox Is	17-Oct-20	9.8	16.8	13.3
6955	1	CLEAR LAKE	Mackenzie Bay	09-Jul-20	11.4	12.6	12.0
6955	1	CLEAR LAKE	Mackenzie Bay	12-Aug-20	18.8	20.4	19.6
6955	1	CLEAR LAKE	Mackenzie Bay	24-Aug-20	15.4	15.8	15.6
6955	1	CLEAR LAKE	Mackenzie Bay	08-Sep-20	21.0	16.4	18.7
6955	2	CLEAR LAKE	Main Basin-deep spot	08-Oct-20	15.2	14.6	14.9
6955	3	CLEAR LAKE	Fiddlers Bay	08-Oct-20	16.2	15.6	15.9
7076	2	KATCHEWANOOKA LAKE	Young Pt near locks	10-Oct-20	15.8	15.2	15.5
6990	4	LOWER BUCKHORN LAKE	Deer Bay W-Buoy C267	22-May-20	14.2	11.4	12.8
6990	4	LOWER BUCKHORN LAKE	Deer Bay W-Buoy C267	19-Jun-20	16.8	16.2	16.5
6990	4	LOWER BUCKHORN LAKE	Deer Bay W-Buoy C267	08-Jul-20	22.4	21.8	22.1
6990	4	LOWER BUCKHORN LAKE	Deer Bay W-Buoy C267	08-Aug-20	27.2	28.4	27.8
6990	4	LOWER BUCKHORN LAKE	Deer Bay W-Buoy C267	14-Sep-20	19.4	17.8	18.6
6990	4	LOWER BUCKHORN LAKE	Deer Bay W-Buoy C267	09-Oct-20	11.2	11.6	11.4
6919	15	PIGEON LAKE	C340-DeadHorseSho	03-Oct-20	16.0	<b>39.4</b>	16.0
7241	2	SANDY LAKE	Mid Lake, deep spot	21-Jun-20	5.2	5.4	5.3
7241	2	SANDY LAKE	Mid Lake, deep spot	17-Jul-20	5.2	5.4	5.3
7241	2	SANDY LAKE	Mid Lake, deep spot	19-Aug-20	5.2	5.4	5.3
7241	2	SANDY LAKE	Mid Lake, deep spot	06-Sep-20	6.2	6.8	6.5
7133	6	STONY LAKE	Gilchrist Bay	23-Jun-20	<b>21.4</b>	15.8	15.8
7133	6	STONY LAKE	Gilchrist Bay	23-Jul-20	16.8	15.6	16.2
7133	6	STONY LAKE	Gilchrist Bay	21-Sep-20	<b>87.2</b>	22.4	22.8

STN	Site ID	Lake Name	Site Description	Date	TP1 (µg/L)	TP2 (µg/L)	Avg.TP (µg/L)
7133	6	STONY LAKE	Gilchrist Bay	08-Oct-20	13.2	11.4	12.3
5178	1	UPPER STONEY LAKE	Quarry Bay	01-Oct-20	<b>30.6</b>	<b>44.8</b>	-
5178	3	UPPER STONEY LAKE	Young Bay	01-Oct-20	6.6	7.6	7.1
5178	4	UPPER STONEY LAKE	S Bay, deep spot	01-Oct-20	9.4	7.8	8.6
5178	5	UPPER STONEY LAKE	Crowes Landing	01-Oct-20	7.0	7.8	7.4
5178	6	UPPER STONEY LAKE	Mid Lake, deep spot	01-Oct-20	<b>16.6</b>	9.2	9.2
6963	1	WHITE LAKE (DUMMER)	S end, deep spot	20-May-20	7.6	7.2	7.4
6963	1	WHITE LAKE (DUMMER)	S end, deep spot	15-Jun-20	10.6	10.4	10.5
6963	1	WHITE LAKE (DUMMER)	S end, deep spot	17-Jul-20	17.8	15.4	16.6
6963	1	WHITE LAKE (DUMMER)	S end, deep spot	14-Aug-20	11.0	11.2	11.1
6963	1	WHITE LAKE (DUMMER)	S end, deep spot	16-Sep-20	8.6	8.8	8.7

## 2020 Secchi Depth and Calcium Measurements

Named after its inventor, Angelo Secchi, a Secchi disk is a device for measuring water clarity. It is a weighted disc 20cm in diameter with alternate black and white quadrants. When lowered into a lake, the depth at which the disc can no longer be seen (the black and white quadrants cannot be distinguished) is called the Secchi depth. The deeper the Secchi depth, the clearer the water. Basic water clarity can be affected by the amount of sediments or Dissolved Organic Matter (DOM) that the water contains. Seasonal variation of water clarity is usually related to the amount of algae it contains resulting in spring and fall Secchi Depths being greater than mid-summer values. The Lake Partner Program (LPP) asks volunteers to measure the Secchi Depth every two weeks between early May to early October. Since 2018, LPP have averaged the Secchi Depths and only provide the seasonal average which is presented here.

Calcium is a nutrient that is required by all living organisms. Aquatic species from zooplankton to crayfish depend on extracting calcium from lake water in order to grow. Levels of calcium below 2.5 mg/L can threaten the survival of many aquatic species. Calcium in lake water is derived from mineral weathering of rocks and atmospheric deposition of calcium-rich dust. Many Ontario lakes on the Precambrian Shield have been found to have very low calcium levels believed to be due to the low rate of weathering of hard, low calcium content rocks and the removal of calcium from the watershed by forest harvesting. As a result, since 2008 the LPP has been measuring the calcium concentration of some lake water samples for all lakes tested for Total Phosphorus. The average calcium measurement for each site in 2020 is provided in the table below. As shown in the table, the Kawartha Lakes do not have a calcium deficiency. The limestone bedrock and calcareous soils to the south of the lakes provide more than enough calcium to sustain the aquatic life in our lakes.

STN	Site ID	Lake	Site Description	Date	Secchi Depth (m)	Calcium (mg/L)
6902	2	BALSAM LAKE	N Bay Rocky Pt.	2020 Avg.	-	21.5
6902	5	BALSAM LAKE	NE end-Lightning Pt	2020 Avg.	4.5	10.1
6902	7	BALSAM LAKE	South B-Killarney B	2020 Avg.	4.2	19.9
363	1	BIG CEDAR LAKE	Mid Lake, deep spot	2020 Avg.	5.6	28.4
7131	9	BUCKHORN LAKE (U)	Young's Cove, deep spot	2020 Avg.	-	29.5
7131	10	BUCKHORN LAKE (U)	NE of Fox Is	2020 Avg.	3.6	30.2
6955	1	CLEAR LAKE	Mackenzie Bay	2020 Avg.	3.6	31.3
6955	2	CLEAR LAKE	Main Basin-deep spot	2020 Avg.	4.0	27.9
6955	3	CLEAR LAKE	Fiddlers Bay	2020 Avg.	3.5	28.0
7075	2	JULIAN LAKE	Mid Lake, deep spot	2020 Avg.	5.6	-
7076	2	KATCHEWANOOKA	Young Pt near locks	2020 Avg.	5.7	27.9
6990	4	LOWER BUCKHORN	Deer Bay W-Buoy C267	2020 Avg.	3.9	31.9
6990	7	LOWER BUCKHORN	Lower Deer Bay, Mid-deep	2020 Avg.	2.0	-
6990	8	LOWER BUCKHORN	Main basin, deep spot	2020 Avg.	2.3	-
6919	15	PIGEON LAKE	C340-Dead Horse Shoal	2020 Avg.	3.1	26.9
7241	2	SANDY LAKE	Main basin, deep spot	2020 Avg.	4.6	41.6
7133	6	STONY LAKE	Gilchrist Bay	2020 Avg.	3.0	30.4
5178	1	UPPER STONEY LAKE	Quarry Bay	2020 Avg.	6.2	25.4
5178	3	UPPER STONEY LAKE	Young Bay	2020 Avg.	7.2	26.7

<b>STN</b>	<b>Site ID</b>	<b>Lake</b>	<b>Site Description</b>	<b>Date</b>	<b>Secchi Depth (m)</b>	<b>Calcium (mg/L)</b>
5178	4	UPPER STONEY LAKE	S Bay, deep spot	2020 Avg.	-	25.7
5178	5	UPPER STONEY LAKE	Crowes Landing	2020 Avg.	6.9	23.9
5178	6	UPPER STONEY LAKE	Mid Lake, deep spot	2020 Avg.	6.9	24.5
6963	1	WHITE LAKE	S end, deep spot	2020 Avg.	-	32.5