Hutchinson
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Memorandum

Date: **February 25, 2019**

To: **Dominique O'Brien, Manager of Community Services, Seguin Township**

From: **Kris Hadley, Christine Geiger and Neil Hutchinson**

Re: **J100033 – 2018 Water Quality Monitoring Summary**

In 2018, Seguin Township completed the eleventh year of sampling for its Water Quality Monitoring Program. This program collects total phosphorus (TP) concentration data and other pertinent lake information (e.g., Secchi depth, dissolved oxygen concentration, lake depth, dissolved organic carbon, and major ion concentrations) in support of the water quality model developed to predict phosphorus concentrations in the Township[1]. Continued monitoring will also allow the Township to identify any changes in lake water quality as they emerge.

Monitoring in 2018 was conducted by summer students employed by Seguin Township. HESL staff provided sampling instructions which consisted of two half day training session in the spring and fall and ongoing technical guidance, and assisted coordination with the laboratory at Dorset Environmental Science Centre (DESC). From May 17th to June 17th, 2018, duplicate water samples were collected from 45 lakes for analysis of spring overturn TP concentration and in August 23 of those lakes were revisited to measure dissolved oxygen and temperature profiles, Secchi depth and lake depth.

Spring total phosphorus data are also collected by volunteers for several of the lakes in the Township under the province's Lake Partner Program (LPP) using the same sampling protocols as Seguin's program and analyzed at DESC. As with previous years, available LPP total phosphorus data collected since 2002 were compiled, reviewed and added to the Seguin data set to provide more data for more lakes and years. Combined, these two monitoring programs provide spring overturn total phosphorus data for 88 of the 129 lakes in Seguin Township that have a surface area of at least 10 ha. The LPP data for 2016 have been incorporated, however, 2017 and 2018 data have not yet been posted by the LPP. These data will be reviewed and included in future updates to the total phosphorus summaries.

The major findings from the 2018 Seguin monitoring and the results of the combined data from Seguin's monitoring program and the LPP are summarized below, and recommendations are provided for future sampling.

[1] *Hutchinson Environmental Sciences, Ltd., 2016.* Review, Update and Refinement of Seguin Township's Water Quality Model (SWQM) and Phosphorus Management Approach. *Final report prepared for Seguin Township. January 2016. 67pp*

1. Spring Total Phosphorus

1.1 Data Screening

Water samples for analysis of total phosphorus are taken into duplicate laboratory-provided glass tubes. Contamination of samples can occur during sample collection which can produce elevated TP concentrations and 'bad splits' between the field duplicates. Even with careful sampling, bad splits occur in approximately 10% of sample submissions to DESC (pers. comm., Bev Clark, MOECP retired). All sample pairs that differed by more than a) 40% from the minimum of the two values, and b) 4 μg/L, were therefore flagged and the higher of the two values was removed, assuming contamination.

There were two bad splits (4%) identified in the 45 samples collected by Seguin Township in 2018 (Table 1). This represents continued good sampling practices as the percentage of bad splits has remained below 10% since 2012. Samples collected by the LPP also demonstrated good sampling practice with only 5.1% of samples with bad splits. We recommend continued vigilance in following sampling protocol when collecting water samples to maintain the good record of minimum sample contamination.

Table 1. Bad Splits between Duplicate Samples Collected by the Seguin Township Monitoring Program (ST) and the Lake Partner Program (LPP) for Seguin Township Lakes

Year	# of Bad Splits (>40% and >4 μg/L difference between sample pairs)	Total # of Samples	% Bad Splits
2008 (ST)	3	25	12
2009 (ST)	7	37	19
2010 (ST)	4	36	11
2011 (ST)	8	47	17
2012 (ST)	4	50	8
2013 (ST)	1	53	2
2014 (ST)	1	46	2
2015 (ST)	0	40	0
2016 (ST)	1	49	2
2017 (ST)	0	50	0
2018 (ST)	2	45	4
ST (08-17)	31	489	6.3
LPP (02-16)	23	455	5.1

Outliers from the data set were identified using the Dixon's Q and Grubbs' outlier tests[2] at a significance level of α = 0.05. Twelve values were identified as outliers in the 2002-2018 data set and were removed from the dataset prior to analysis (Table 2). One previously identified outlier in the data set is no longer considered an outlier with the addition of the 2018 Seguin Township and 2016 LPP data. The value from

[2] For lakes with 3 to 10 years of data, a sample was considered to be an outlier based on both the Dixon and Grubb's test. For lakes with more than 10 years of data, only the Grubb's test was used to identify outliers.

Brush Lake (5.8 µg/L, 2011) was identified as an outlier in 2017, but was not in 2018 and so was incorporated into the updated data set.

Table 2. Outlier Total Phosphorus Values (2002-2018)

Lake	Year	Outlier TP (µg/L)	Mean 2002-2018 TP (µg/L) (outlier excluded)
Armishaw Lake	2018	14.1	5.3
Black Water Lake	2008	16.2	9.7
Cosh Lake	2008	21.0	6.7
Gilbank Lake	2006	13.9	7.4
Lane Lake	2013	10.0	5.1
Little Whitefish Lake	2006	10.1	4.9
Maple Lake	2008	18.2	10.4
McNutt Lake	2008	16.5	8.6
Murdock Lake	2018	68.8	11.2
Oastler Lake	2014	10.8	6.8
Salmon Lake	2002	13.2	5.8
Whitefish Lake	2010	7.4	4.1

1.2 Summary

Mean spring total phosphorus concentrations for the 88 lakes with data from 2002 to 2018 ranged from 3.5 to 14.5 µg/L, with an overall average of 7.4 µg/L (Table 3). Seventy-two (72) of the lakes had spring TP concentrations <=10 µg/L, which provides a high level of protection against aesthetic deterioration due to excessive algal production in lakes (MOE 1994). No new lakes were sampled in 2018.

The MOECP recommends a minimum of two years of spring overturn TP data to be 95% confident of being within 20% of the mean spring concentration of a lake (Clark and Hutchinson 1992). Eighty-one (81) lakes in Seguin Township now meet or exceed the minimum monitoring data requirements to provide reliable estimates of long term, spring total phosphorus concentrations.

Mann Kendall trend analysis was used to determine whether TP concentrations were changing significantly over time (2002-2018) in lakes with at least 10 years of data. Nineteen (19) lakes in the data set met the criteria for trend analysis. Clear Lake displayed a significant but low magnitude increasing trend in TP over time with an increase from 3.1 µg/L in 2003 to 4.3 µg/L in 2017 (an increase of only 0.1 µg/L/year, $p<0.05$; Figure X).

Figure 1. Lakes with Significant Linear Trends in Total Phosphorus Concentrations at Clear Lake

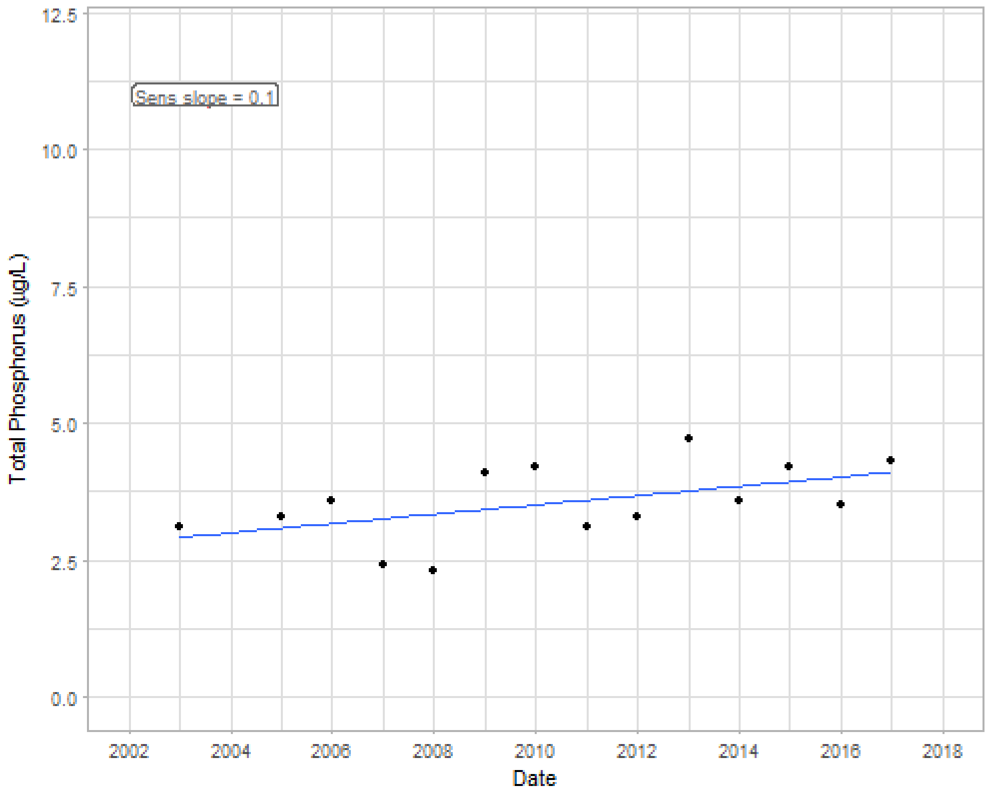

Table 3. Mean Spring Total Phosphorus (TP) Concentrations in Seguin Township Lakes (n=85)

Lake name	TP 2018 (µg/L)	# of Years Sampled (02-18)	Mean TP (02-18) (µg/L)
Anselmi Lake		1	8.9
Armishaw Lake		4	5.3
Baby Lake		8	8.8
Back Lake	7.5	6	8.0
Black Water Lake		8	9.7
Blue Lake	4.0	9	3.9
Brennan Lake		4	9.4
Brush Lake	5.7	4	4.9
Burr Lake		2	6.7
Capton Lake		4	7.1
Carruthers Lake		2	5.7
Clear Lake		14	3.5
Cosh Lake	8.6	6	7.0
Diamond Lake	9.0	7	9.5
Draper Lake		6	7.2
Dyson Lake		8	4.9
Fair Lake	7.4	5	7.1
Faris Lake	5.1	5	4.1
First Lake	12.1	7	7.8
Flaxman Lake	4.6	5	4.5
Forget Lake		6	5.8
Gerow Lake		1	9.1
Gilbank Lake	6.4	10	7.3
Haines Lake	8.6	6	7.9
Home Lake		1	16.9
Hooton Lake	6.2	3	6.0
Horseshoe Lake		16	7.3
Isabella Lake	9.9	17	9.6
Joselin (Burnt) Lake	6.1	16	5.9
Kight Lake	15.0	5	11.1

Lake name	TP 2018 (µg/L)	# of Years Sampled (02-18)	Mean TP (02-18) (µg/L)
Kingshott Lake	9.2	6	9.9
Lane Lake	5.9	5	5.1
Lieback Lake		4	5.4
Linger Long (Napken) Lake	11.0	6	9.2
Lioness Lake	8.7	2	8.9
Little Lake Joseph		6	6.2
Little Otter Lake	8.6	4	6.4
Little Seguin/Duck Lake		12	9.5
Little Whitefish Lake		11	4.9
Long Lake	5.6	5	7.0
Long Lake 1		3	4.3
Lower Fry Lake		6	13.0
Manitouwaba Lake	6.1	15	6.0
Maple Lake	9.1	12	10.4
Martin Lake	6.7	8	6.8
Mcdonald Lake		5	7.8
McGowan Lake	6.7	15	5.2
McKechine Lake	4.4	6	4.0
Mclean Lake	7.6	6	7.4
McNutt Lake	9.2	9	8.7
McTaggart Lake		1	10.9
Mill Lake		1	6.0
Mirror Lake	9.5	6	7.2
Mohan Lake		1	5.4
Murdock Lake		4	11.2
Mutton Lake	10.9	6	10.3
Neville Lake	13.5	6	11.9
Oastler Lake	6.4	14	6.8
Otter Lake	4.5	17	6.1
Pender Lake	6.5	5	5.6
Pickering Lake	14.8	7	13.0

Lake name	TP 2018 (µg/L)	# of Years Sampled (02-18)	Mean TP (02-18) (µg/L)
Portage Lake		8	5.8
Rankin Lake	7.3	16	8.5
Richmond Lake		3	6.3
Roberts Lake		7	7.1
Salmon Lake	4.9	16	5.8
Scime Lake		2	9.3
Scott Lake		5	5.6
Second Lake	12.7	6	11.2
Sovereign Lake	5.8	2	6.2
Star Lake		15	10.0
Storm Lake	8.4	5	6.5
Sucker Lake	5.5	9	6.0
Sugar Lake	6.2	16	6.9
Ten Mile Lake		4	9.5
Third Lake	10.2	5	11.2
Three-Legged Lake		10	5.1
Tiffin Lake/Silver	7.1	7	6.6
Trout Lake		6	4.9
Tub Lake	7.6	5	7.0
Tucker Lake		8	8.1
Turtle Lake		12	8.0
Upper Fry Lake		13	14.5
Virtue Lake		7	3.2
Whitefish Lake		9	4.4
Windfall Lake		5	7.6
Wright Lake		1	6.4
Yarrow Lake	12.3	5	9.2

2. Dissolved Organic Carbon and Major Ions

Water quality samples were collected and analyzed for major ions and dissolved organic carbon during the spring sampling.

Major ion sampling was performed for the second time in the 2018 monitoring campaign. Water samples were collected and submitted to the water chemistry lab at DESC for analysis of calcium and chloride (Table 4). Chloride concentrations were elevated in several of the lakes some of which are in close proximity to a highway or major roads (e.g., Back, First, Haines, Joselin (Burnt), McGowan, McNutt, Oastler, Third, and Silver) suggesting some of these lakes may be impacted by local road treatment, however Second Lake had high chloride concentration despite no nearby major road. Three lakes sampled in 2018 (Back, Joselin (Burnt) and McGowan) were significant outliers from the remainder of the lakes measured for chloride.

Calcium concentrations in 20 Seguin Township lakes have dropped below 2.0 mg/L, a threshold known to potentially effect organisms with high calcium demands, such as crayfish and some zooplankton species (Hadley et al. 2014; Jeziorski et al. 2008). Calcium decline in the Muskoka region is a well studied phenomenon and believed to be a long-term consequence of 20^{th} century acidification coupled with Canadian Shield bedrock which is highly resistant to natural weathering processes which replenish ions such as calcium in soils (Jeziorski et al. 2008).

Past sampling performed for the Township of Seguin has focused on the qualitative assessment of dissolved organic substances by water colour observation, however, beginning in 2017 dissolved organic carbon (DOC) samples were also collected to begin to better quantify DOC and identify lakes in which TP concentrations reflect elevated DOC concentrations. DOC is the dominant factor explaining TP concentrations in Precambrian Shield Lakes and lakes sampled by the District of Muskoka Lake System Health Program show a significant relationship of TP to DOC (HESL 2016). Lakes with high DOC concentration (i.e., >10 mg/L) will have naturally enriched TP concentrations and may not model well because they fall outside the range of DOC in lakes that were used to develop and calibrate the Province's Lakeshore Capacity Model (Ontario, 2010) which was used as the basis of the Seguin Water Quality Model. No lakes sampled in 2018 had DOC concentrations above 10 mg/L (Table 4) but Palmer and Yan (2013) reported that DOC concentrations are increasing in Muskoka area lakes. We recommend continued DOC sampling in the future to inform the modelling and help explain the TP concentrations of other Seguin Township lakes.

Figure 2. Relationship between Dissolved Organic Carbon and Total Phosphorus in the Seguin Lakes

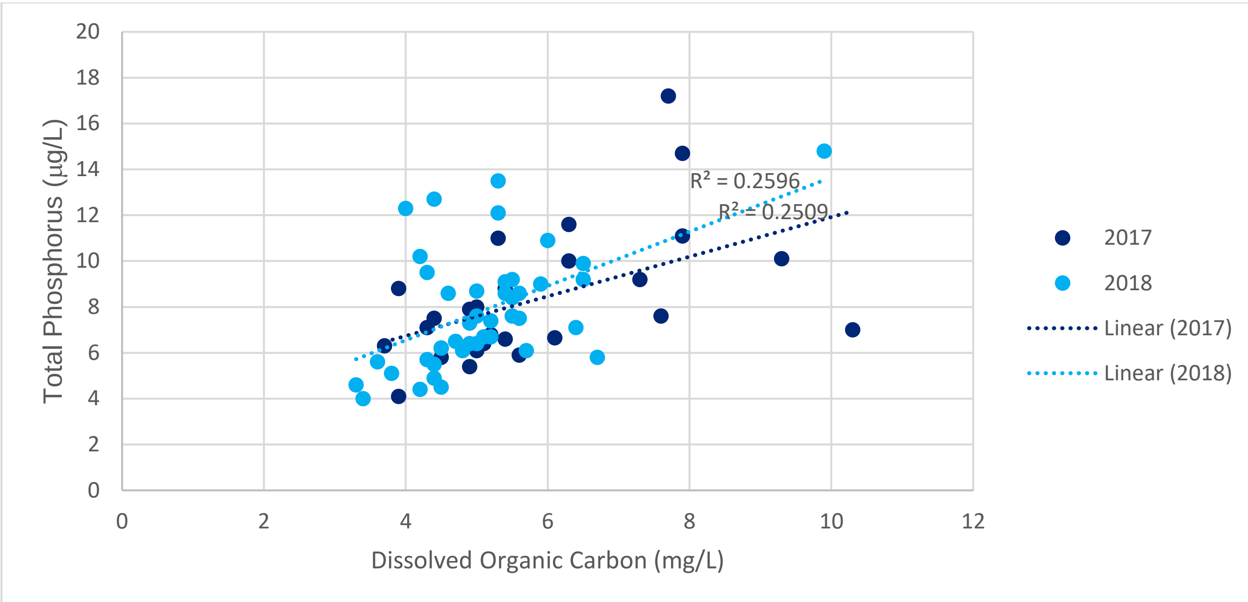

Table 4. Summary of Dissolved Organic Carbon and Major Ion Sampling Conducted in 2018

Lake Name	Dissolved Organic Carbon (mg/L)	Ca (mg/L)	Cl (mg/L)
Armishaw Lake	6.4	2.2	1.3
Back Lake	5.6	6.6	*63.7*
Blue Lake	3.4	1.2	0.3
Brush Lake	4.3	2.0	1.6
Cosh Lake	5.6	2.1	2.0
Diamond Lake	5.9	2.3	4.0
Fair Lake	5.2	1.3	0.4
Faris Lake	3.8	1.3	2.1
First Lake	5.3	5.1	24.6
Flaxman Lake	3.3	1.2	0.2
Gilbank Lake	4.9	3.9	13.3
Haines Lake	5.4	4.3	27.7
Hooton Lake	4.5	2.1	2.7
Isabella Lake	6.5	2.3	3.7
Joselin (Burnt) Lake	4.8	7.7	*60.6*
Kingshott Lake	6.5	1.6	0.5
Lioness Lake	5	1.9	0.4
Little Otter Lake	4.6	4.2	12.1
Long Lake	3.6	1.7	1.2
Manitouwaba Lake	5.7	1.2	0.9
Maple Lake	5.4	2.6	4.7
Martin Lake	5.2	1.5	7.8
McGowan Lake	5.1	23.1	*255.0*
McKechine Lake	4.2	4.2	2.8
McLean Lake	5.5	0.9	0.9
McNutt Lake	5.5	5.1	31.1
Mirror Lake	4.3	6.4	4.7
Murdock Lake	6.6	4.6	2.4
Mutton Lake	6	2.4	4.3
Neville Lake	5.3	1.5	0.9
Oastler Lake	5	5.5	31.4
Otter Lake	4.5	2.3	1.9
Pender Lake	4.7	1.3	0.3

Lake Name	Dissolved Organic Carbon (mg/L)	Ca (mg/L)	Cl (mg/L)
Pickering Lake	9.9	1.5	0.2
Rankin Lake	4.9	5.2	11.2
Salmon Lake	4.4	1.9	2.0
Second Lake	4.4	4.7	27.7
Sovereign Lake	6.7	1.2	0.2
Storm Lake	5.5	1.1	0.2
Sucker Lake	4.4	1.9	3.0
Sugar Lake	4.5	1.9	1.0
Third Lake	4.2	4.5	23.4
Tiffin Lake/Silver	6.4	5.5	27.1
Tub Lake	5	1.0	0.2
Yarrow Lake	4	1.4	0.3
Summary Stats			
Minimum	3.3	0.9	0.2
25th percentile	4.4	1.46	0.85
Median	5	2.1	2.4
75th percentile	5.6	4.5	12.1
Maximum	9.9	23.1	255.0

3. August Field Sampling

Dissolved oxygen and temperature profiles, lake depth, Secchi depth and water colour (qualitative) were monitored (Table 5) at 23 study lakes in August 2018.

Of the lakes monitored, five were shallow and mixed to the bottom. Three lakes were weakly stratified and could potentially mix to the bottom during strong wind events. These lakes have potential for internal phosphorus loading via sediment resuspension and would also have lower rates of phosphorus loss to the sediments due to wind mixing into the water column. Several of the lakes displayed low oxygen concentrations (<2.0 mg/L) within 1 m of the lake bottom.

In 2018, the Seguin Township monitoring program collected samples for total phosphorus from 1 meter above bottom (1mob) to document the potential for phosphorus release from lake sediments (internal loading) in lakes whose dissolved oxygen concentrations fell below 2.0 mg/L (n=8, Table 5). Unfortunately, recording of field protocols did not distinguish the "top" sample from the "bottom" sample on the sample sheets provided to the LPP laboratory. Therefore, it is not possible to state with confidence which samples were collected from the surface and which were collected from the bottom of the lake. We have presented the data here with the highest TP values in each pair as the "bottom" sample, as that is the pattern we would expect, however these data should be interpreted with caution. Based on our assumptions of these data, all of the 8 lakes sampled in fall of 2018 (i.e., Brush Lake, Gilbank Lake, Isabella Lake, Burnt Lake, McGowan Lake, Lioness Lake, Pickering Lake and Sugar Lake) showed higher phosphorus concentrations in the bottom sample. The magnitude of the increase in seven of the 8 lakes was small (3-5X), however, indicating that the increase was more likely related to settling of particulate phosphorus from the surface waters than to internal loading. In addition, sampling was conducted in late August, when there would still be at least 6 weeks in which anoxia and internal loading could develop. Continued top/bottom sampling of Seguin Township lakes is recommended to confirm patterns seen in 2018 and to identify any lakes which may experience internal loading of total phosphorus.

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Table 5. Summary of August 2018 Field Sampling Results.

	Depth (m)	Surface Water Temperature (˚C)	Dissolved Oxygen (mg/L)[1]	Potentially Anoxic Hypolimnion?[2]	Shallow Mixed Water Column?[3]	Total Phosphorus Top (µg/L)	Total Phosphorus Bottom (µg/L)	Secchi Depth (m)	Water Colour
Brush Lake	13.2	26	0.3	Yes	No	4.85	22.44	4.2	Blue/green
Cosh Lake	3.85	26.1	8.05	No	Weakly			3.75	Orange
Fair Lake	10.37	25.8	6.33	No	Yes			3.3	Yellow
Flaxman Lake	16.8	23.5	6.51	No	No			4.4	Green
Gilbank Lake	16.5	25.4	1.65	Yes	No	4.38	20.41	5.47	Yellow/green
Isabella Lake	6.7	26	0.5	Yes	No	8.02	25.11	3.25	Red
Joselin (Burnt) Lake	9.3	26.3	1.67	Yes	No	3.6	19.11	5.3	Yellow/green
Lioness Lake	7.7	23.7	0.02	Yes	No	4.56	45.17	4.8	Yellow
Little Otter Lake	4.3	25.7	7.97	No	Yes			4.3	Green
Manitouwaba Lake	5.15	25.9	8.23	No	Weakly			5.15	Green
Maple Lake	4.8	25.6	7.13	No	Weakly			4.1	Orange
McGowan Lake	11.6	24.7	1.38	Yes	No	4.77	23.39	5.8	Green/yellow
McKechine Lake	5.4	26	8.51	No	Yes			4.25	Green/blue
Mirror Lake	3.8	26.4	6.68	No	Yes			3.6	Green
Oastler Lake	19.5	26.1	5.83	No	No			5.23	Green
Otter Lake	30.3	25.6	4.82	No	No			4.3	Green
Pender Lake	10	23.3	3.18	No	No			3.9	Brown/orange
Pickering Lake	10.37	25.2	0.61	Yes	No	11.1	26.3	2.65	Red
Sucker Lake	16.2	25.7	3.29	No	No			4.6	Green
Sugar Lake	17.6	23.6	1.24	Yes	No	8.38	21.9	2.55	Yellow
Tiffin Lake/Silver	7.86	25.9	8.75	No	No			2.4	Yellow/red
Yarrow Lake	3.1	22.5	8.48	No	Yes			3.1	Orange

[1]depth in brackets is the deepest D.O. measurement; [2]mean hypolimnetic dissolved oxygen concentration <2.0 mg/L; [3]weak stratification refers to lakes that have a thermocline (>1°C change/1 m depth) that extends to the lake bottom.

4. Summary and Recommendations

Although there were errors in recording field data, the 2018 Seguin Water Quality Monitoring Program was a success. Samples were collected for total phosphorus, dissolved oxygen, temperature, Secchi depth, dissolved organic carbon and major ion analysis, providing important data to inform the ongoing assessment of development capacities and aid in the identification of emerging lake health issues in the Township.

The key results of this years monitoring program and recommendations for future sampling are:

- A total of 88 of 129 lakes (68%) in Seguin Township have measured spring total phosphorus concentration data, and 81 of these lakes have at least 2 years of data as of the end of the 2018 sampling season. It is important that Seguin Twp. continue to build this record to inform their lake management program.
- Clear Lake displayed a significant but low-magnitude increasing trend in TP from 3.1 mg/L (in 2003) to 4.3 mg/L.
- August monitoring of dissolved oxygen, temperature, lake depth and Secchi depth was completed for 23 lakes in 2018. These data have been useful to flag shallow lakes and lakes that potentially undergo anoxia for future refinements of the Seguin Water Quality Model and to explain potential error in model predictions. Continued expansion of this database to include additional lakes and to look for changes over time is recommended but should not be considered authoritative as the sampling period ends well before the end of the period of stratification and so does not capture the maximum oxygen stress.
- We recommend that the monitoring program continue with the focus on lakes that have little or no data (‘B’ lakes, Appendix A), and include the collection of top/bottom total phosphorus samples in low oxygen lakes
- 2018 was the second monitoring year which included quantitative analysis of DOC, however the majority of the Seguin Township lakes still have not been sampled for DOC. We recommend continued sampling for dissolved organic carbon to inform future understanding of these lakes and to detect any changes over time. HESL will work with Seguin Township to select the most appropriate lakes for additional sampling.
- Lakes with a shallow mixed water column, high DOC, or potential for anoxic hypolimnia should be identified in future revisions of the Seguin Water Quality Model to explain possible error in model predictions and to adjust the model accordingly.
- It is important to reinforce the need for proper field protocol for sample collection and record keeping among the student crew. We recommend that an orientation “refresher” continue to be conducted for the students prior to the August sampling with additional attention to sample chain of custody and completion of Lake Partner Program Submission Forms.

5. References

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Appendix A. Seguin Township 2019 Lake Sampling Recommendations

Lakes to Sample in 2019	
Anselmi Lake	Long Lake 1
Baby Lake	Lower Fry Lake
Black Water Lake	Mcdonald Lake
Brennan Lake	McTaggart Lake
Burr Lake	Mill Lake
Capton Lake	Mohan Lake
Carruthers Lake	Portage Lake
Clear Lake	Richmond Lake
Draper Lake	Roberts Lake
Dyson Lake	Scime Lake
Forget Lake	Scott Lake
Gerow Lake	Star Lake
Home Lake	Ten Mile Lake
Horseshoe Lake	Three-Legged Lake
Kight Lake	Trout Lake
Lane Lake	Tucker Lake
Lieback Lake	Turtle Lake
Linger Long (Napken) Lake	Upper Fry Lake
Little Lake Joe	Virtue Lake
Little Seguin/Duck Lake	Whitefish Lake
Little Whitefish Lake	Windfall Lake
	Wright Lake

Appendix B. Seguin Township Lake List

Lake Name	2009 Model Lake No.	Watershed Code	Upstream	Accessible?	DOC Sampled?	DOC Priority	'A'	'B'
1	26	GB (end)	0	-				x
2	27	GB (end)	28	-				x
3	1	B (end)	7	-				x
4	100	LJ	0	-				x
5	87	S3	0	-				x
7	89	S3	0	-				x
8	126	OT	0	-				x
9	127	OT	0	-				x
10/Good Lake	95	S6	0	No				x
6/Vinett Lake	88	S3	92	All Marsh				x
Aikman Lake	54	MC	56	Yes				x
Anselmi Lake	101	LJ (end)	0	No				x
Armishaw Lake	102	LJ (end)	0	Yes	x	1	x	
Baby Lake	61	S1	0	Yes	X	4	x	
Back Lake	49	H	0	Yes	x	1	x	
Bennett Lake	28	GB	0	-				x
Black Water Lake	97	S8	0	Yes	X	4	x	
Blue Lake	2	B	0	Yes	x	3	x	
Brennan Lake	15	BS	25	Yes		1	x	
Brush Lake	103	LJ (end)	0	Yes	x			x
Burr Lake	104	LJ	113	Yes				x
Capton Lake	50	H	0	-		1	x	
Carruthers Lake	62	S1	0	Yes				x
Carter Lake	105	LJ (end)	0	-				x
Catfish Lake	29	GB (end)	0	-				x
Clear Lake	63	S1	61	Yes		3	x	
Clear Lake 1	30	GB (end)	0	-				x
Clubbe Lake	106	LJ (end)	0	No				x
Cochrane Lake	51	H	0	Yes				x

Cosh Lake	64	S1	0	Yes	x	1	x	
Dainty Lake	65	S1	0	No				x
Dell Lake	44	H	0	-				x
Diamond Lake	66	S1	0	Yes	x	1	x	
Dick Lake	107	LJ (end)	0	Yes				x
Draper Lake	108	LJ (end)	0	Yes	X	4	x	
Dyson Lake	109	LJ (end)	0	Yes	X	4	x	
Fair Lake	110	LJ (end)	0	Yes	x	1	x	
Faris Lake	67	S1	0	Yes	x	3	x	
First Lake	16	BS	18	Yes	X	4	x	
Flaxman Lake	17	BS	22	Yes	x	3	x	
Forget Lake	31	GB (end)	0	Yes		3	x	
Fume Lake	90	S3	87,88,91	No				x
Gerow Lake	111	LJ (end)	0	Yes				x
Gilbank Lake	68	S1	72b,83	Yes	X	4	x	
Haines Lake	42	H (end)	47,48	Yes	x	1	x	
Hamer Lake	112	LJ	0	Yes				x
Heaslip Lake	32	GB (end)	0	Yes				x
Hines Lake	33	GB (end)	40	-				x
Home Lake	45	H	43	Yes				x
Hooton Lake	55	MC	0	Yes	x			x
Horn Lake	84	S2	0	No				x
Horseshoe Lake (includes Virtue Lake)	18	BS	17,19	Yes	X	4	x	
Hurst Lake	113	LJ	0	No				x
Isabella Lake	60	S (end)	70,85,90,93,94,95,96,97,98	Yes	x	1	x	
Jelso Lake	91	S3	0	No				x
Joselin (Burnt) Lake	34	GB (end)	37	Yes	x		x	
Kight Lake	52	H	0	Yes		1	x	
Kingshott Lake	35	GB	0	Yes	x	1	x	
Krapek Lake	114	LJ to Portage	0	No				x

Lane Lake	43	H	0	Yes	X	4	x	
Lieback Lake	69	S1	0	Yes		1	x	
Linger Long Lake/Napken	3	B	0	Yes	X	4	x	
Lioness Lake	19	BS	15	Yes	x			x
Lipscombe Lake	56	MC	58	No				x
Little Manitouwaga Lake	98	S9	99	No				x
Little Seguin/Duck Lake	70	S1	66,73	Yes		1	x	
Little Whitefish	71	S1	63	Yes	X	4	x	
Long Lake	53	H	0	Yes	x	1	x	
Long Lake 1	72	S1	0	Yes			x	
Loucks Lake	115	LJ (end)	0	No				x
Lovell Lake	4	B	0	Yes				x
Lower Fry Lake	85	S2	86	Yes		1	x	
Manitouwaba Lake	99	S9	0	Yes	x	1	x	
Maple Lake	73	S1	74,78,81	Yes	X	4	x	
Martin Lake	74	S1	62,65,67,75,76,77	Yes	x	1	x	
McCan Lake	116	LJ (end)	0	No				x
McCauley Lake	75	S1	0	No				x
McCoy Lake	57	MC (end)	54,59	No				x
McDonald Lake	5	B	3,6	Yes		1	x	
McGowan Lake	36	GB	0	Yes	x	3	x	
McGruther Lake	46	H	0	-				x
McKechine Lake	37	GB	0	Yes	x	1	x	
McLean Lake	76	S1	0	Yes	x	1	x	
McNutt Lake	47	H	49,50,51,52,53	Yes	x	1	x	
McTaggart Lake	117	LJ	112,121,124	Yes				x
Mirror Lake	118	LJ (end)	0	Yes	X	4	x	

Mohan Lake	77	S1	69	No				x
Motley Lake	119	LJ	104	No				x
Murdock Lake	6	B	0	Yes	x	1	x	
Mutton Lake	78	S1	80	Yes	x	1	x	
Neville Lake	48	H	44,45,46	Yes	X	4	x	
Oak Lake	38	GB (end)	0	No				x
Oastler Lake	7	B	4,5,8	Yes	x	1	x	
One Island Lake	39	GB (end)	0	No				x
Otter Lake	8	B	2,9,10,11, 12,13,14	Yes	X		x	
Payne Lake	40	GB	0	No				x
Pender Lake	20	BS	0	Yes	x	1	x	
Pickering Lake	120	LJ (end)	0	No	x			x
Ponsford Lake	79	S1	0	No				x
Portage Lake	128	LJ (end)	0	Yes	X	4	x	
Rankin Lake	9	B	0	Yes	x		x	
Richmond Lake	41	GB (end)	36	Yes				x
Roberts Lake	121	LJ	0	Yes	X	4	x	
Salmon Lake	10	B	0	Yes	X	4	x	
Santa Lake	96	S7	0	-				x
Scime Lake	11	B	0	Yes			x	
Scott Lake	12	B	0	Yes		3	x	
Second Lake	21	BS	16,24	Yes	x	1	x	
Sovereign Lake	13	B	0	Yes	x			x
Spectacle Lake	22	BS	0	-				x
Star Lake	80	S1	79,82	Yes		1	x	
Storm Lake	94	S5	0	Yes	x	1	x	
Sucker Lake	122	LJ (end)	125	Yes	X		x	
Sugar Lake	81	S1	0	Yes	X	4	x	
Tarver Lake	58	MC	0	No				x
Ten Mile Lake	92	S3	89	Yes		1	x	
Third Lake	23	BS (end)	21	Yes	x	1	x	

Three-Legged Lake	59	MC	55	Yes	X	4	x	
Tiffin/Silver Lake	123	LJ (end)	117	Yes	x		x	
Trout Lake	72.5	S1	72	Yes		3	x	
Tub Lake	93	S4	0	Yes	x	1	x	
Tucker Lake	124	LJ	0	Yes	X	4	x	
Turtle	82	S1	68	Yes	X	4	x	
Upper Fry Lake	86	S2	84	Yes		1	x	
Watson Lake	125	LJ	119	Yes				x
Whitefish Lake	83	S1	71,64	Yes	X	4	x	
Windfall Lake	24	BS	0	Yes		1	x	
Wright Lake	14	B	0	Yes				x
Yarrow Lake	25	BS	20	Yes	x	1	x	

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