Township of/Canton de Tiny

To:	Mayor Evans and Members of Council
From:	Tim Leitch, Director of Public Works Public Works Department
Prepared By:	JF Robitaille, Engineering Manager Public Works Department
Report Number:	PWR-022-25
Meeting Date:	27 Aug 2025
Subject:	**Farlain Lake Water Levels** Our File No: E09/82736/25

Recommendation

THAT Public Works Report PWR-021-25 regarding drainage issues at Farlain be received;

AND THAT Council directs staff to proceed with Option #3, to schedule a public meeting for the concerned citizens with the Township's Drainage Superintendent to inform them of their rights and options for controlling lake levels under the Drainage Act.

Background/Analysis

There have been several calls from residents of Farlain Lake raising concerns about the water levels of the water body and requesting that the Township of Tiny investigate causes and potential control measures.

The issue of high water is a concern for residents as many of the residences were constructed prior to the existence of zoning bylaws and are built fairly close to the shore of the lake. Many septic systems are also within the areas that flood during times of high water, which pollutes the lake.

In terms of municipal infrastructure, high lake levels have some impact on the amount of park space available on Andrew Drive and the usability of the public boat launch. There is also a 200m section of Andrew Drive on the east side of the lake where the service life of the roadway is negatively impacted by the high water. However, from staff's knowledge, no roads have ever had to be shut down due to high water in the area.

The Township of Tiny engaged with the Severn Sound Environmental Association (SSEA) to do a review of the lake water levels in the past following similar periods of high water, which resulted in a 2019 report addressing the issue (Appendix A).

The report indicates Farlain Lake is a kettle lake and is unique in that it has no surface discharge. The lake is mainly groundwater fed with a groundwater fed tributary that flows year round into the lake. Several other tributaries flow into the lake on an intermittent basis as a result of precipitation. Not having an outlet can lead to high water levels in years with greater than average precipitation, while steady groundwater inputs prevent abnormally low water levels in years with less precipitation.

Currently, even though this summer has been very dry, lake levels remain high. This may be due to the extreme snowfall levels from last winter.

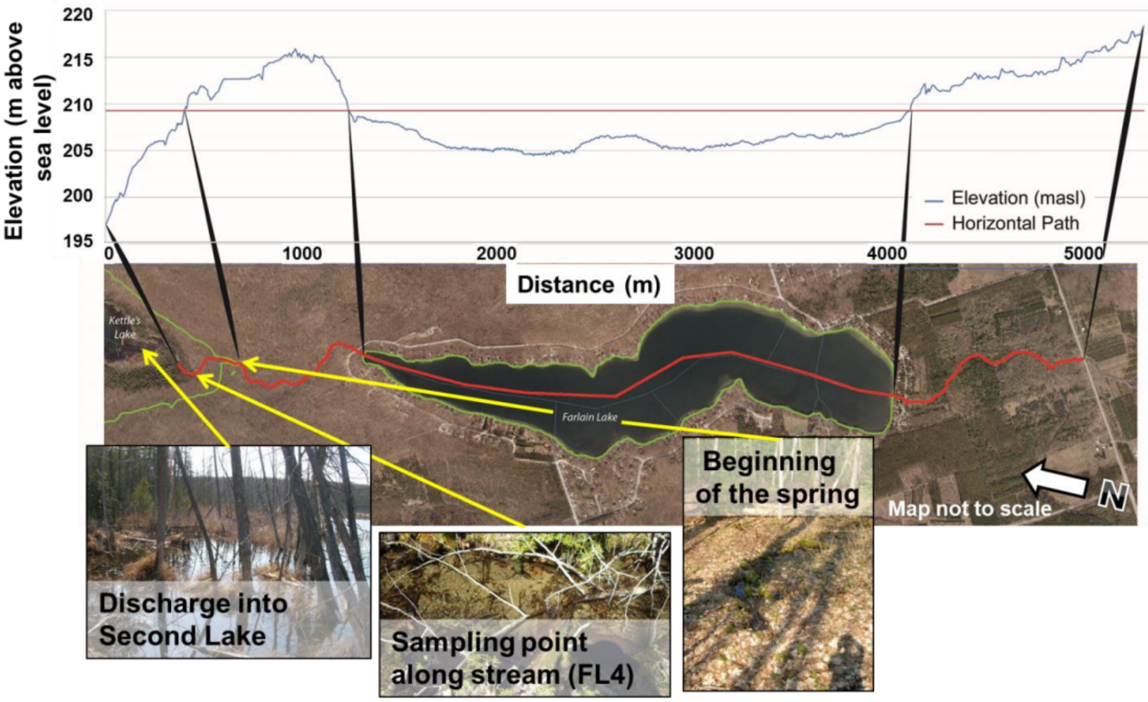
Based on the SSEA 2019 report, it is suspected that Farlain Lake now discharges very slowly to Second Lake, another inland lake in Awenda Park, via groundwater flow. They indicated that a hydrogeological study of the area to determine the flow rates and directions of groundwater flow could be done to obtain more definitive answers for the cause of the high water levels.

Several residents have brought up that they believe that simply removing the section of Farlain Lake Road at the north end of the lake, which was installed by the Township in the 1980's (a private trespass road has existed there since the 1950's), or installing culverts there would help solve the issue. One argument from residents for the removal of the road at the north end of the lake has been that prior to its installation the lake extended further north and the land there allowed for better groundwater flow between Farlain and Second Lake. However, the below air-photo from 1931 predate the installation of any road and the lake did not extend further north than it currently does.

1931 - North End of Farlain

2024 - North End of Farlain Lake

Another item suggested by residents is that installing culverts at the north end of the lake would allow the water to flow overland to Second Lake since there is a "depression" between the two lakes. However, if one consults the below elevation profile, the depression between the lakes rises more than 6m (20 feet) above the level of Farlain Lake.



In order to drain the lake, water would need to be pumped out, or a 600m or longer pipe would have to be drilled between the lakes. Both of these options would be significant capital projects, if they are even technically and legally feasible. While they aren't recommended in the SSEA report, the ideal framework for investigating these options further would be through the Drainage Act.

Reviewed By Other Departments
Not applicable.

Options/Alternatives

Option #1
Do nothing. The lake levels are not having a major impact on municipal infrastructure and the Township has no legal obligation to control its levels. However, it is an ongoing concern for residents of the area and this option does nothing to provide them with potential recourses to protect their property. If this option is chosen, the issue will return again and again in the future for future Councils and staff to re-investigate.

Option #2
Instruct staff to include funds in the 2026 budget to work with the SSEA / external consultants to perform a hydrogeological study to gather further information on how water enters and drains from the lake and the causes of the high water. However, it would not provide residents with concrete options for controlling lake levels. This Option could be also be performed in conjunction with Options #3 or #4 to inform a potential solution through the Drainage Act.

Option #3
Instruct staff to provide information to concerned residents about how they could petition for a municipal drain under the Drainage Act to control lake levels. This would be done through a public

meeting with the Township's Drainage Superintendent, Sid Van Der Veen from RJ Burnside and Associates to educate them on their rights under the Drainage Act.

In short, the concerned residents can petition the Township for drainage under the Drainage Act. If a valid petition per the rules set out in the drainage act is received by the Township (in this case it would require at least 50% of the properties "requiring drainage" requesting that the Township proceed), an engineer would be hired by the Township to put together a report investigating engineering options for controlling the lake level, estimates of costs, and assigning responsibilities for costs to the properties who drain to the lake / properties who would benefit from such a scheme. If the petitioners want to go ahead with the drain following the report, costs for the intial report, detail design, construction and operation of the drain would be paid for by all benefitting properties. However, if the petitioners do not want to go ahead with a drain following the report, the cost of the report would be charged back to the properties who had petitioned for it.

This option provides concerned residents a means of trying to get their concerns addressed without impact to the general taxpayer. This is staff's recommended option.

Option #4
Instruct staff to petition for a municipal drain as the road authority. This is similar to Option #3, except that a petition from the road authority is all that is required to proceed with the hiring of a drainage engineer to investigate the possibility of a municipal drain and how costs would be distributed if the work goes ahead. The cost of the report would fall entirely onto the Township if a municipal drain is not persued. For the work to go ahead following the Engineer's Report, the Township could unilaterally decide to go ahead and force the cost onto the benefitting citizens, or only go ahead with the work if a majority of the benefitting properties are in agreement.

The advantage of this option is that the report provides more concrete options and costs for residents. Even if nothing comes of the report, it remains valid for future staff, residents and Councils. This option could still be persued following the public meeting with the Drainage Superintendent detailed in Option #3 if Council deems there is enough public support or interest.

Financial Implications

Option #1
There are no financial implications associated with this item.

Option #2
In consultation with the SSEA, a proper hydrogeological study with fields studies of lake levels, bathymetry, modelling of future scenarios, etc. would be roughly $120,000. This amount would be carried in the 2026 budget deliberations.

Option #3
The cost for this item would be limited to the Township's Drainage Superintendant's time. This would easily fit in the 2025 operating budget for drainage (01-310-2304). 50% of the cost would be funded by the Ministry of Agriculture, Food and Agribusiness.

Option #4
The cost of a preliminary drainage engineer's report under the Drainage Act is estimated at $80,000. This amount would be carried in the 2026 budget deliberations.

Relationship to Strategic Plan

- Environment and Public Land Management

Conclusion
It is recommended that the concerned public be informed of their options under the Drainage Act for addressing the high water levels of Farlain Lake.

Appendices
SSEA - Farlain Lake Water Levels

Tim Leitch, Director of Public Works	Approved - 16 Aug 2025
Haley Leblond, Director of Corporate Services/Deputy CAO	Approved - 19 Aug 2025
Robert Lamb, Chief Administrative Officer	Approved - 19 Aug 2025

Severn Sound

Environmental Association

Farlain Lake Water Levels

January 2019

Farlain Lake Water Levels

Prepared by:
Severn Sound Environmental Association

for the

Township of Tiny

January 2019

Foreword

This document reports on preliminary technical investigations conducted by SSEA in the Farlain Lake area for the Township of Tiny. Data presented in this report are a combination of volunteer observations, SSEA data, and publicly available climate data. The report received technical review from the Lake Simcoe Region Conservation Authority (LSRCA) prior to its publication. This does not necessarily signify that the contents reflect the views and policies of the Corporation of the Township of Tiny or the LSRCA. Mention of trade names or commercial products does not necessarily constitute endorsement or recommendation for use.

Reference to this document should be made with the following citation:
Severn Sound Environmental Association. 2019. Farlain Lake Water Levels.

For additional copies of this report or information on the SSEA, please contact the Severn Sound Environmental Association office.

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Acknowledgements

Special thanks to hydrogeologists Tara Harvey and Mike Wilson from the LSRCA for their input and comments.

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Background

The SSEA has received complaints from concerned residents over the past couple of years regarding high water levels on Farlain Lake and the resulting property damage and shoreline tree dieback (Figure 1). Of particular concern are septic systems that might become inundated with water and contaminate the lake. Up to approximately 190 homes or cottages may be affected by high water, depending on how close structures are located to the shoreline. While definitive answers on the cause of these higher lake levels would require a hydrogeological study of the area and calculation of a water budget for the lake, some information is available that may shed light on the situation. This document summarizes what is known about the area and provides recommendations for further studies.

Figure 1. Photos taken in May 2018 showing shoreline damage and flooded conditions on Farlain Lake. Photos courtesy of Peter Andrews.

Current Lake Conditions

Farlain Lake is a kettle lake, as are downstream Second Lake (also known as Kettle's Lake) and Gignac Lake, and was formed during the last glacial period. Kettle lakes form when a block of ice trapped in glacial debris melts, and the meltwater fills the depression left by debris deposited around the melting ice block (Mackie 2001). Farlain Lake is unique in that has no surface discharge, classifying it as a seepage kettle lake. It is mainly groundwater fed and is in a groundwater recharge zone, with a groundwater fed tributary that flows year round into the lake on the west side (South Georgian Bay Lake Simcoe Watershed Region, 2006). Several other tributaries flow into the lake on an intermittent basis as a result of precipitation.

There is a depression between the north end of Farlain Lake and the south end of Second Lake, and it is possible that these lakes were connected via surface flow at one point when water levels were much higher. It is suspected that Farlain Lake now discharges very slowly to Second Lake via groundwater flow (Figure 2, Figure 3). A hydrogeological study would be needed to determine the direction and rate at which groundwater flows within the area. Since there is no surface discharge, lake levels are susceptible to a higher degree of seasonal and yearly fluctuation. Not having an outlet can lead to high water levels in years with greater than average precipitation, while steady groundwater inputs prevent abnormally low water levels in years with below average precipitation.

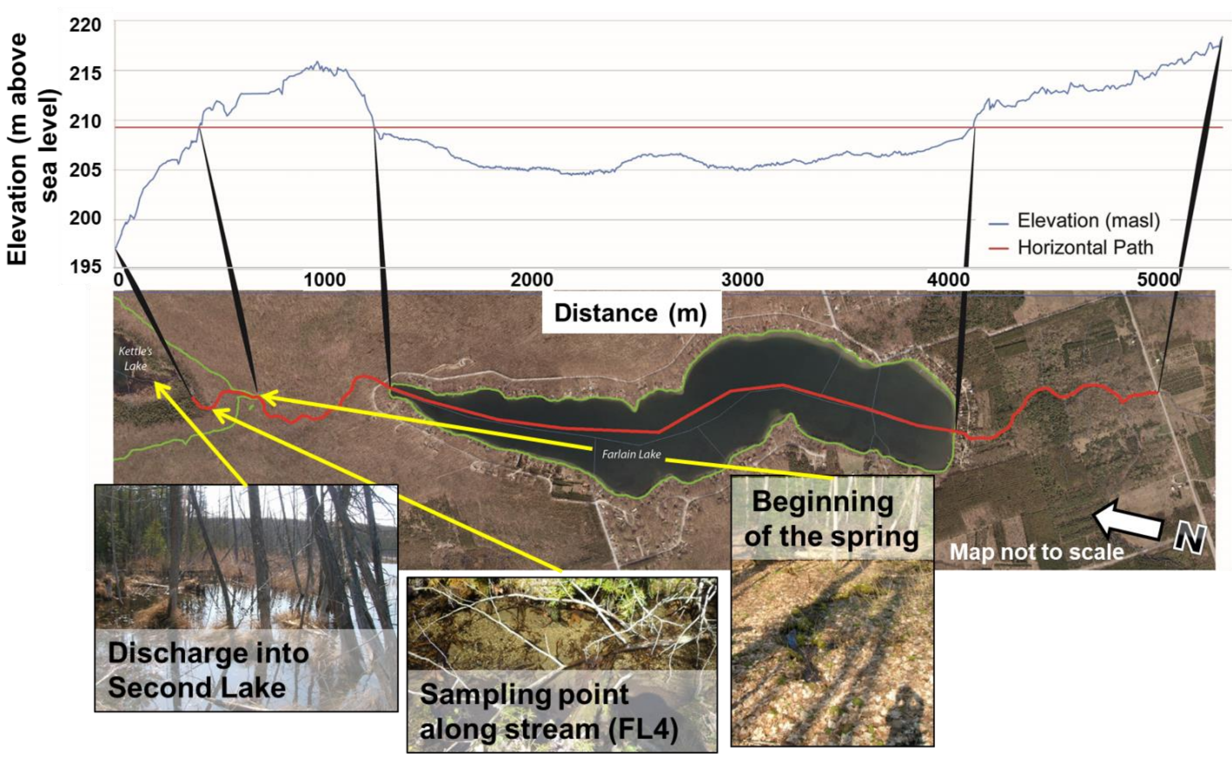

Figure 2. Elevation profile for Farlain Lake. Elevation data is in m above sea level; data from MNRF (Provincial Digital Elevation Model). Vertical exaggeration is 47x. Second Lake is also known as Kettle's Lake.

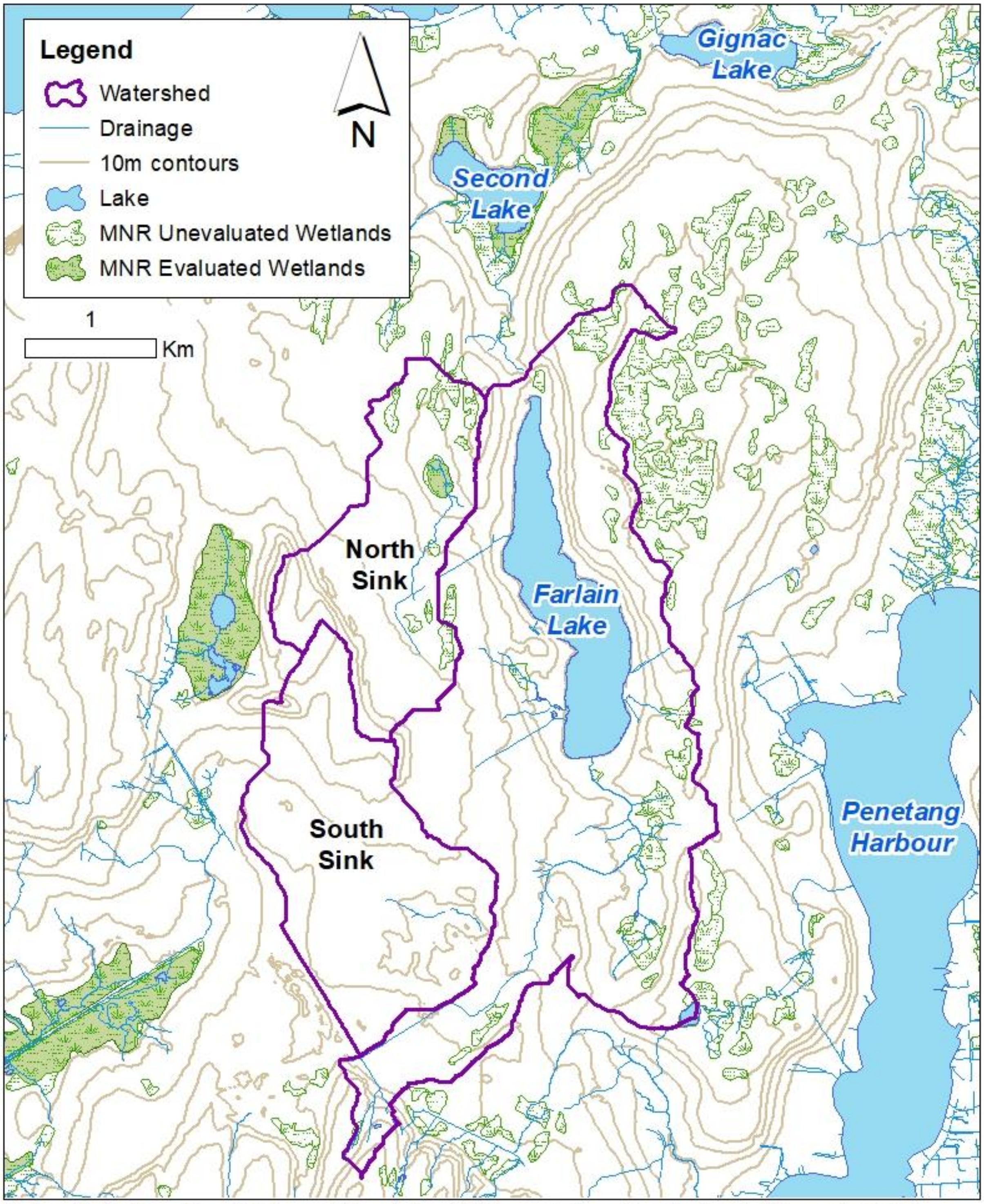

Figure 3. Topographic map showing the Farlain Lake watershed. Also included are the north and south sinks, which could potentially drain to the lake via groundwater flow.

Spring water level measurements have been recorded by a shoreline resident at their waterfront residence from 2015-2018. Measurements were made from the water surface to the top of the concrete pad of their boathouse. The graph below shows water levels taken in mid-April to early May. These data show that levels have risen steadily over the past 4 years, with a substantial increase of approximately 40 cm from 2015 to 2016 (Table 1 and Figure 4). Note that because only one spring measurement was taken and snowpack data is not available, it is difficult to relate the timing of spring melt to the annual water levels. The timing of spring melt is important as there would be a large difference in water levels if a measurement was taken before compared with after the spring melt, or if a measurement was taken immediately following compared with several weeks following a melt event.

Table 1. Water level measurements taken by volunteer on Farlain Lake. The same measuring point was used each year.

Date	Julian Date	Depth at benchmark (cm)
07/05/2015	127	4.4
15/04/2016	106	45.0
05/05/2017	125	55.0
11/05/2018	131	65.6

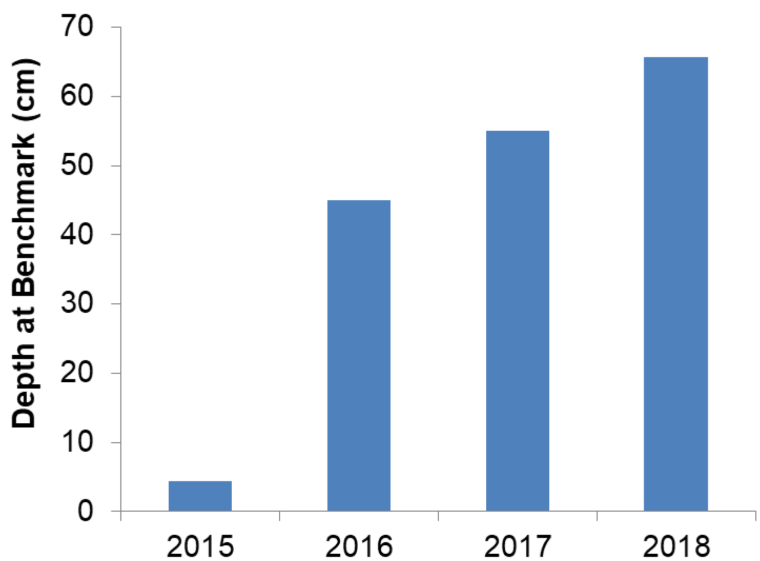

Figure 4. Spring water levels for Farlain Lake.

There are no lake water level measurements available prior to 2015 that are taken from the same location, but based on anecdotal observations from residents, it seems that the high spring levels over the last 3 years do not represent normal conditions for the lake. The SSEA monitors water levels on other inland lakes in the Severn Sound watershed, however each of these lakes has an outflow, so conditions are not directly comparable to Farlain Lake.

In order to give context to recent climate conditions, it is useful to refer to data from the Environment and Climate Change Canada (ECCC) weather station (operational from 1889-2016) and more recently, SSEA's Davis weather station, both located at the Midland Wastewater Treatment Plant (data available to Aug 2018, data gaps exist). Shown below are monthly average temperatures (Figure 5), total monthly rainfall (Figure 6) and total annual snowfall (Figure 7) from 2010-2016. Lower summer temperatures can cause decreased evaporation rates, while higher total rain and snowfall contribute to greater surface runoff. The summers of 2014, 2015 and 2017 were cooler than normal, while total annual rainfall was high in 2014 and 2017. Snowfall amounts in the 2013/14 and 2014/15 seasons were moderately high. Note that the methods used to measure rain and snowfall at the Midland station changed in 2010, so data prior to that year are not comparable to those taken after 2010. Snowfall data for the 2016/17 and 2017/18 seasons are not available. While useful as background information, it is difficult to fully relate snowfall data to water levels. A given snowfall event could have been followed by a melt period and therefore would not have contributed to overall snow accumulation and corresponding spring melt event, which has the greatest effect on water levels. Local snow accumulation data would give better information to relate to water levels.

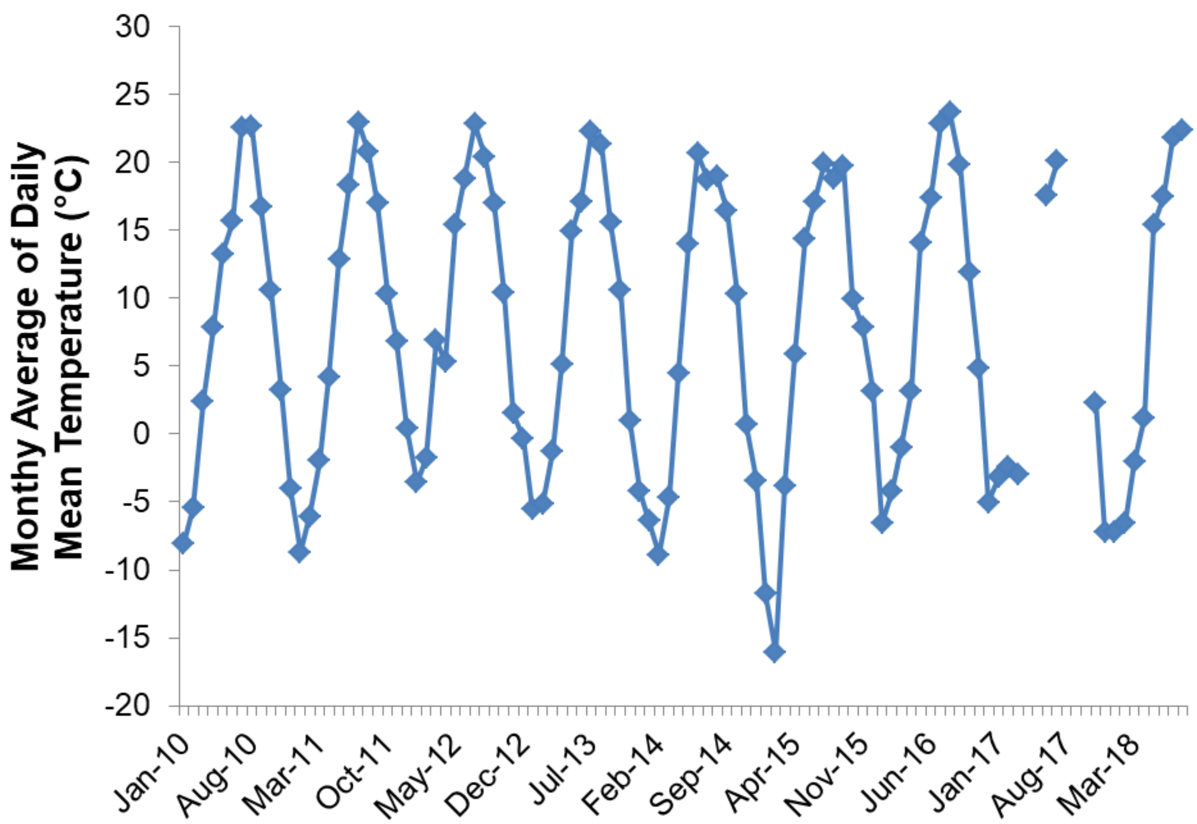

Figure 5. Monthly average temperature as recorded at the ECCC weather station at the Midland WWTP, 2010-2016, and the SSEA Davis weather station at the Midland WWTP, 2017-2018.

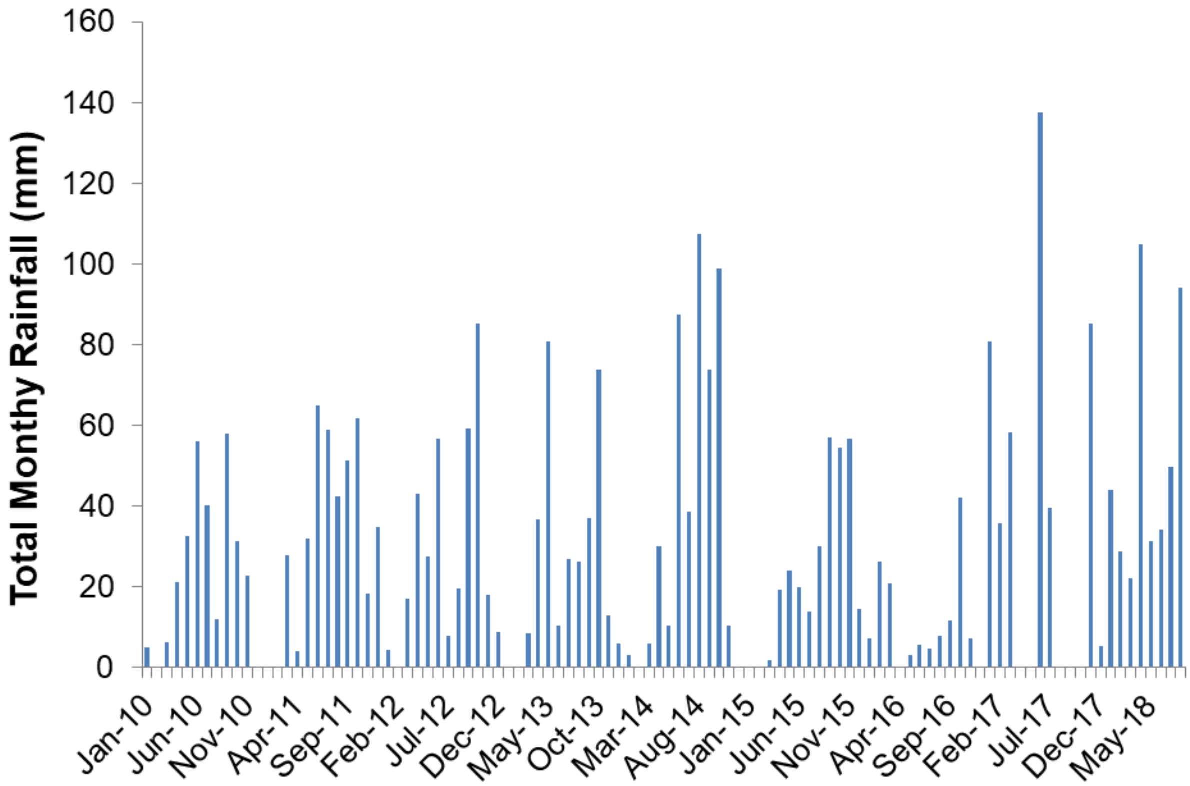

Figure 6. Total monthly rainfall as recorded at the ECCC weather station at the Midland WWTP, 2010-2016, and the SSEA Davis weather station at the Midland WWTP, 2017-2018.

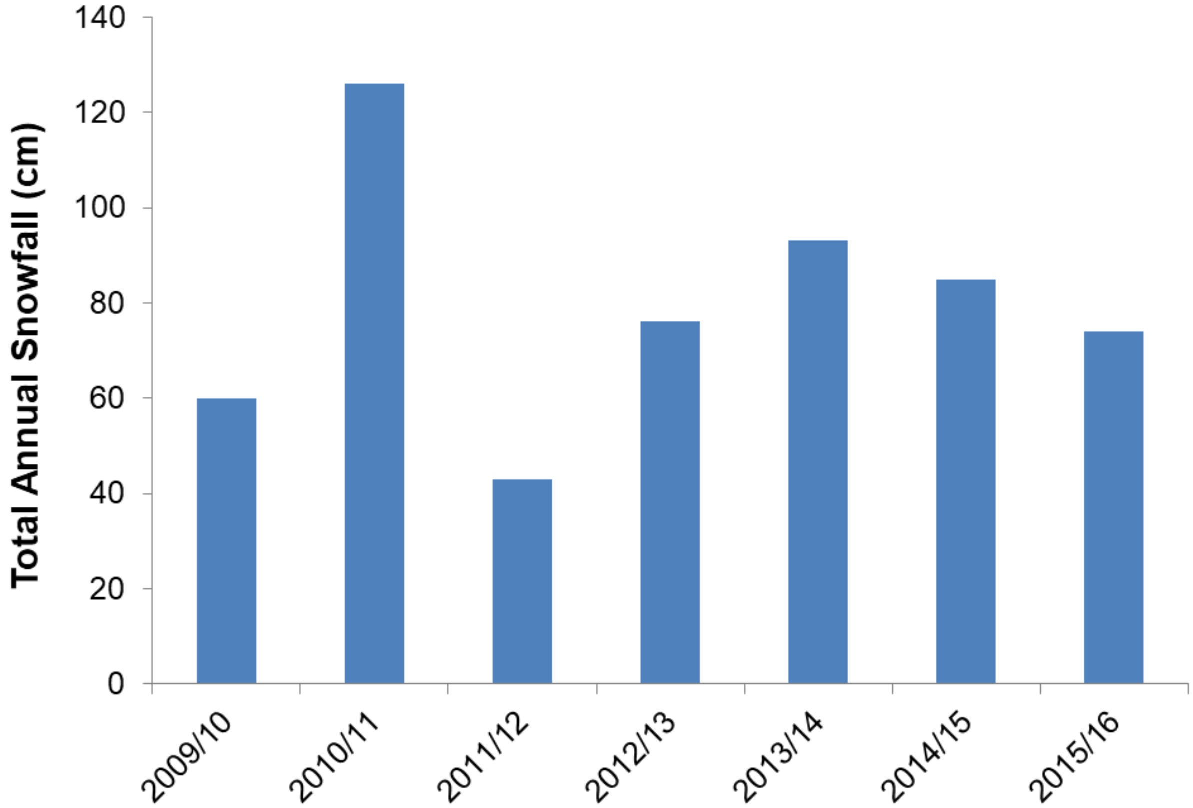

Figure 7. Annual snowfall as recorded at the ECCC weather station at Midland, 2010-2016.

Factors Influencing Lake Levels

Lake water levels are determined by the balance of water inputs and outputs. For a generalized lake system (Figure 8), inputs include precipitation in its various forms, inflowing tributaries, inflowing groundwater and surface runoff. Outputs include evapotranspiration of water by terrestrial plants, evaporation from the lake surface, and discharge via surface flow (river) and/or groundwater. In the case of Farlain Lake, all components of the hydrological cycle are present with the exception of a surface outlet.

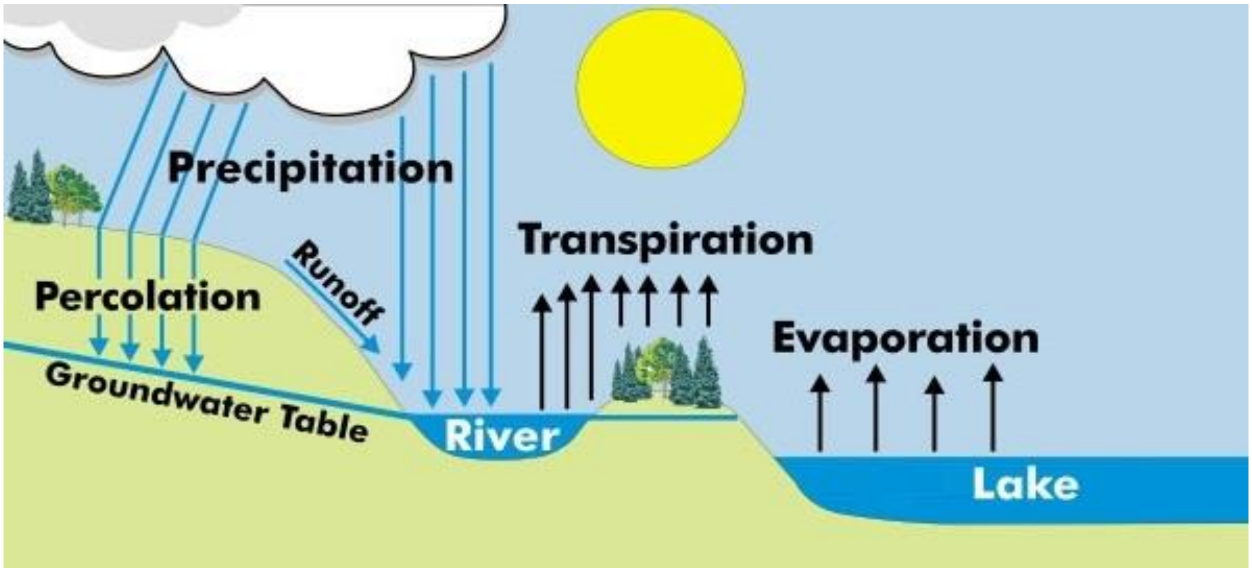

Figure 8. Generalized hydrologic cycle (modified from US Army Corps of Engineers, Creative Commons).

Changes in precipitation and timing/intensity of snow melt may have a large impact on water levels in the lake, especially since there is no outflow. The exact impact will be determined partially by the local geology/physiography so this along with hydrological variables (precipitation, timing and intensity of snow melt) are important to consider in the determination of possible causes of the increased water levels.

Factors Leading to Lake Level Rise for Farlain Lake

The recent increases in water levels observed on Farlain Lake are likely related to changes in precipitation and snow melt. An increase in snow melt could be a result of an increase in snowfall amount and/or warmer days earlier in the season that cause the snow to melt all at once instead of over a longer period of time. Since there is no record of water levels over the entire summer season, or for a longer historical period, it is currently difficult to determine if the recent high water levels are related to larger precipitation events or snow melt events, or if they represent long term changes in the water levels.

The fact that there is no outlet from the lake would impact the response of the lake to precipitation/runoff/snow melt events. This impact would result in higher water levels as all the inputs are stored within the lake then slowly discharged via groundwater. The speed of this discharge via groundwater depends on the local geology. If the geology is sandy then the discharge will occur faster and the increase in water levels would be less, but if the geology is more silt or clay-rich then the impact to water levels would likely be much greater as it takes longer for the water to move through the ground. The surface geology around Farlain Lake is mostly coarse sandy deposits with some areas of silty to sandy till deposits from the Tioga and Vasey Series, respectively (MOE 1973; Oak Ridges Moraine Groundwater Project, 2018; Figure 9). However, the underlying geology is dominated by the Sunnybrook drift which is a lower permeability layer that is rich in silt and clay, and allows groundwater to flow much more slowly (Oak Ridges Moraine Groundwater Project, 2018; Figure 10).

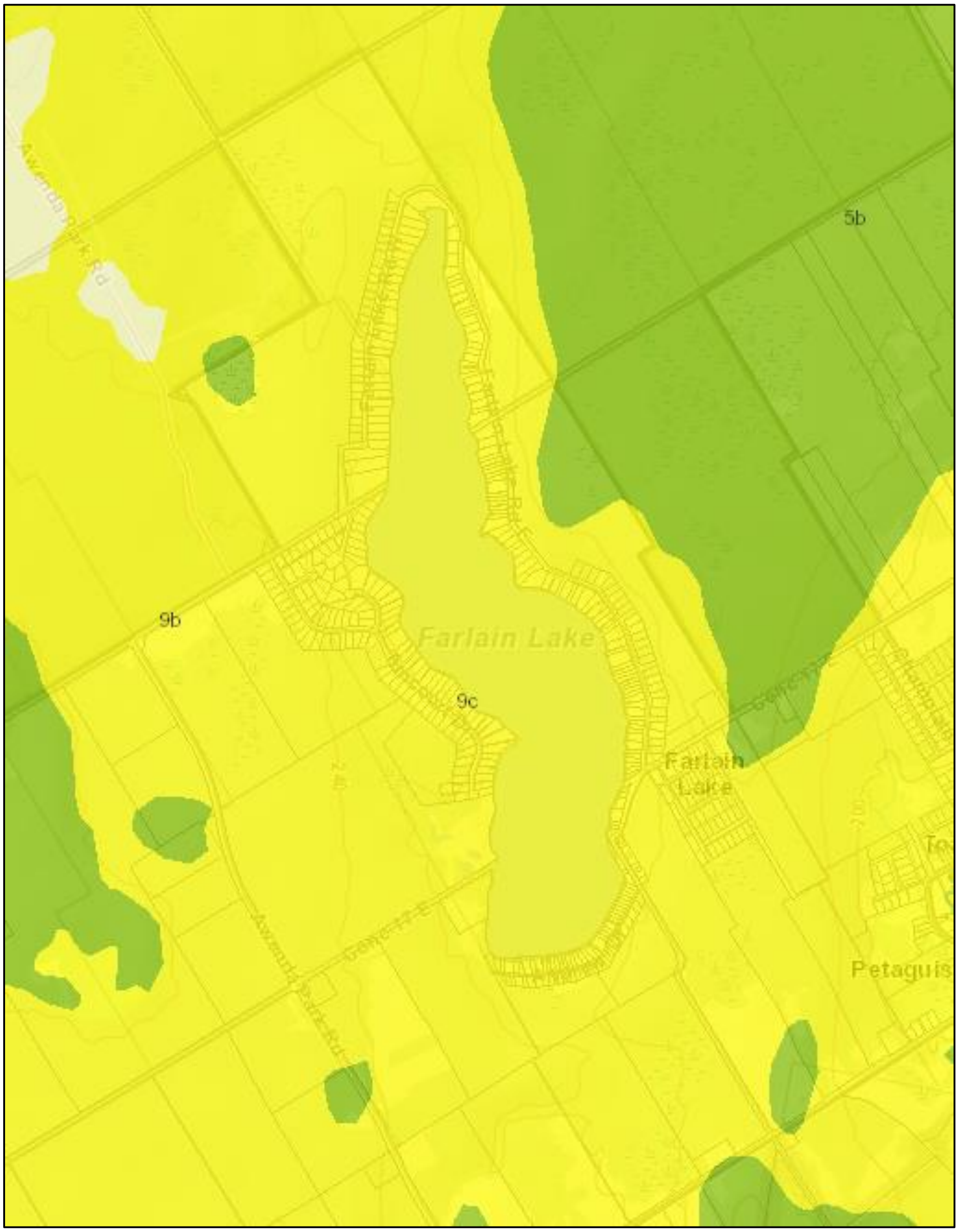

Figure 9. Surface geology (Ontario Geological Survey). Yellow represents coarse sandy deposits, green represents till deposits (finer sediments with silt/clay). Data use permission granted from the YPDT-CAMC partnership.

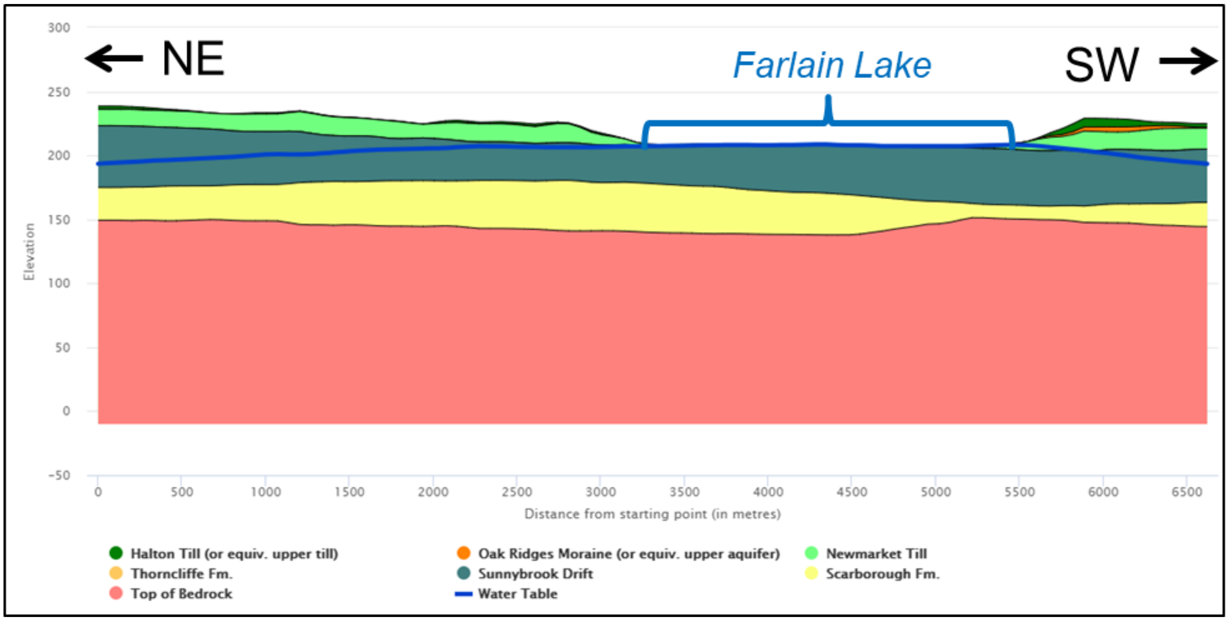

Figure 10. Geologic cross section, approximately NE-SW through Farlain Lake. Sunnybrook Drift underlies Farlain Lake and is a lower permeability layer (contains silt and clay). Data use permission granted from the YPDT-CAMC partnership.

Based on the local geology, it is expected that any precipitation would result in large water level increases as the lake receives runoff from a large catchment relative to the lake's size (the lake is 1 km^2 and drains a watershed that is 14 km^2). Due to the sandy nature of the top sediments this runoff and shallow groundwater may be transmitted quickly to the lake resulting in a larger total amount of precipitation entering the lake over a shorter time period. However, the Sunnybrook drift underlying the lake would result in slow discharge of the water from the lake. Therefore, larger water level increases following precipitation would be expected as a result of the local geology.

If increased precipitation events are occurring recently (precipitation events that are higher intensity or longer lasting etc.), then these may be a big contributor to the higher water levels within the lake. More investigation of the climate conditions are required to look into the timing and intensity of precipitation and melt events to determine if they are in fact increasing over the years in question. It is also important to further investigate lake water levels and groundwater levels to better determine if this is a seasonal water level increase or a long term increase in groundwater and surface water levels.

Recommendations

There has been a suggestion by residents that an artificial channel should be created to help manage lake levels and alleviate current flood conditions. SSEA does not recommend that the natural drainage of the lake be altered. This likely wouldn't be feasible under provincial and federal legislation such as the Fisheries Act and Drainage Act. Draining the lake north to Second Lake (into Awenda Provincial Park) or east to

Penetang Harbour could have unintended consequences for both Farlain Lake and the receiving water body including: impacts on receiving water quality and water temperature, reduced water level fluctuation necessary for native aquatic plants, and potential movement of invasive species.

It would be beneficial to conduct a hydrogeology study of the lake to determine the balance of inputs and outputs, also known as a water budget. This would involve quantifying precipitation using rain and snow gauges, and measuring tributary flow and infiltration rates. Inflowing and outflowing groundwater, surface runoff and evapotranspiration can be modelled using regional models, aided by digital elevation models (DEMs) and groundwater level data collected from local wells.

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