SPRINGFIELD LAKE WATER QUALITY STUDY

PREPARED FOR

Summit County Engineers
538 E South St
Akron, OH
44311-1843

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Contents

Project Understanding

Springfield Lake is located in Northeast Ohio southeast of the I-76 and I-77 interchange in Summit County, OH. The communities of The Township of Springfield, City of Akron, and Village of Lakemore encompass the lake. The project team wrote the report with the understanding that there may be multiple sources contributing to the non-attainment of water quality standards.

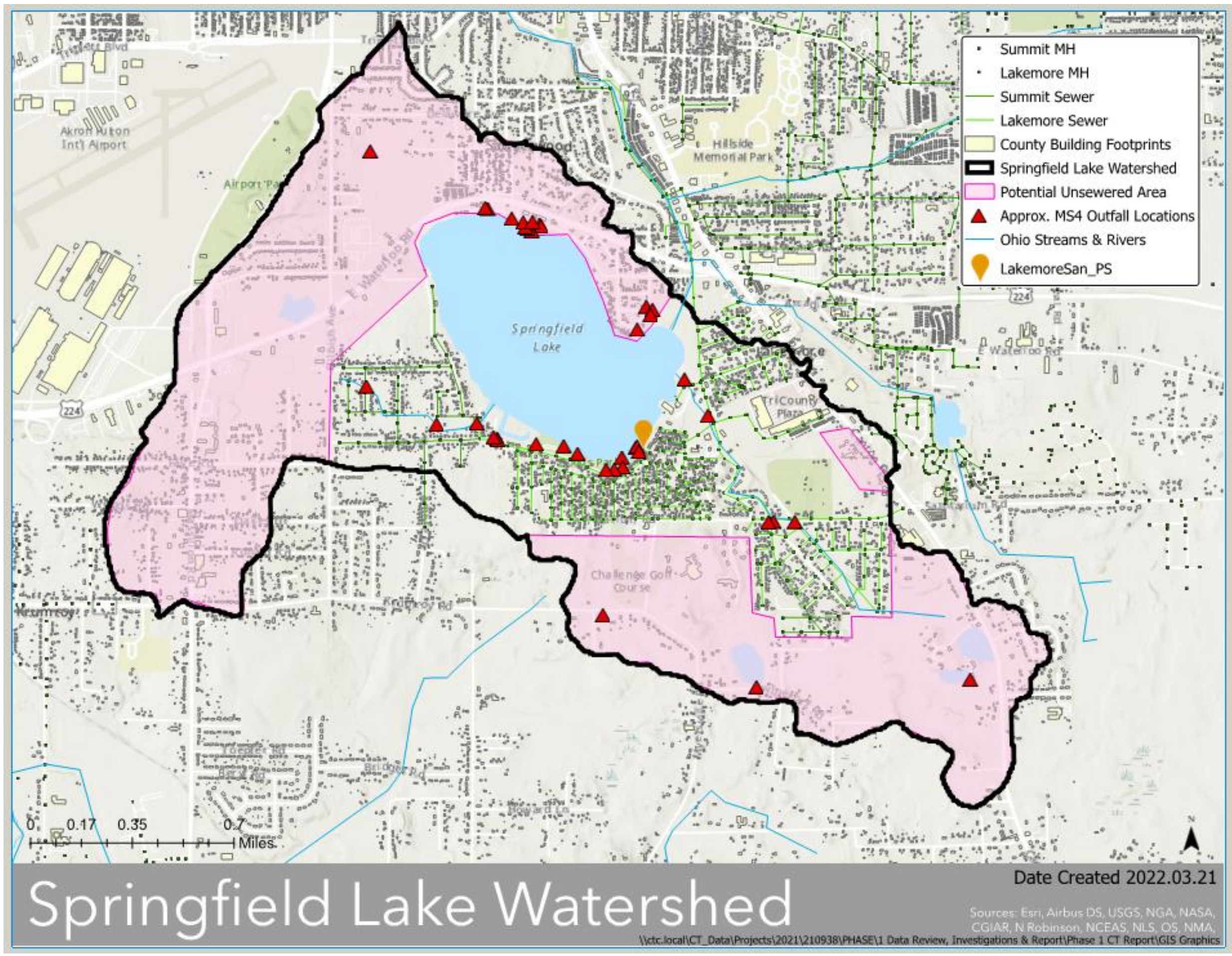


Figure 1: Springfield Lake Watershed

Recommendations

Available water quality data collected from 2006 to 2021 reveals an obvious decline in surface-water quality (See “ODNR Water Quality Analysis” below). There are several potential sources contributing to water quality non-attainment identified in this report based upon previously completed reports and vetted through watershed mapping (See “Mapping” section below).

Water quality parameters sampled and their results, do not suggest a single contaminant source is the issue. All the parameters sampled and the results that were yielded suggest a decline in water quality. The water quality data suggests that surface water runoff and sewage (sewered and/or unsewered areas) may contribute to the non-attainment of water quality. Overall, limited data exists. A single sampling location does not provide enough data to identify the contaminant sources definitively. Most of the parameters that are discussed below were tested at one (1), two (2), or three (3) sample locations. E. Coli was the only parameter that was sampled at more than three (3) locations throughout the years. All data received from external agencies is to be read and understood with caution.

The primary recommendations (1-3) are steps which may be taken.

1) Prepare a pragmatic sampling program to seek primary contributors to water quality non-attainment.

   Phase 1 of the sampling program should include *E. coli*, Total Suspended Solids, Secchi Disk, Conductivity, Total Nitrogen, Total Phosphorus, pH, and temperature. Phase 1 should include (7) monitoring sites as shown in the following Figure. These locations could help determine if a given influent tributary is contributing to allochthonous, nutrient loading of Nitrogen, Phosphorus or other nutrient loadings from residences, golf courses, or farms.

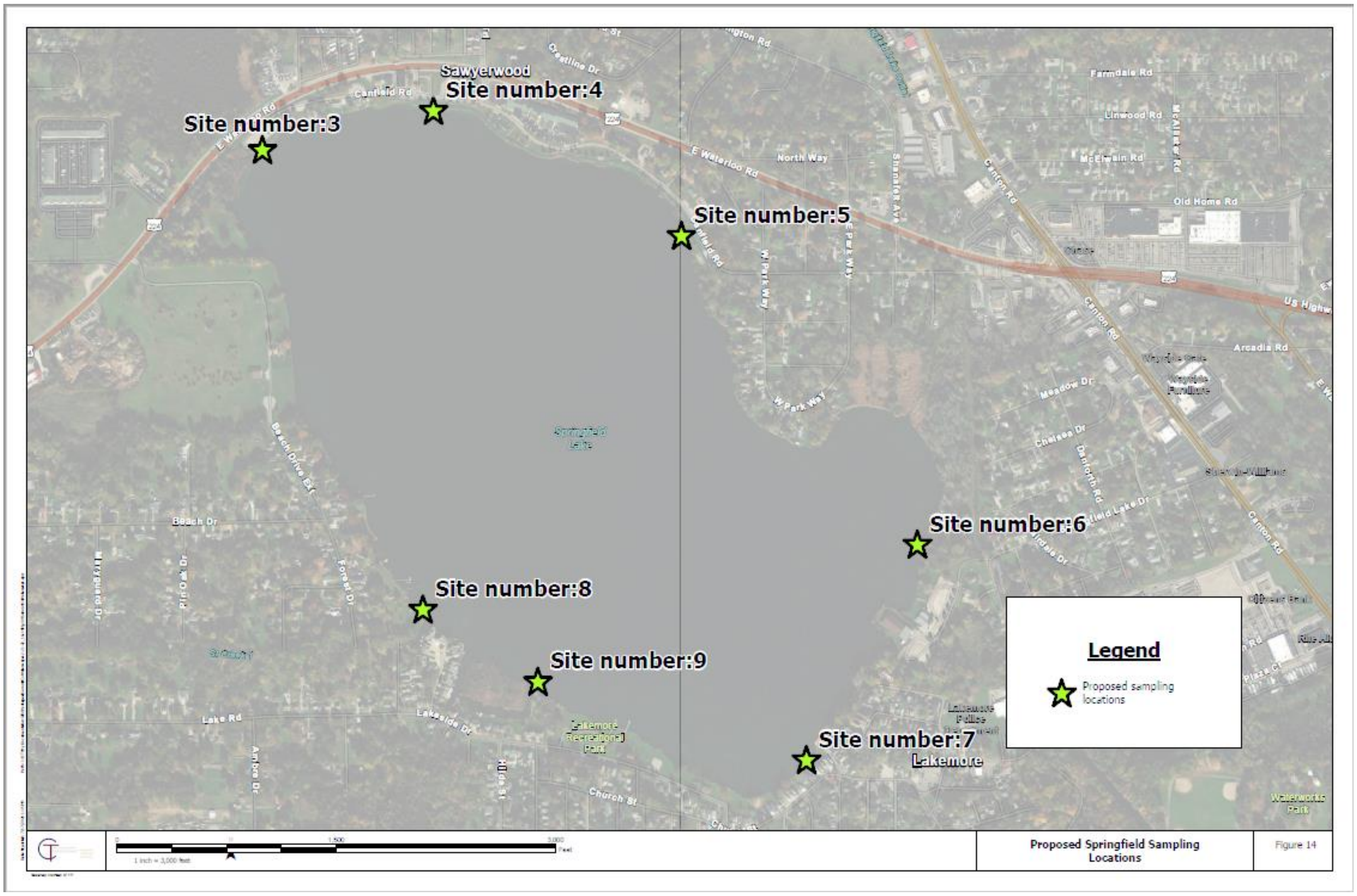


Figure 2: Proposed Sampling Locations in Springfield Lake

Location of 7 proposed sample sites

Site Number	**Coordinates**
1	41.034034 N, -81.447303 W
2	41.034493 N, -81.443037 W
3	41.032334 N, -81.437183 W
4	41.026562 N, -81.431208 W
5	41.022853 N, -81.433993 W
6	41.023899 N, -81.441051 W
7	41.026474 N, -81.444809 W

The recommended program would include both dry and wet weather sampling (Appendix B). Dry weather sampling would be performed twice per month for 3 months (May – July). Wet weather sampling would be completed after a rain event with anticipated rainfall totals of at least one-half of an inch (0.5”), for at least 2 events. The goal of Phase 1 would be to identify which tributaries of the 6 identified are obvious contributors to water quality non-attainment. Once the significant contributors are identified, a second round of sampling may be conducted to identify whether the presence of human sewage is detected using Microbial Source Tracing. One dry and one wet weather event sample would be tested. If results are inconclusive, additional events (up to 2) may be added. Based upon the results of Phase 2, additional investigations may be necessary to identify the specific system or properties which are contributing to the water quality issues.

2) Properly map all MS4 outfalls and system components. Perform dry weather screening in accordance with MS4 permitting and document results. Locating all outfalls may require a drawdown of the Lake. Sample and mitigate any illicit dry weather discharges.

3) Sample water quality from ditches and nearby groundwater in areas with septic systems (starting with areas that exhibit signs of older or failing septic systems). Utilize data and complaints collected by the Summit County Department of Health.

The following secondary recommendations (4-6) would require close coordination with Summit County DSS, Summit County Department of Health, City of Akron, Watershed Superintendent, Springfield Township, and the Village of Lakemore:

4) Review CCTV records and dates for sanitary systems and track rehabilitation efforts. If the condition is poor, consider soil/groundwater testing for high *E. coli* levels to confirm the impact of a leaky sanitary system on the Lake’s water quality.

5) Review Lakemore Pump Station SSO records (frequency and volumes). Monitor the progress of upgrades to the facility. Consider water quality sampling/testing near the pump station site during various conditions.

6) Monitor adjacent sanitary systems' Capacity Management Operation & Maintenance (CMOM) program. Review records annually and track progress towards adequate capacity improvements. The Joint Task Force provided previously drafted Findings and Orders as prepared by Ohio EPA. Track the execution of these orders. Continue water quality sampling in parallel.

7) EPA recommends weekly sampling to evaluate the *E. coli* geometric mean (GM) and statistical threshold value (STV) over 30 days and encourages more frequent sampling at more densely populated locations. Consider such a recommendation to collect additional data.

8) Add monitoring for microcystins at lake sampling locations, including near-shore areas where wading and swimming activities and pet exposures are most likely. The lake appears to have a consistent concentration of 15-40 µg/L of microcystins that is seasonally persistent and exceeds recreational advisory levels. These levels do not peak and crash, suggesting a stable population not associated with a bloom.

Lastly, the following guiding observations are offered which summarize the data evaluated.

Water Quality Issues:

- Water clarity is trending towards hypereutrophic state.
- Conductivity is trending to levels that may affect fish and macroinvertebrate health.
- Total Phosphorus levels witnessed are at hypereutrophic state.
- Chlorophyll *a* levels witnessed are at hypereutrophic state and indicative of potential algal blooms.
- Reported concentrations of microcystin in lake water samples (including April, June, and October sampling dates) ranged from 15.99 µg/L to 37.69 µg/L. Thus, the microcystin concentration reported from each sample exceeds the Ohio EPA recommended value for recreational waters of 8 µg/L (which is also the swimming advisory concentration).

Mapping and Watershed Issues:

- Reports confirming inadequate system capacity results in SSO.
- Proximity to potentially failing and/or leaky sanitary system.
- Proximity to potentially failing or failed on-lot septic systems.
- Lack of mapping of the complete septic system, sewer systems, and outfall screening results.

Data Review

Documents and databases reviewed include information from various sources surrounding Springfield Lake and the entire watershed. Local agencies surrounding Springfield Lake Watershed were contacted to request any additional sampling or testing and the results. The results of the parameters requested are discussed below. The sources and specific information are listed in Appendix A attached to this report.

Obvious concerns for potential sources contributing to non-attainment of water quality standards include:

1) Sanitary pump station bypassing (sanitary sewer overflow, or SSO) located within the Township of Springfield, City of Akron, and Village of Lakemore
2) Leakiness and proximity of the sanitary sewer system to Springfield Lake within the Township of Springfield, Lakemore, and the City of Akron.
3) Proximity of and lack of sanitary sewers in adjacent neighborhoods (unsewered areas)
4) Runoff and discharges from municipal separate storm sewer system (MS4) outfalls that are found within the Township of Springfield, City of Akron, and Village of Lakemore.
5) Application of fertilizers entering the drainage course from agricultural properties
6) Application of fertilizers entering the drainage course from golf course properties
7) Application of fertilizers entering the drainage course from residential properties
8) Increased urbanization development creating additional stormwater runoff from impervious surfaces
9) Increased residential home developments creating additional stormwater runoff from impervious surfaces

Parameters Evaluated

TSS

Total Suspended Solids - (TSS) are solid particles greater than 2 microns suspended in the water column. Anything smaller than 2 microns is considered a dissolved solid. The higher the TSS concentration, the more turbid the water; TSS is inversely related to water clarity.

TSS are located within the water column. Regarding water quality, high TSS may decrease water's natural dissolved oxygen levels and increase water temperature. This may prevent organisms living in the water of lakes and streams, such as small fish, from being able to survive. TSS can block transmission of sunlight through the water column, reducing or even halting photosynthesis, lowering dissolved oxygen levels in the water and resulting in decreased survival of aquatic organisms (including plants, invertebrates and fish). Water will heat up more rapidly and hold more heat as consequence of greater absorption/scattering of sunlight by milky water high in TSS. In turn, high TSS will adversely affect aquatic life that has adapted to a lower temperature regime.

The typical range of TSS varies largely on the surface water type. Water with a TSS concentration of **less than 20 mg/l** is considered **clear.** Water with TSS levels between **40 and 80 mg/l** tends to **appear cloudy**, while water with concentrations over **150 mg/l** usually **appears dirty**.

CONDUCTIVITY

Conductivity measures water's ability to pass an electrical current. Because dissolved salts and other inorganic chemicals conduct electrical currents, conductivity increases as salinity increases. Organic compounds, like oil, do not conduct electrical current well and therefore have a low conductivity when in water. Temperature also affects conductivity: the warmer the water, the higher the conductivity. Conductivity is one of the most vital, useful, and frequently tested parameters when it comes to determining water quality. As salinity and temperature increase, conductivity also increases, which can have a negative effect on the quality of water. This is because the higher the conductivity, the higher amount of impurities (dissolved minerals and organic substances) that are in the water.

Conductivity ranges between water bodies, but typically lakes and streams have a conductivity (measured and reported as specific conductance) range between **0-200 µS/cm**, while major rivers can have a specific conductance value up to 1,000 µS/cm. Water that has a specific conductance range of **1,000-10,000 µS/cm** indicates that it is **saline.** Inland water studies indicate good mix fisheries range between 150-500 µS/cm. High conductivity may indicate water is unsuitable for fish and/or macroinvertebrates.

TOTAL NITROGEN

Total Nitrogen (TN) water analysis refers to the measurement and analysis of TN content in water samples. Total Nitrogen represents the collective concentration of various forms of nitrogen compounds present in water, including organic nitrogen, ammonia/ammonium, nitrate, and nitrite.

Nitrogen is a crucial nutrient for aquatic ecosystems, but excessive nitrogen levels can lead to water pollution and environmental degradation. Monitoring total nitrogen helps assess the overall water quality and detect any potential pollution sources. It provides valuable information on the health and integrity of water bodies. Excessive nitrogen in water can cause a variety of environmental problems, including eutrophication. When nitrogen levels are high, it can stimulate the excessive growth of blue-green algal blooms and aquatic plants. As these organisms decompose, they consume oxygen, leading to oxygen depletion in the water, which can harm fish and other aquatic organisms. Some algal blooms include toxic blue-green algae, which can result in adverse health effects (including death) in humans, livestock, pets, birds, and fish. The US EPA has a maximum contaminant level in water for nitrates at **10 mg/L** and for nitrites at **1 mg/L**.

Total Nitrogen (TN) is also measured with a Trophic State Index (TSI). The TSI is a classification system designed to “rate” individual lakes, ponds and reservoirs based on the amount of biological productivity occurring in the water. The **trophic state index ranges between 0 and 100**. There are three basic trophic states for lakes: **oligotrophic (0-40)**, **mesotrophic (40-50)**, and **eutrophic (50-70**). Values above 70 indicate a hypereutrophic state and indicates the lake water quality is **poor.** High nutrient levels can cause algal blooms. When a lake hits a hypereutrophic state, it is unacceptable to swim or fish throughout the lake.

TOTAL PHOSPHORUS

Total Phosphorus (TP) is a measure of all phosphorus found in a sample, whether the phosphorus is dissolved or particulate.

High levels of total phosphorus in water can come from either wastewater or run-off from agricultural land. Increased levels of total phosphorus can encourage the growth of nuisance plants such as algal blooms (including toxic blue-green algae as described above) and result in eutrophication and hypereutrophication. Total phosphorus is one of several key components in the determination of the trophic state index (TSI) of a waterbody, as discussed below. To control eutrophication, the US EPA has established a recommended limit of **0.05 mg/L** of total phosphorus for streams entering lakes and no more than **0.024 mg/L** for reservoirs.

Total Phosphorus (TP) also utilizes TSI to interpret results. TSI levels for TP are the same as TN. The **trophic state index ranges between 0 and 100**. There are three basic trophic states for lakes: **oligotrophic (0-40)**, **mesotrophic (40-50)**, and **eutrophic (50-70**). Values above 70 indicate a hypereutrophic state and indicates the lake water quality is **poor.** High nutrient levels can cause algal blooms. When a lake hits a hypereutrophic state, it is unacceptable to swim or fish throughout the lake.

CHLOROPHYLL A

Chlorophyll *a* – Chlorophyll allows plants (including algae) to photosynthesize, i.e., use sunlight as an energy source to convert simple molecules (carbon dioxide, water, sulfates and ammonia) into organic compounds; the rates of photosynthesis in a biological community is referred to as primary productivity. Chlorophyll *a* is the predominant type of chlorophyll found in green plants and algae. Chlorophyll *a* is an indicator of the primary productivity associated with algae growing in a waterbody and may be used to predict algal biomass. Chlorophyll *a* at concentrations greater than **20-30 µg/L** is usually associated with algal blooms. Although algae are a natural part of freshwater ecosystems, excess algal biomass can cause aesthetic problems such as green scums or bad odors and can result in decreased levels of dissolved oxygen. Some algae also produce toxins that can be of public health concern when they are found in high concentrations.

Chlorophyll *a* concentration is a priority parameter used to classify the biological productivity of a lake. Chlorophyll also utilizes TSI to interpret results. TSI levels for chlorophyll are the same as TN and TP. The **TSI ranges between 0 and 100**. There are three basic trophic states for lakes: **oligotrophic (0-40)**, **mesotrophic (40-50)**, and **eutrophic (50-70**). Values above 70 indicate a hypereutrophic state and indicates the lake water quality is **poor.** High nutrient levels can cause algal blooms. When a lake hits a hypereutrophic state, it is unacceptable to swim or fish throughout the lake.

One of the symptoms of degraded water quality condition is the increase of algae biomass as measured by the concentration of chlorophyll *a*. Waters with high levels of nutrients from fertilizers, septic systems, sewage treatment plants, and urban runoff may have high concentrations of chlorophyll *a* and an excess amount of algae.

CYANOBACTERIA (BLUE GREEN ALGAE)

Cyanobacteria, also known as blue-green algae, are photosynthetic bacteria that can live in many types of water. They are important primary producers (organisms that make energy directly from the sun) in aquatic ecosystems. While critical to water and soil resources, excessive cyanobacteria growth can cause ecological and public health concerns. Rapid, excessive cyanobacteria growth is commonly called a "bloom." High nutrient levels and warm temperatures often result in favorable algae bloom-forming conditions. In their late stages, these blooms can be identified as floating mats of decaying, bad-smelling, gelatinous scum in lakes and form mats along the bottom of streams.

Microcystin is the most commonly measured and detected cyanotoxin in freshwater bodies. Microcystin is a potent liver toxin and a possible human carcinogen.

The health effects of cyanotoxins can be acute or chronic and have been observed in the liver, nervous, and gastrointestinal systems. Liver cyanotoxins (including microcystins) are likely the most commonly found toxins in freshwater cyanobacterial blooms and the most frequently studied. The recreational public **health advisory threshold** for microcystin in the State of Ohio for recreational water is **8 µg/L.**

In-situ fluorescence probes are a useful tool in the real-time assessment of cyanobacterial blooms. Concentrations of chlorophyll *a* and two other types of accessory pigments found in cyanobacteria (phycocyanins and phycoerythrins) may be measured in relative fluorescence units (RFU) and may be used to predict when cyanotoxin concentrations are of concern. The presence and abundance of cyanotoxins may be verified by sampling and chemical analysis; concentrations of cyanotoxins greater than **20-30 µg/L** are usually associated with **algal blooms**. The highest concentrations of cyanobacteria/blue-green algae may occur at depths **ranging from 2 to 9 m**, which will not be visible from the shore.

E. COLI

E. coli (an abbreviated name for the bacterial species *Escherichia coli*) lives in the intestines of humans and animals and is therefore commonly found in human and animal feces. Most strains of *E. coli* are harmless, but some can make people sick. *E. coli* is considered an indicator organism, used to identify fecal contamination in freshwater and indicate the possible presence of disease-causing bacteria and viruses (pathogens). *E. coli* concentrations may be linked with other parameters such as high Total Suspended Solids (TSS) because the bacteria tend to be found with particles. *E. coli* concentrations may also be linked with high phosphorus, nitrate, and biological oxygen demand (BOD) concentrations.

Regulatory criteria for *E. coli* are expressed as the number of colony forming units (cfu) per 100 mL. The EPA recommends for recreational waters, a geometric mean (GM) of 100 cfu per 100 mL and a statistical threshold value (STV) of 320 cfu per 100 mL. This recommendation is based on an estimated illness rate of 32 per 1,000. The GM is a statistic often used for bacterial counts in federal and state water quality standards. The GM of the monitoring samples should not exceed whichever criterion is selected from the two recommendations in any 30-day interval. The STV represents the 90th percentile value from the population of sample values in the same 30-day interval, meaning that no more than 10% of samples should exceed it.

Summit County Public Health states that *E. coli* concentrations above **1,030 cfu/100mL** is considered a **public health nuisance** and would result in further investigation or enforcement to have the nuisance abated.

Ohio EPA in OAC 3745-1-37 Table 37-2 indicates a E. coli levels at designated swimming beaches should not exceed 90-d GM of 126 cfu/100 mL and an STV of 410 cfu/100 mL for both bathing waters and primary contact recreational waters. An STV of 235 cfu/100mL is the basis of a beach or bathing water advisory.

The EPA recommends that the geometric mean of at least **five samples should not exceed 200 bacterial colonies per 100 milliliters (mL)**, and **no single sample should exceed 400 colonies per 100 mL.**

Mapping and Water Quality Evaluation

Total Suspended Solids

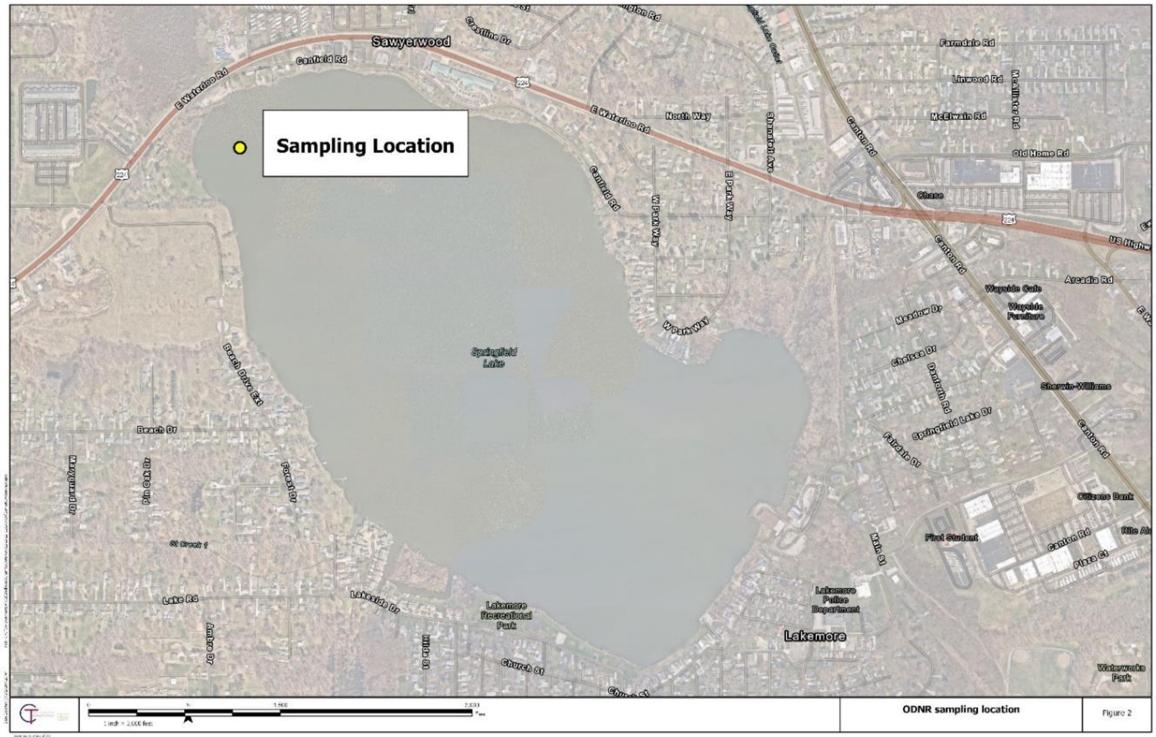
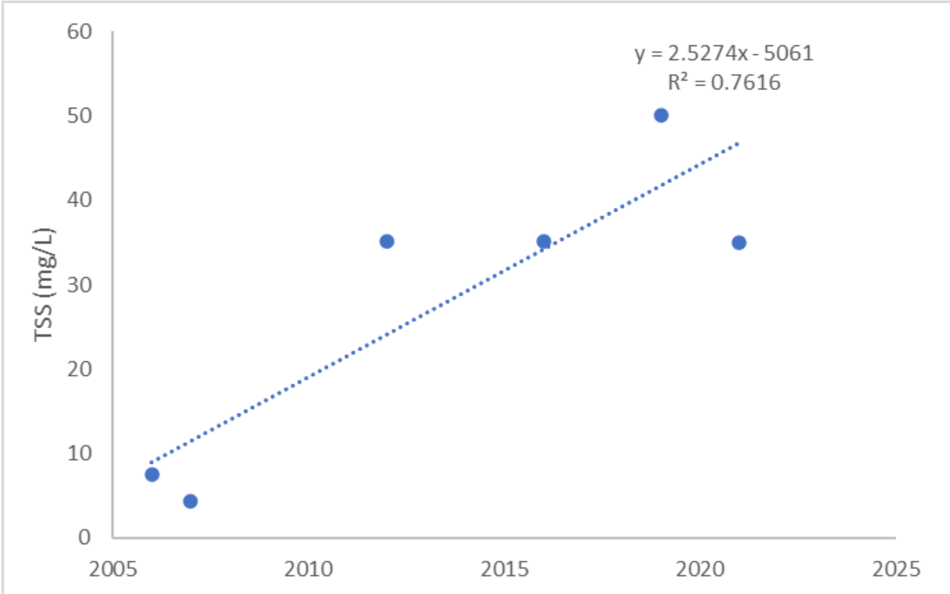


Figure 3: Total Suspended Solids Sample Location Map

Location ID	Location Description	Date	TSS (mg/L)	Clarity
1	80340	2006	7.5	Clear
		2007	4.3	Clear
		2012	35.2	Cloudy
		2016	35.2	Cloudy
		2019	50.1	Cloudy
		2021	35	Cloudy

Table 1: Total Suspended Solids Results



Graph 1: Total Suspended Solids Overall Graph

Evaluation

Over time, total suspended solids appear to be increasing, as illustrated in Graph 1. As stated above, water samples with TSS levels between 40 and 80 mg/l tend to appear cloudy. This may indicate poor water quality.

Conductivity

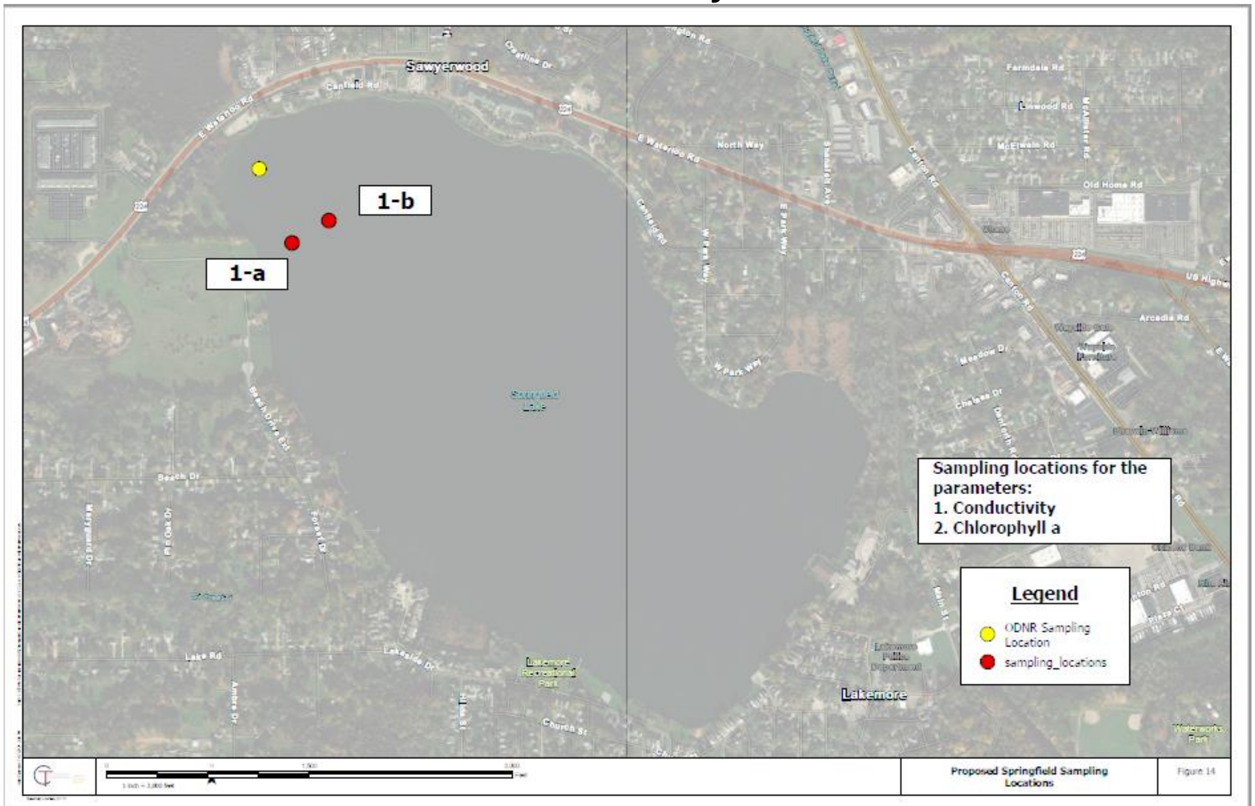


Figure 4: Springfield Lake 1a and 1b Sample Location for Conductivity and Chlorophyll a

Location ID	Location Description	Date	Specific Conductance(µS/cm)	Saline vs. Non-Saline
1	80340	2012	670	Non-Saline
		2016	694	Non-Saline
		2019	614	Non-Saline

Table 2: ODNR Results for Conductivity

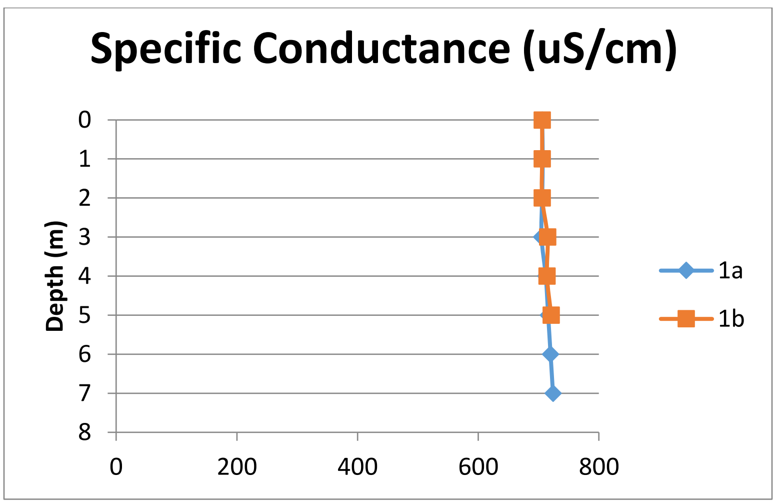
Springfield Lake 1a			
Date	**Depth (m)**	**Specific Conductance (µS/cm)**	**Saline vs. Non-Saline**
6/21/2023	0	706	Non-Saline
	1	707	Non-Saline
	2	706	Non-Saline
	3	705	Non-Saline
	4	712	Non-Saline
	5	716	Non-Saline
	6	720	Non-Saline

	7	724	Non-Saline

Table 3: Springfield Lake 1a Conductivity Results

Springfield Lake 1b			
Date	**Depth (m)**	**Specific Conductance (µS/cm)**	**Saline vs. Non-Saline**
6/21/2023	0	706	Non-Saline
	1	706	Non-Saline
	2	706	Non-Saline
	3	715	Non-Saline
	4	714	Non-Saline
	5	721	Non-Saline

Table 4: Springfield Lake 1b Conductivity Results



Graph 2: Conductivity Springfield Lake 1a and 1b Results Graph

Evaluation
All three locations where specific conductance measurements were taken in the lake were sampled from the northwest corner of Springfield Lake. The average of all of the results is 749 uS/cm. This level indicates that the lake water is not saline. Some possible sources include road salt runoff and failing sewage systems. High conductivity may indicate water is unsuitable for fish and/or macroinvertebrates. The results of the conductivity are still at a stable level for fish and macroinvertebrates.

Total Nitrogen (TN)

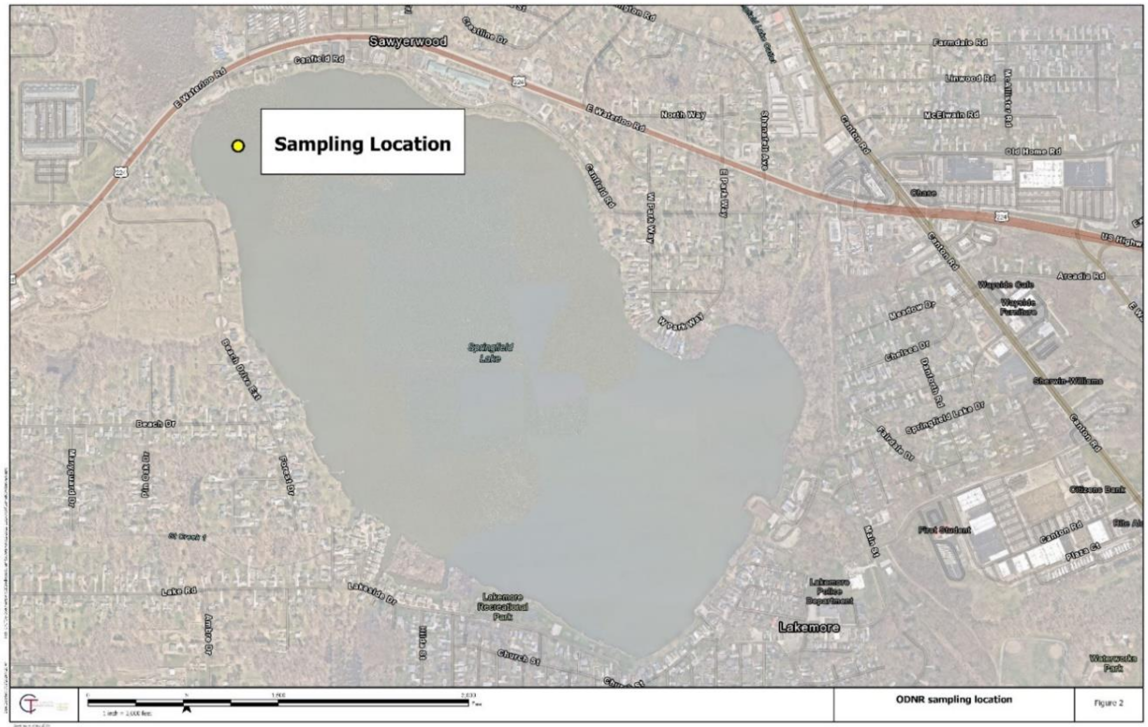
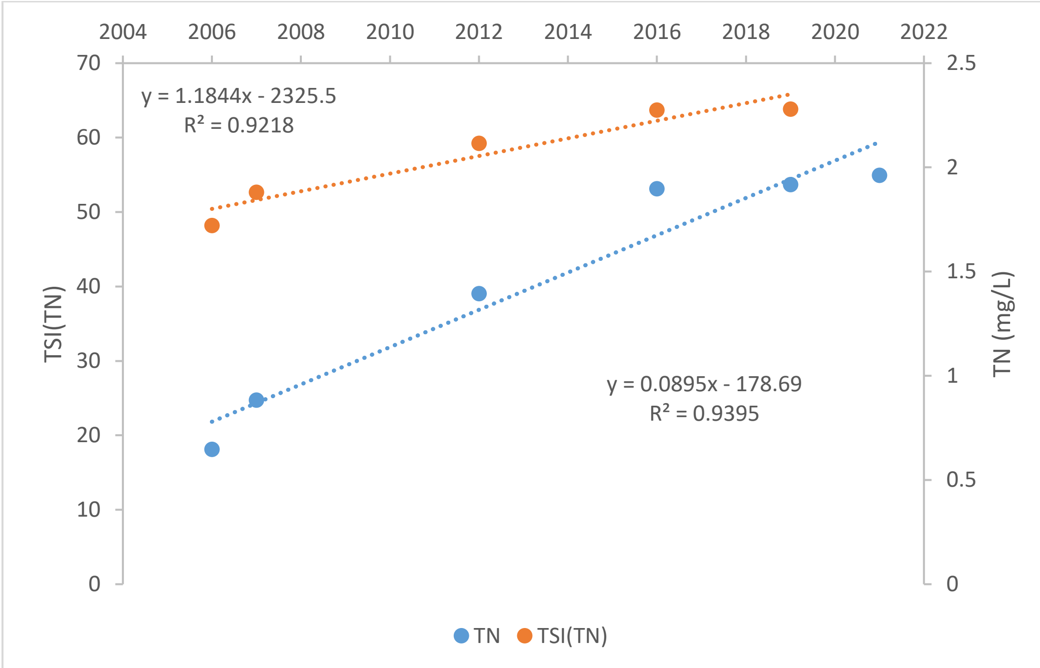


Figure 5: Springfield Lake Sampling Location for Total Nitrogen

Location ID	Location Description	Date	TN mg/L	TSI (TN)	Category
1	80340	2006	0.648	48	Mesotrophic
		2007	0.884	53	Eutrophic
		2012	1.394	59	Eutrophic
		2016	1.898	64	Eutrophic
		2019	1.918	64	Eutrophic
		2021	1.962	64	Eutrophic

Table 5: ODNR Springfield Lake TN Results



Graph 3: ODNR Springfield Lake TN Results

Evaluation

The trophic state index for total nitrogen (TN) values is increasing slightly over time; however, between the years 2016 to 2021, the results of both TSI and TN concentration have been relatively stable. Springfield Lake is considered to be eutrophic state based on TSI measurements. The eutrophic level indicates that Springfield Lake has a high level of biological productivity and a greater amount of nutrients, able to support an abundance of algae, aquatic plants, birds, fish, insects, and other wildlife. The water quality of Springfield Lake is currently considered fair quality. A trophic state above 60 but below 70 can be considered highly productive and a reasonable lake for fishing and most water sports, although a stated above, TSI values for TN are increasing over time.

Total Phosphorus (TP)

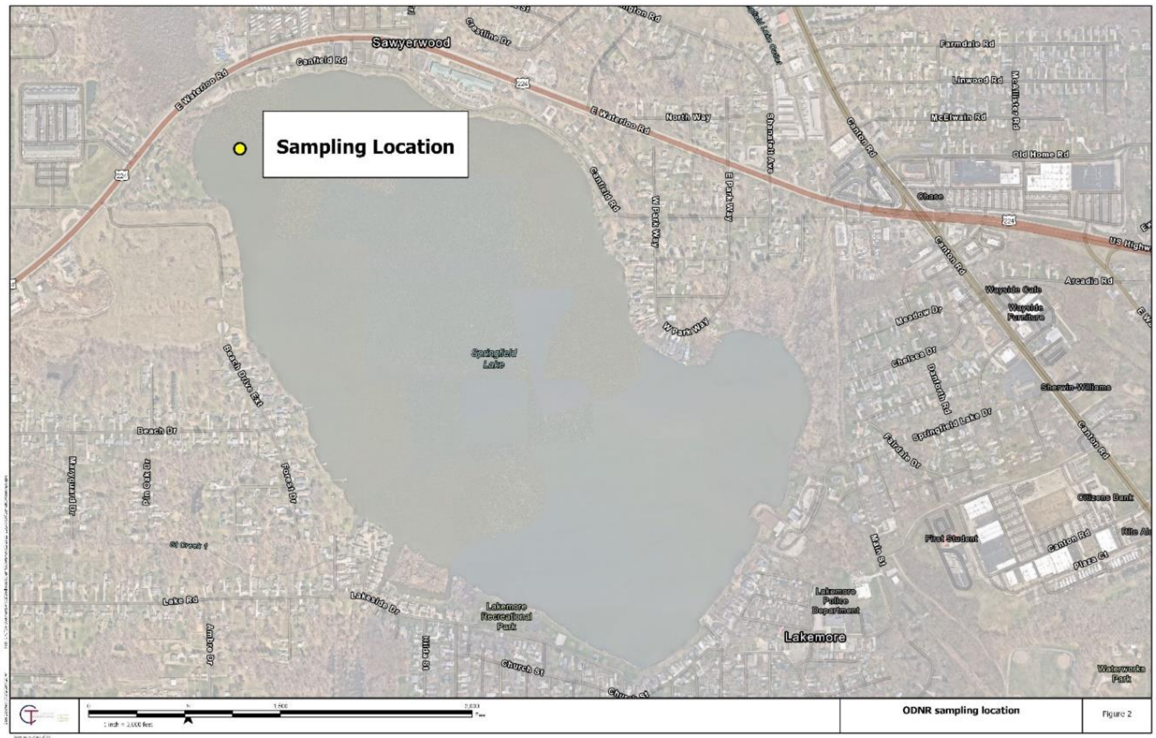
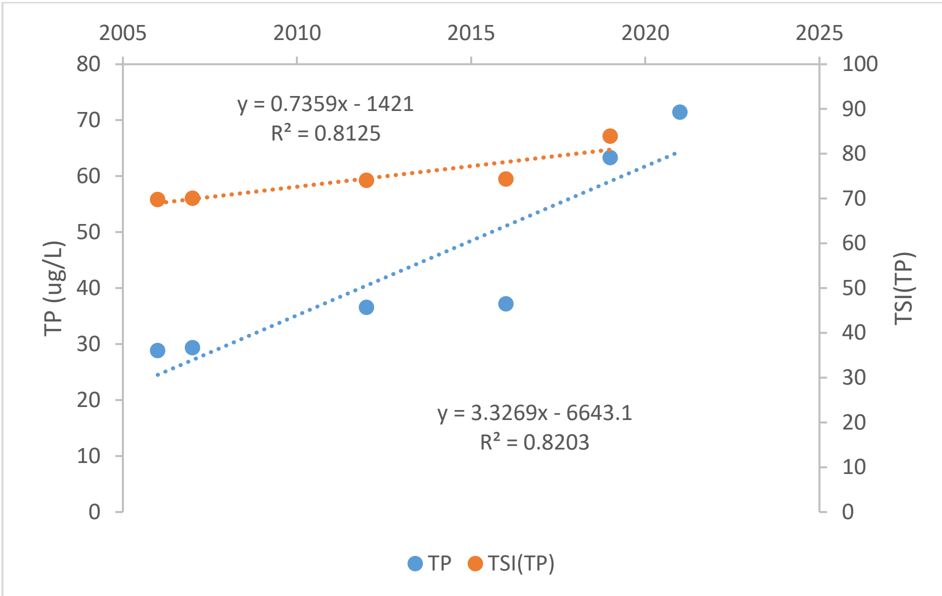


Figure 6: Springfield Lake Sampling Location for Total Phosphorous

Location ID	Location Description	Date	TP (µg/L)	TSI(TP)	Category
1	**80340**	2006	36.1	55.86434	Eutrophic
		2007	36.7	56.10204	Eutrophic
		2012	45.7	59.26466	Eutrophic
		2016	46.5	59.5149	Eutrophic
		2019	79.2	67.1939	Eutrophic
		2021	89.3	68.92466	Eutrophic

Table 6: ODNR Springfield Lake TP Results



Graph 4: ODNR Springfield Lake TP Results

Evaluation

Currently, Springfield Lake TSI values based on total phosphorus (TP) indicate that the lake is eutrophic, indicating that the water quality is marginal and could become worse if trends continue. TP concentrations have more than doubled over the study time. **Trophic state index for TP values are increasing over time and indicate Springfield Lake is trending towards a hypereutrophic state**. Hypertrophic or hypereutrophic lakes are very nutrient-rich lakes characterized by frequent and severe nuisance algal blooms and low transparency. Hypereutrophic lakes have a visibility depth of less than 3 feet (90 cm). Excessive algal blooms can also significantly reduce oxygen levels and prevent life from functioning at lower depths creating dead zones beneath the surface. Increased levels of total phosphorus can encourage the growth of nuisance plants such as algal blooms.

Chlorophyll / Chlorophyll *a*

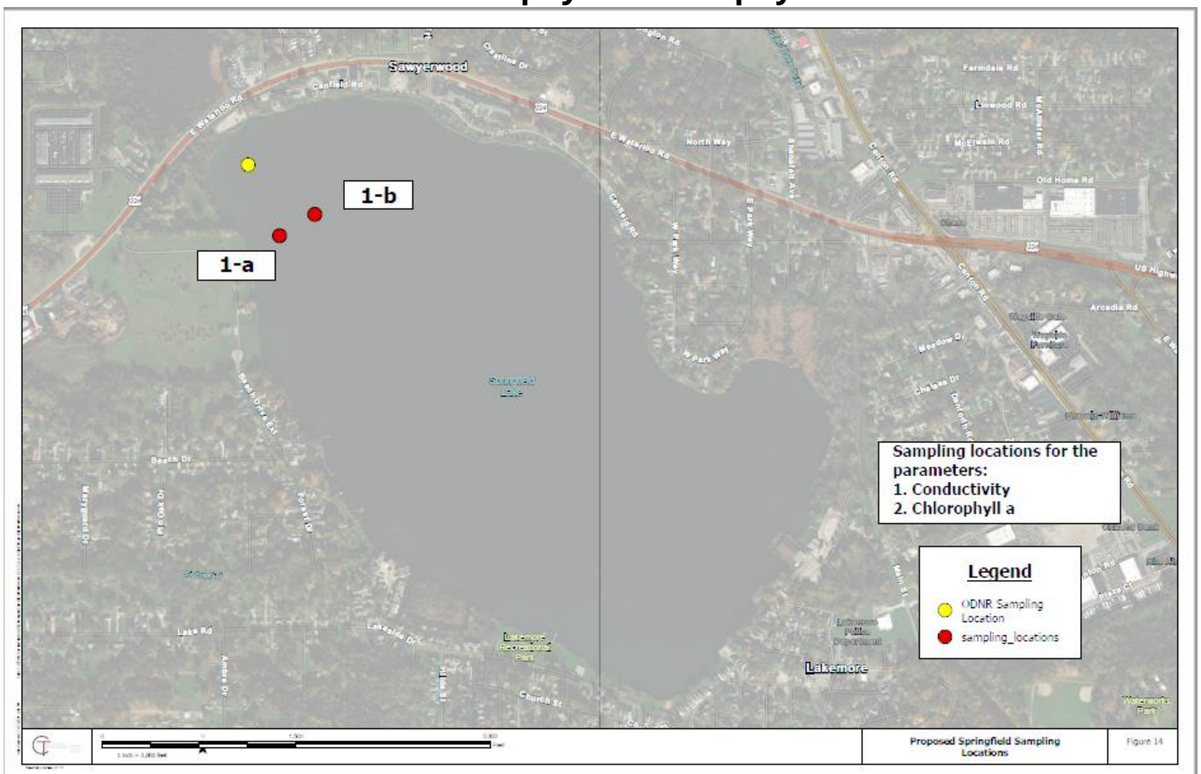
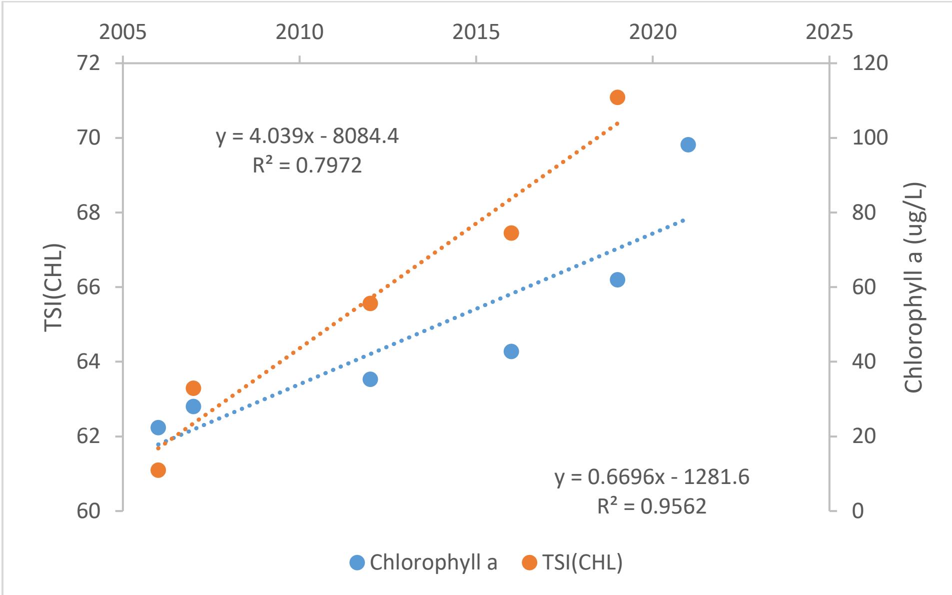


Figure 7: Springfield Lake Sampling Location for Conductivity and Chlorophyll *a*

Date	CHL ug/L	TSI(CHL)	Category
2006	22.4	61.09989	Eutrophic
2007	28	63.28893	Eutrophic
2012	35.3	65.56169	Eutrophic
2016	42.8	67.45164	Eutrophic
2019	62	71.08719	Hypereutrophic
2021	98.2	75.59853	Hypereutrophic

Table 7: ODNR Springfield Lake Chlorophyll a Results



Graph 5: ODNR Springfield Lake Chlorophyll *a* Results

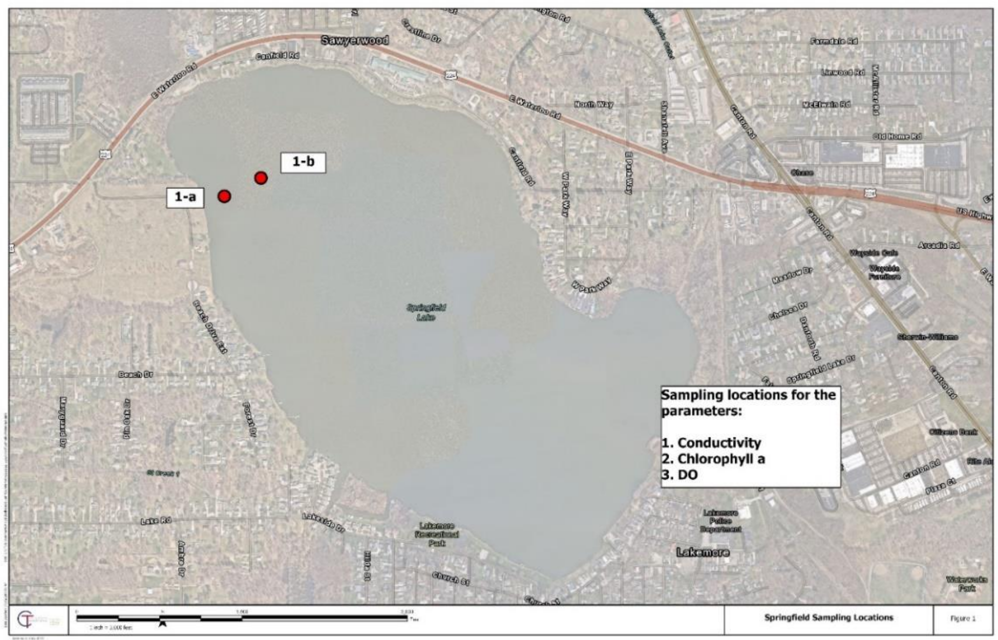


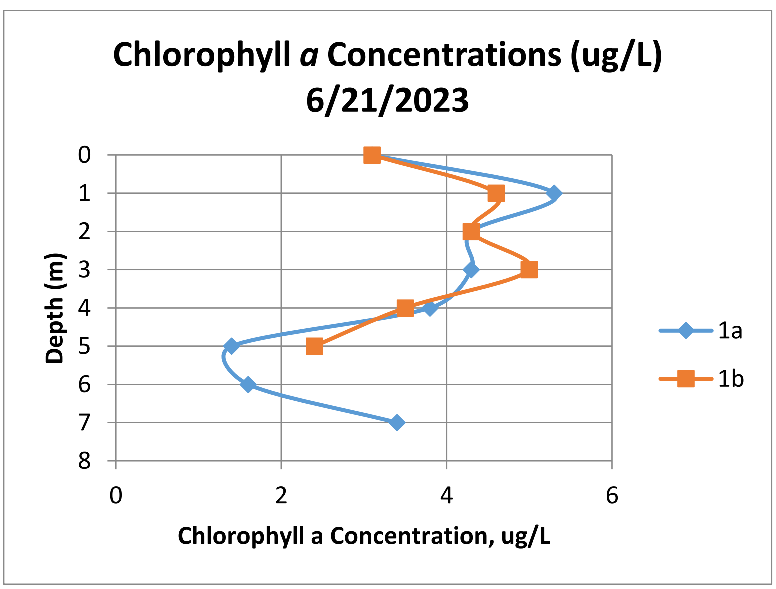
Figure 8: Springfield Lake 1a and 1b Sample Location for Chlorophyll a

Springfield Lake 1a			
Date	**Depth (m)**	**Chlorophyll (µg/L)**	**Chlorophyll RFU**
6/21/2023	0	3.1	0.8
	1	5.3	1.3
	2	4.3	1.1
	3	4.3	1.1
	4	3.8	1
	5	1.4	0.4
	6	1.6	0.4
	7	3.4	0.7

Table 8: Springfield Lake 1a Results

Springfield Lake 1b			
Date	**Depth (m)**	**Chlorophyll (µg/L)**	**Chlorophyll RFU**
6/21/2023	0	3.1	0.8
	1	4.6	1.2
	2	4.3	1.1
	3	5	1.3
	4	3.5	0.9
	5	2.4	0.6

Table 9: ODNR Springfield Lake 1b Results



Graph 6: Akron Watershed Department Springfield Lake Chlorophyll *a* Results

*It is to be noted that any results received by external agencies are to be read and understood with caution.

Evaluation

Chlorophyll is a priority parameter used to classify lake trophic state. It is helpful at predicting algal biomass. Chlorophyll concentrations have tripled during the sampling time and the corresponding TSI values exceed 70, indicating Springfield Lake is in a **hypereutrophic state**. **Chlorophyll *a* concentrations greater than 20-30 µg/L are usually associated with algal blooms. All six (6) Springfield Lake ODNR samples shown in Graph 5 exceeded 20 µg/L. The average chlorophyll *a* concentration was 48 µg/L**. At this average concentration, it would be highly recommended to restrict or prohibit recreational activities, swimming, or fishing within Springfield Lake.

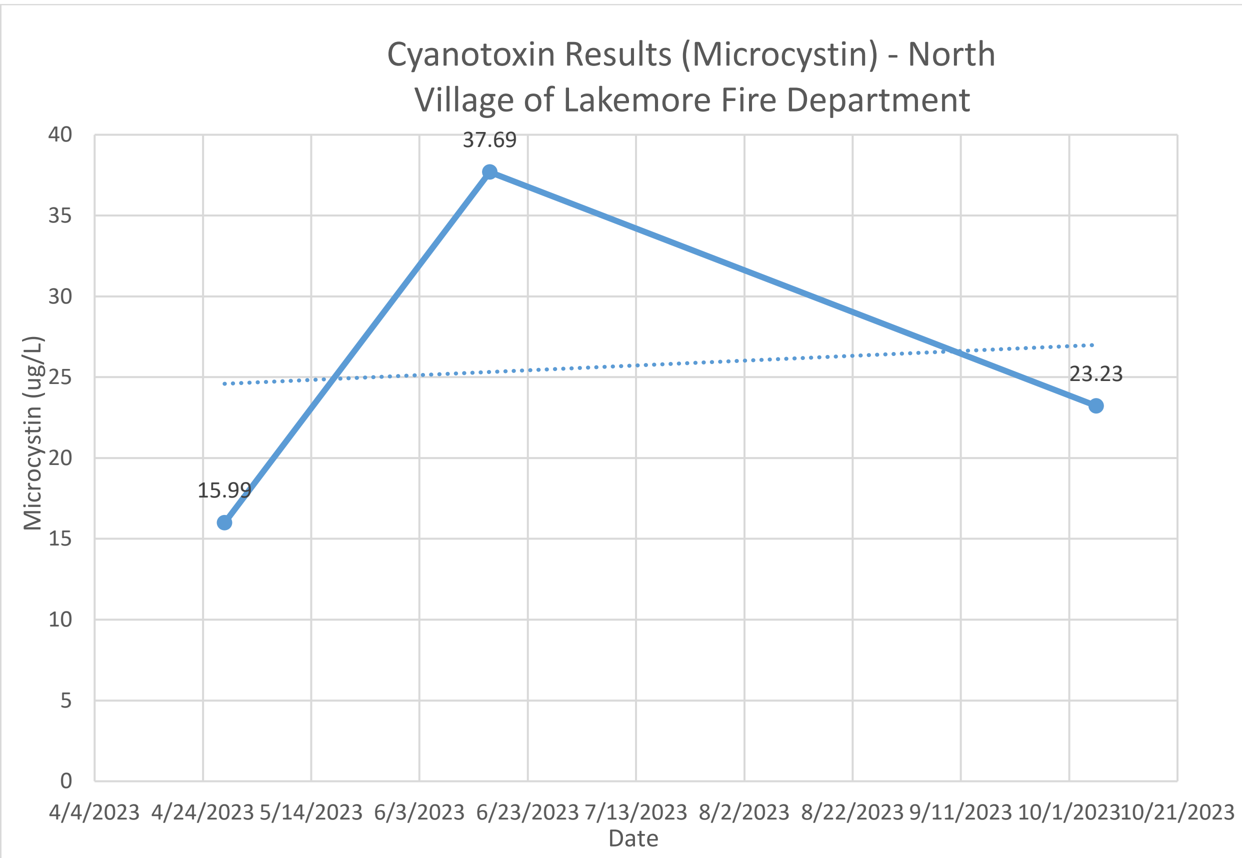
Cyanotoxin Analysis

Figure 9: Village of Lakemore Fire Department Sample Location for Cyanotoxin

Location	Date	Microcystin Cyanotoxin Results (ug/L)	Associations with Algal Blooms(Yes, Maybe, or No)[1]
North	4/28/2023	15.99	No
	6/16/2023	37.69	Yes
	10/6/2023	23.23	Maybe

Table 10: Village of Lakemore Fire Department North Cyanotoxin Results

1- An algal bloom will occur if (microcystin concentrations ≥ 30 µg/L), maybe (microcystin concentrations ≥ 20 µg/L but < 30 µg/L) and no (microcystin concentrations < 20 µg/L).



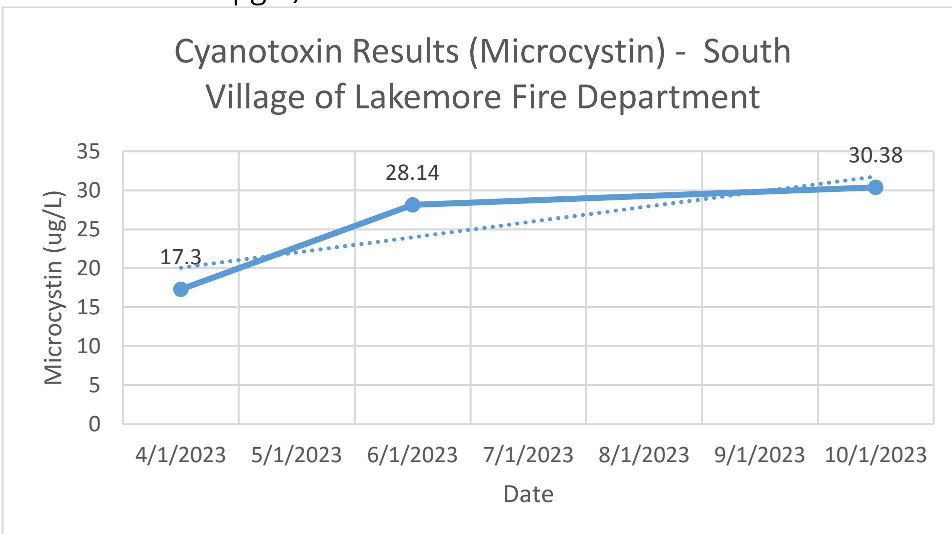
Graph 7: North Cyanotoxin Results

Location	Date	Cyanotoxin Results (ug/L)	Associations with Algal Blooms(Yes, Maybe, or No)[1]
South	4/28/2023	17.3	No
	6/16/2023	28.14	Maybe

	10/6/2023	30.38	Yes

Table 11: Village of Lakemore Fire Department South Cyanotoxin Results

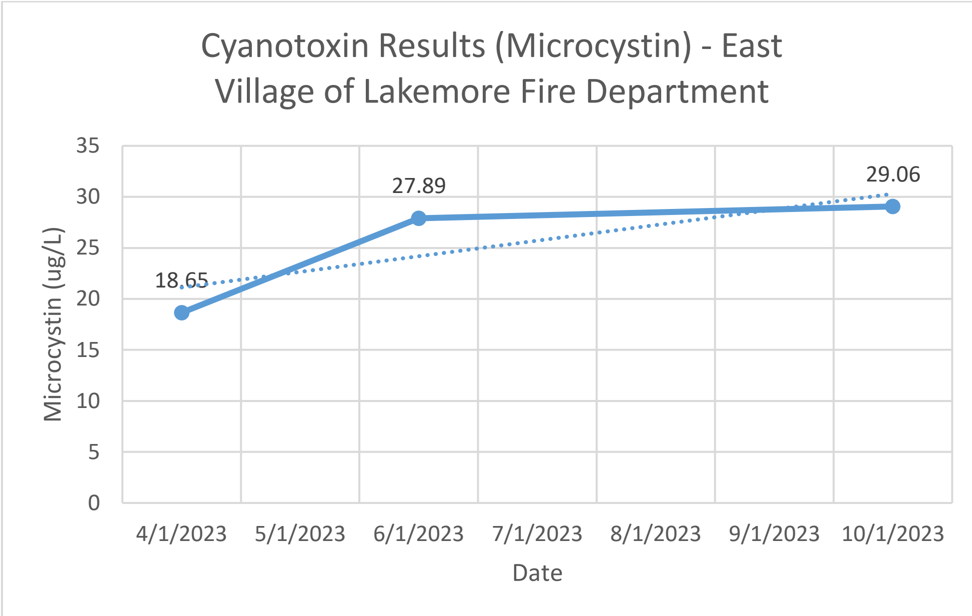
1- An algal bloom will occur if (microcystin concentrations ≥ 30 µg/L), maybe (microcystin concentrations ≥ 20 µg/L but < 30 µg/L) and no (microcystin concentrations < 20 µg/L).



Graph 8: South Cyanotoxin Results

Location	Date	Microcystin Cyanotoxin Results (ug/L)	Associations with Algal Blooms(Yes, Maybe, or No)[1]
East	4/28/2023	18.65	No
	6/16/2023	27.89	No
	10/6/2023	29.06	No

1- Table 12: Village of Lakemore Fire Department East Cyanotoxin ResultsAn algal bloom will occur if (microcystin concentrations ≥ 30 µg/L), maybe (microcystin concentrations ≥ 20 µg/L but < 30 µg/L) and no (microcystin concentrations < 20 µg/L).

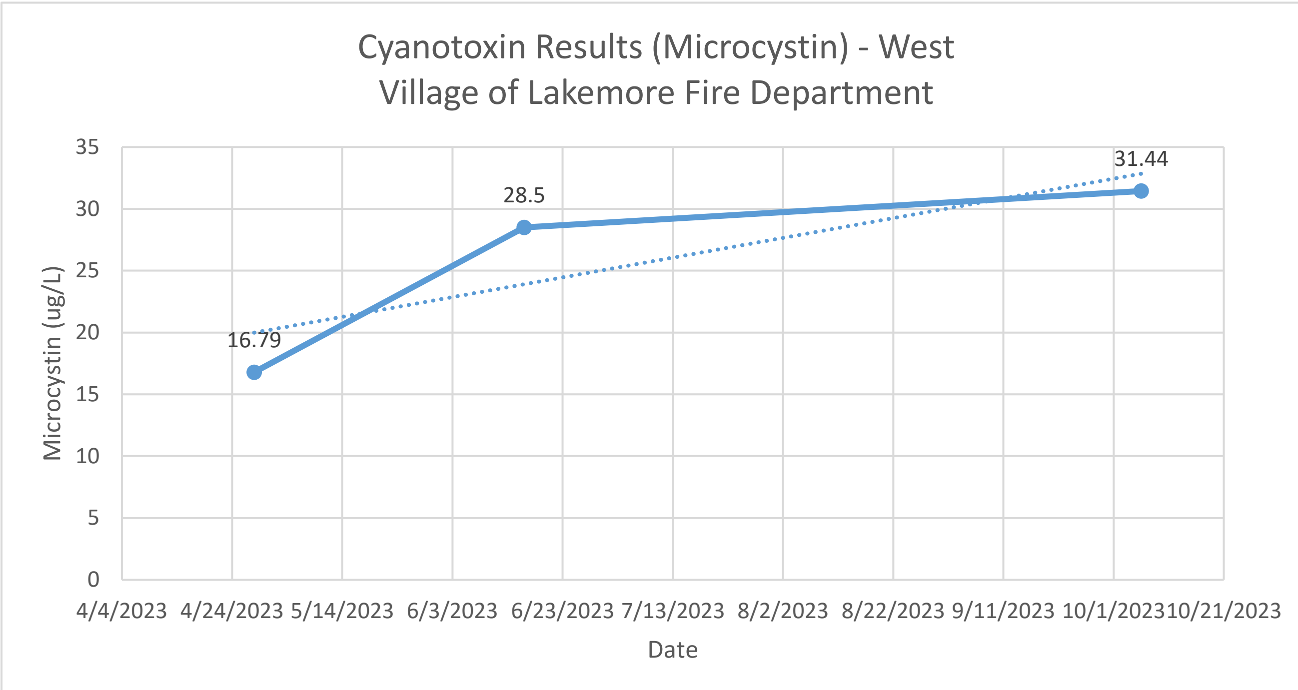


Graph 9: East Cyanotoxin Results

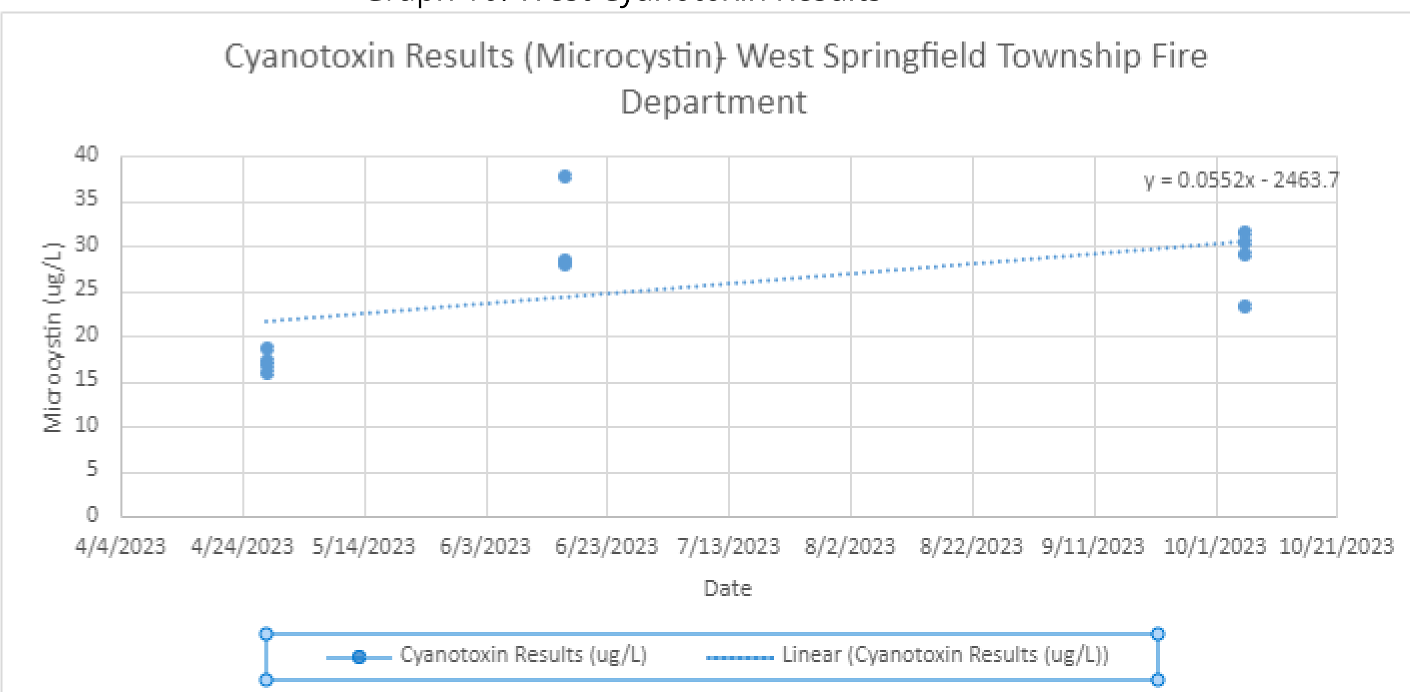
Location	Date	Microcystin Cyanotoxin Results (ug/L)	Associations with Algal Blooms(Yes, Maybe, or No)[1]
West	4/28/2023	16.79	No
	6/16/2023	28.5	No
	10/6/2023	31.44	Yes

Table 13: Village of Lakemore Fire Department West Cyanotoxin Results

1- An algal bloom will occur if (microcystin concentrations ≥ 30 μg/L), maybe (microcystin concentrations ≥ 20 μg/L but < 30 μg/L) and no (microcystin concentrations < 20 μg/L).



Graph 10: West Cyanotoxin Results



Graph 11: Total Cyanotoxin Results for West Springfield Township Fire Department

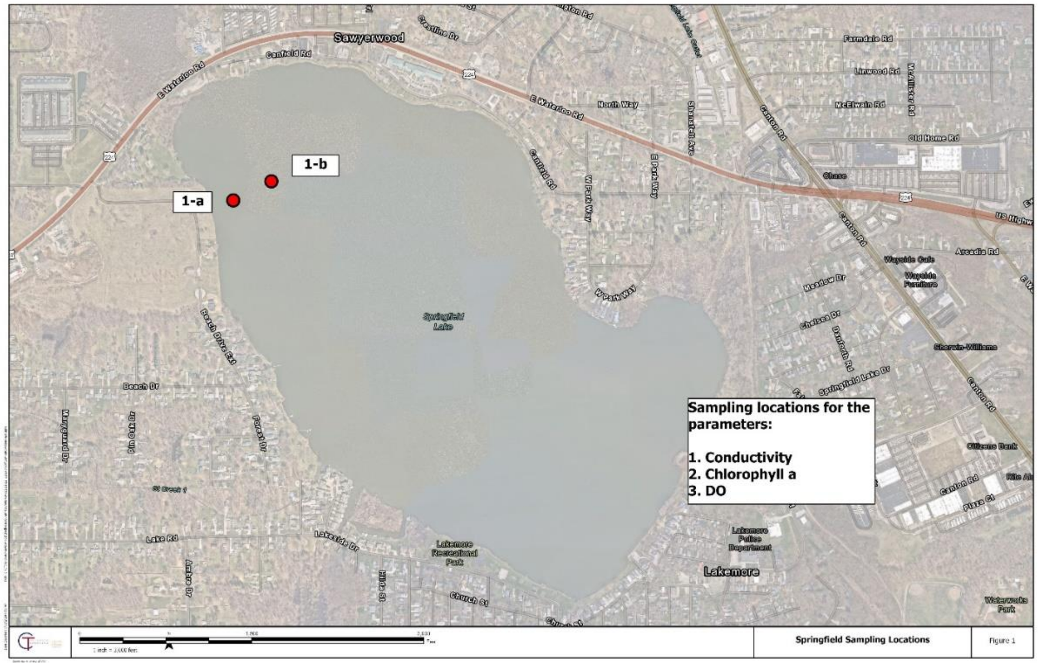


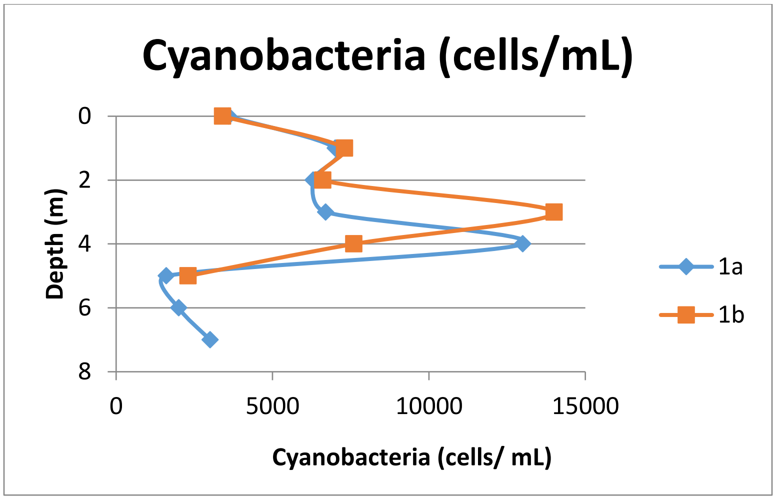
Figure 10: Springfield Lake 1a and 1b Sample Location for Cyanobacterial Abundance

Springfield Lake 1a			
Date	**Depth (m)**	**Blue-Green Algae (cells/mL)**	**Blue-Green RFU**
6/21/2023	0	3600	1.4
	1	7000	2.2
	2	6300	2.2
	3	6700	2.4
	4	13000	4.9
	5	1600	0.8
	6	2000	0.9
	7	3000	1.4

Table 14: Springfield Lake 1a Cyanobacterial Abundance Results

Springfield Lake 1b			
Date	**Depth (m)**	**Blue-Green Algae (cells/mL)**	**Blue-Green RFU**
6/21/2023	0	3400	1.5
	1	7300	2.5
	2	6600	2.3
	3	14000	4.5
	4	7600	2.6
	5	2300	1

Table 15: Springfield Lake 1b Cyanobacterial Abundance Results



Graph 12: Springfield Lake 1a and 1b Cyanobacterial Abundance Results

Evaluation:

Microcystin concentrations less than 20-30 µg/L do not **trigger** algal blooms. Rather they are the **consequence** of algal blooms. The relevance of this comparison is that microcystin concentrations greater than 20-30 µg/L are likely to be accompanied by visually observable blooms; this "visual signal" is a plus when trying to manage recreator exposures to lake water, so signs stating "Do not contact water when algal blooms are present" can be posted for municipal staff or the public. However, since US EPA's and Ohio EPA's recommended criterion for prohibiting swimming is 8 µg/L, there are potential situations when microcystin concentrations may be unsafe for swimming but are not accompanied by visual bloom material. This situation is problematic unless regular monitoring is conducted.

The results for cyanobacterial abundance (number of blue-green algae) for Springfield Lake 1a and 1b showed similar patterns. Between depths of 3 meters to 4 meters, the highest amount of blue-green algae (cells/m) was observed. At Springfield Lake 1a, the cyanobacterial cell counts approximately doubled from samples taken at depths of 3 meters to 4 meters (6,700 cells/mL to 13,000 cells/mL). At Springfield Lake 1b, the cyanobacterial cell counts also approximately doubled from samples taken at depths of 2 meters to 3 meters (6,600 cells/mL to 14,000 cells/mL). These results indicate that the highest populations of cyanobacteria may not be found at the surface and may thus not be conspicuous too observers on the shore. If the cyanobacterial genera include *Anabaena* or *Planktothrix*, the location of the highest number of cells within the water column may vary based upon the light intensity incident upon the lake surface, migrating to depth under conditions of high light intensity (midday sun, light cloud cover) and closer to the surface under conditions of low light intensity (early morning, late afternoon, or heavy cloud cover). This phenomenon is known as vertical migration; populations of *Anabaena* and *Planktothrix* have the ability to regulate their buoyancy through organelles called gas vesicles.

E. coli Review

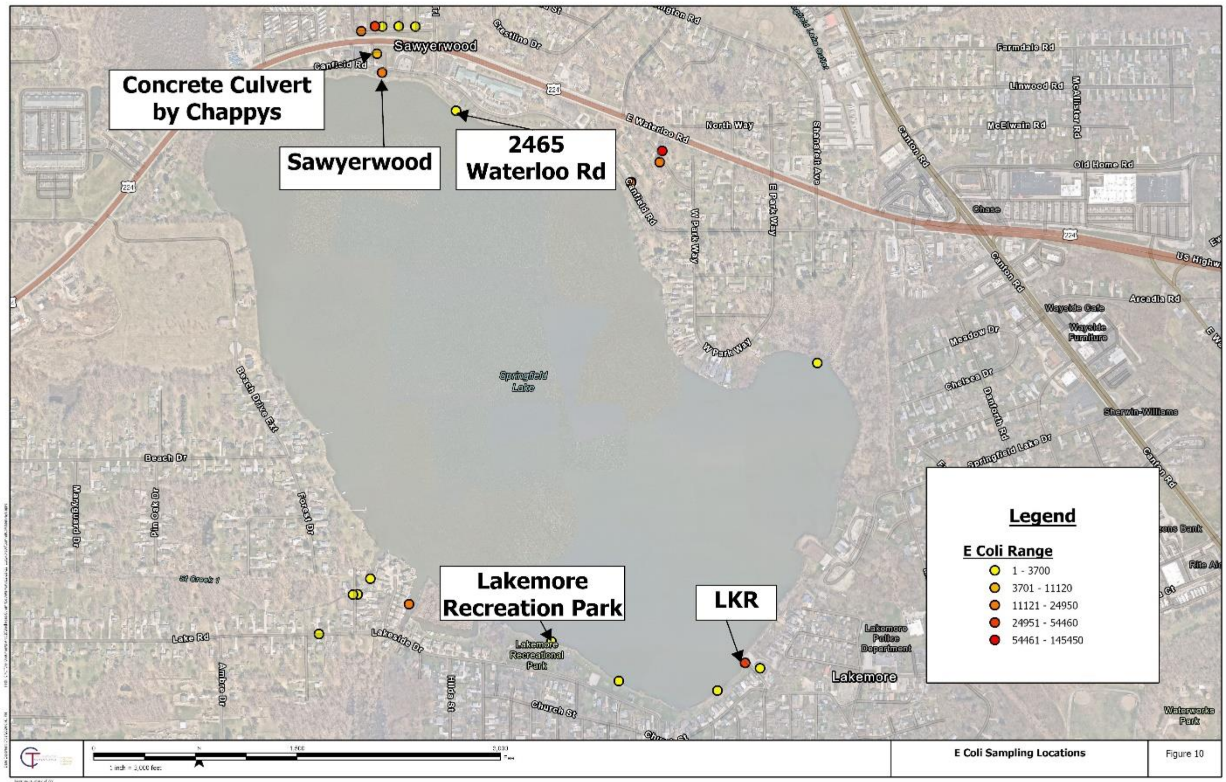
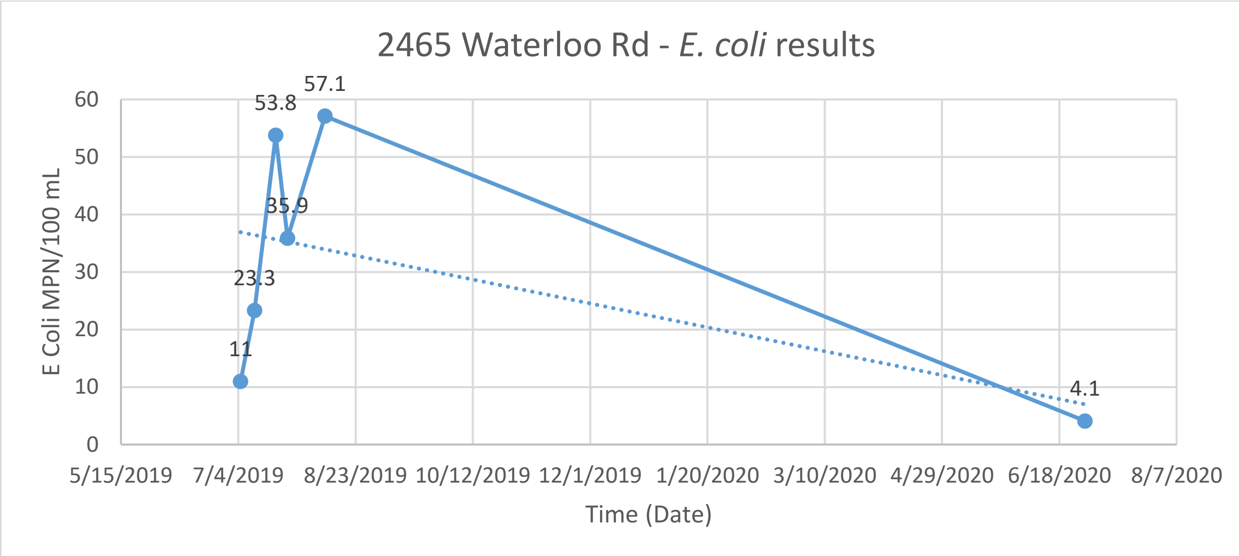


Figure 11: Springfield Lake Sample Location Map for *E. coli* Results

2465 Waterloo Rd	
Date	***E. coli* (MPN/100 mL)**
7/5/2019	11
7/11/2019	23.3
7/20/2019	53.8
7/25/2019	35.9
8/10/2019	57.1
6/29/2020	4.1

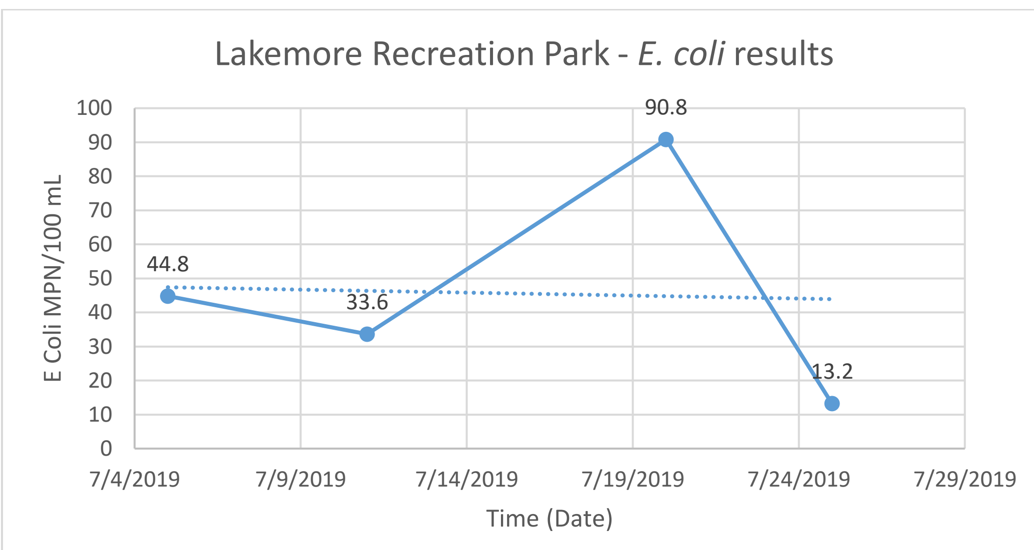
Table 16: 2465 Waterloo Road Results



Graph 13: 2465 Waterloo Road *E. coli* Results

Lakemore Recreation Park	
Date	***E. coli* (MPN/100mL)**
7/5/2019	44.8
7/11/2019	33.6
7/20/2019	90.8
7/25/2019	13.2

Table 17: Lakemore Recreational *E. coli* Results

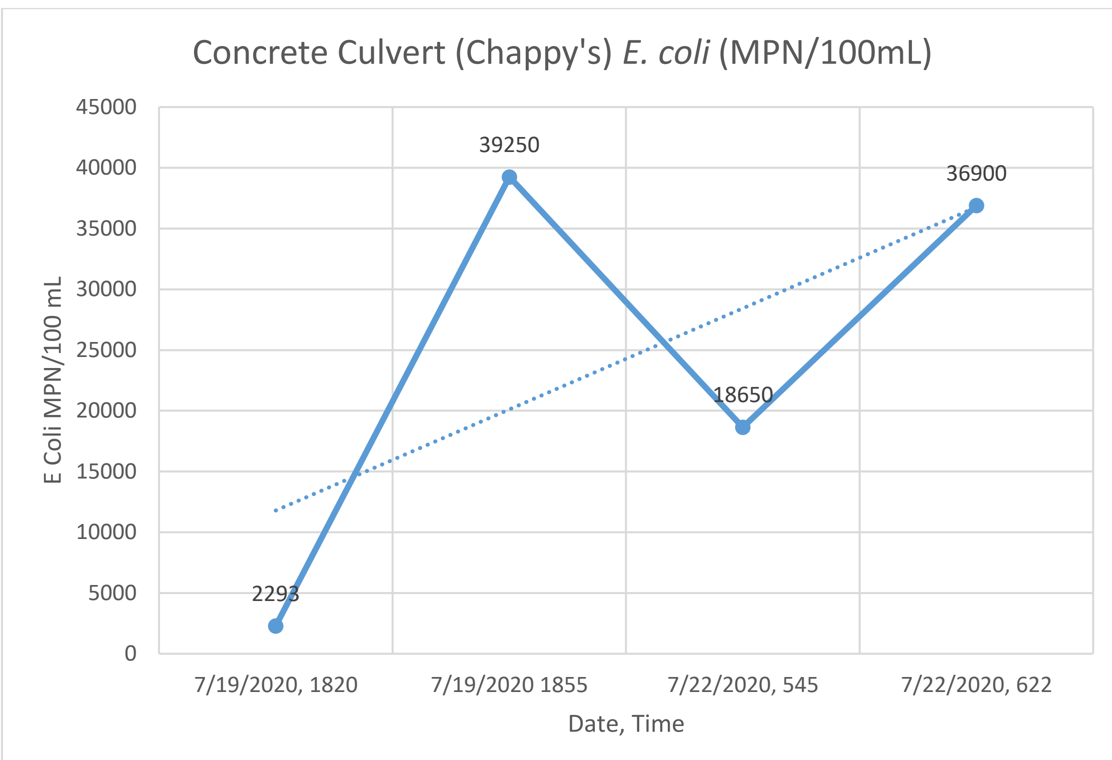


Graph 14: Lakemore Recreational *E. coli* Results

Concrete Culvert by Chappys		
Date, Time	***E. coli*** **(MPN/100mL)**	**Location**
7/19/2020, 1820	2293	Ground flow over grass
7/19/2020 1855	39250	Ground flow over grass
7/22/2020, 545	18650	Ground flow over grass
7/22/2020, 622	36900	Ground flow over grass
8/1/2020, 1006	3700	Taken North of 224, roadway flow into culvert
8/1/2020, 1014	8500	Taken South side 224, long light rain, ducks by outlet

* Did not graph the last 2 results as the sampling locations were not stated

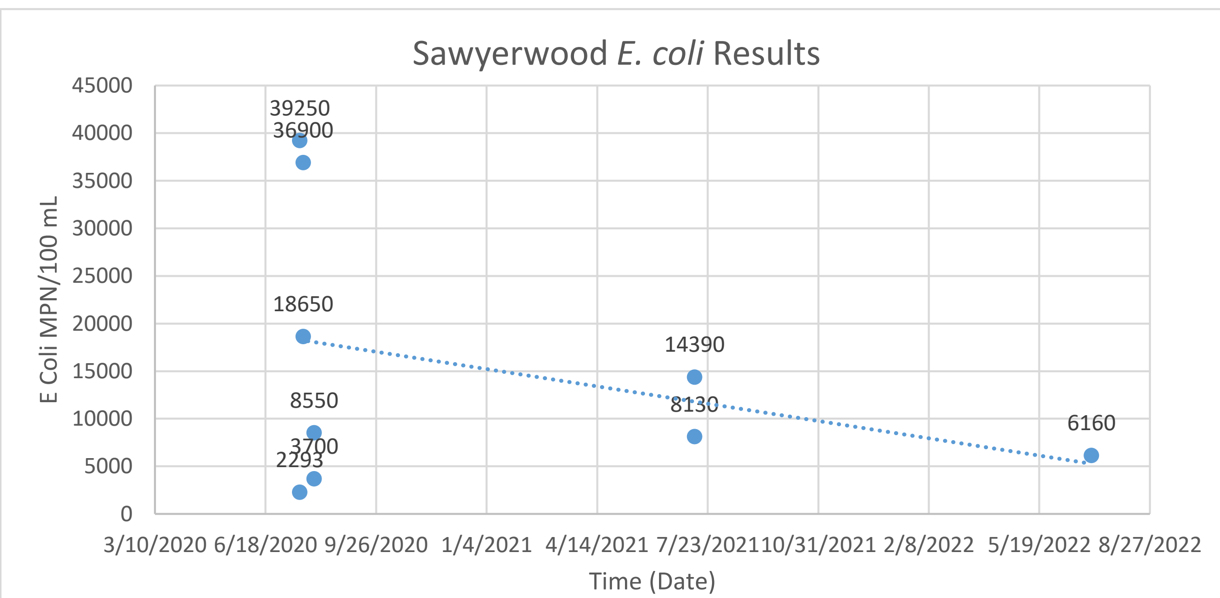
Table 18: Culvert by Chappys E.Coli Results



Graph 15: Culvert by Chappys *E. Ccoli* Results

Sawyerwood		
Sampling Date	**Value (MPN/100mL)**	**Location**
7/19/2020	2293	SAW.02 (41.034675, -81.443495)
7/19/2020	39250	SAW.01 (41.034675, -81.443495)
7/22/2020	18650	SAW.01 (41.034675, -81.443495)
7/22/2020	36900	SAW.02 (41.034675, -81.443495)
8/1/2020	3700	SAW1.01 (41.034675, -81.443495)
8/1/2020	8550	SAW2.01 (41.034675, -81.443495)
7/11/2021	8130	CHAPPYS.CROSS.1 (41.034675, -81.443495)
7/11/2021	14390	CHAPPYS.CROSS.2 (41.034675, -81.443495)
7/5/2022	6160	Chappys cross

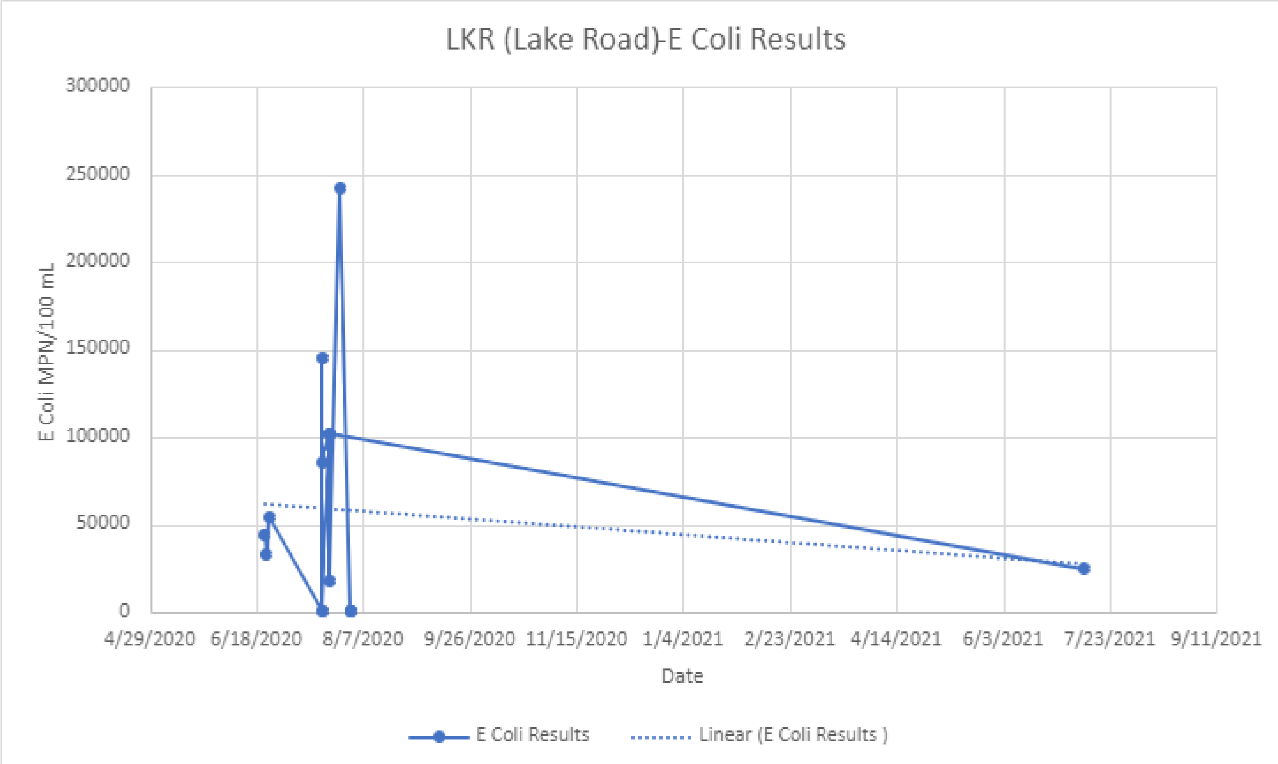
Table 19: Sawyerwood *E. coli* Results



Graph 16: Sawyerwood *E. coli* Results

LKR (Lake Road)		
Date	***E. coli* Results (MPN/100mL)**	**Location**
7/11/2021	24950	LKR.01 (41.022625, -81.433968)
7/11/2021	34480	LKR.02 (41.022625, -81.433968)
8/1/2020	1265	LKR.01 (41.022625, -81.433968)
8/1/2020	1000	LKR.02 (41.022625, -81.433968)
7/22/2020	102300	LKR.01 (41.022625, -81.433968)
7/22/2020	18450	LKR.02 (41.022625, -81.433968)
7/19/2020	1040	LKR.01 (41.022625, -81.433968)
7/19/2020	145450	LKR.02 (41.022625, -81.433968)
7/19/2020	86150	LKR.03 (41.022625, -81.433968)
6/22/2020	44100	1-E (41.022625, -81.433968)
6/22/2020	32850	2-E (41.022625, -81.433968)
6/22/2020	54460	3-E (41.022625, -81.433968)
6/23/2020	32850	Lake Road Concrete Outfall
6/24/2020	54460	Lake Road Concrete Outfall
7/19/2020	1040	Lake Road Concrete Outfall
7/19/2020	145450	Lake Road Concrete Outfall
7/19/2020	86150	Lake Road Concrete Outfall
7/22/2020	102300	Lake Road Concrete Outfall
7/22/2020	18450	Lake Road Concrete Outfall
7/27/2020	242000	Lake Road Concrete Outfall
8/1/2020	922	Lake Road Concrete Outfall
8/1/2020	950	Lake Road Concrete Outfall

Table 20: LKR (Lake Road) *E. coli* Results



Graph 17: LKR *E. coli* Results

Evaluation

It is to be noted that there were over 80 *E. coli* results that were collected and submitted. Of the 80, 48 results were shown and graphed above. The results that were not included in the 48 results, were inconclusive or only one sample was provided per sample location. A trend of results at those locations were unable to be completed. All samples that were shown above were collected surrounding Springfield Lake and not directly within the lake.

Summit County Public Health Summit County Public Health states above **1,030** E.coli/100mL is considered a public health nuisance. Of the 48 *E. coli* results, 33 of those are well above the limit of 1,030 MPN/100 mL.

Ohio EPA in OAC 3745-1-37 Table 37-2 indicates a E. coli levels at designated swimming beaches should not exceed 90-d GM of 126 cfu/100 mL and an STV of 410 cfu/100 mL for both bathing waters and primary contact recreational waters. An STV of 235 cfu/100mL is the basis of a beach or bathing water advisory.

As stated above, *E. coli* levels at designated swimming beaches should not exceed 88 per 100 milliliter (mL) in any one sample, or exceed a three-sample geometric mean average over a 60-day period of 47/100 mL. Recreational waters that are not designated beaches should not have more than 406 E. coli/100 mL in any one sample, or more than 126/100 mL in a 60-day, three-sample geometric mean average. The US EPA says that the geometric mean of at least five samples should not exceed 200 bacterial colonies per 100 milliliters (mL), and no single sample should exceed 400 colonies per 100 mL. All results, except for the ones collected at 2465 Waterloo Road and Lakemore Recreational Park, were well over 200 bacterial colonies per 100 milliliters (mL) and 400 colonies per 100 mL.

Additional Parameters Measured
Secchi Disk

Secchi Disk - Another indicator for water clarity is Secchi Disk (SD). Observable trends show that Springfield Lake **water clarity is decreasing over time**. Eutrophication is the process by which an entire body of water, or parts of it, becomes progressively enriched with minerals and nutrients, particularly nitrogen and phosphorus. Eutrophication is also defined as "nutrient-induced increase in phytoplankton productivity". Trophic state equations can be used to estimate the total weight of biomass in a waterbody. The trophic state index ranges between 0 and 100. There are three basic trophic states for lakes: oligotrophic (0-40), mesotrophic (40-50), and eutrophic (50-70). Values above 70 indicate a hypereutrophic state. **Springfield Lake is trending toward staying in a hypereutrophic state**. At the current rate, the Secchi Depth levels observed in 2021 read at a Hypereutrophic state. A TSI of 72 was read in 2021 with a SD depth reading of 45 cm.

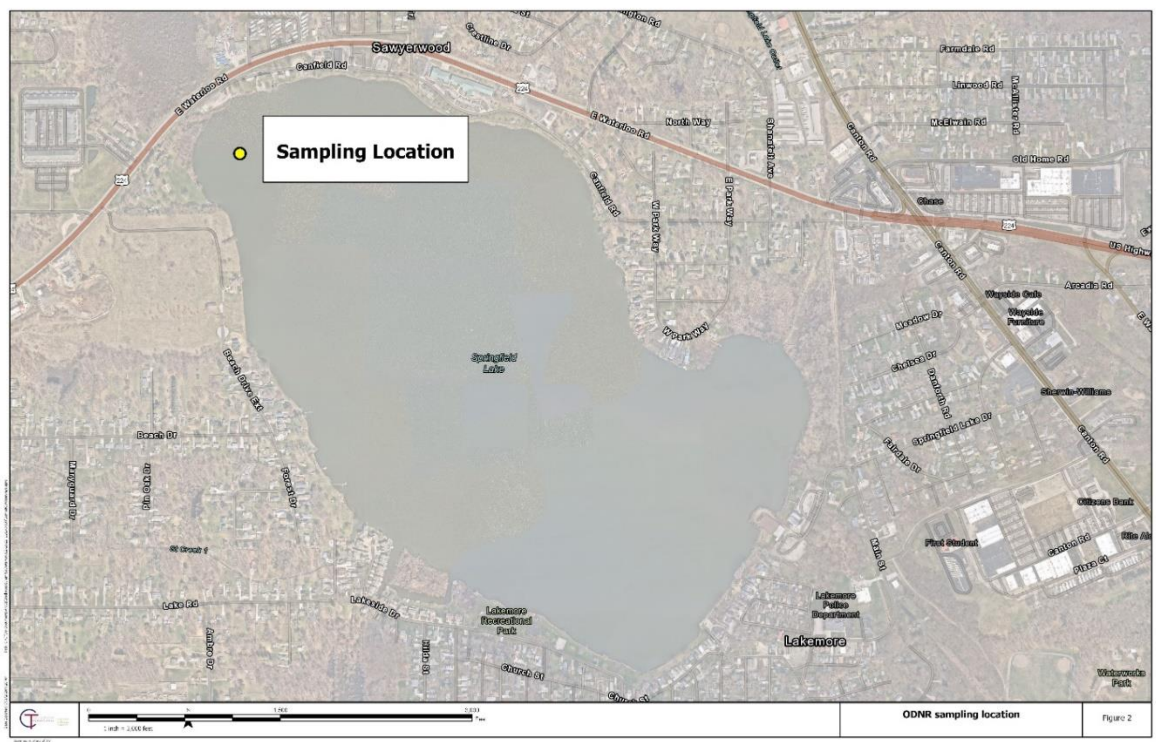
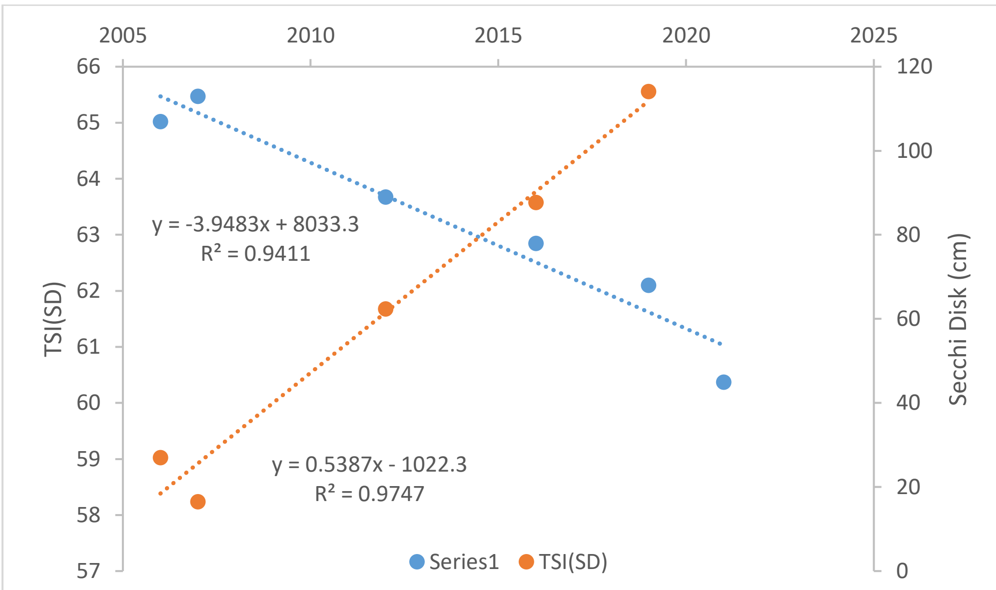


Figure 11: Springfield Lake Sampling Location for Secchi Disk

Date	SD	SD	TSI(SD)	Category
	cm	m		
2006	107	1.07	59.02504	Eutrophic
2007	113	1.13	58.23884	Eutrophic
2012	89	0.89	61.67925	Eutrophic
2016	78	0.78	63.58033	Eutrophic
2019	68	0.68	65.5574	Eutrophic
2021	45	0.45	71.5065	Eutrophic

Table 21: ODNR Springfield Lake Secchi Disk Results



Graph 18: Secchi Results

pH

pH is pH is an expression of hydrogen ion concentration in water. Specifically, pH is the negative logarithm of hydrogen ion (H^+) concentration (mol/L) in an aqueous solution: pH = $-\log_{10}(H^+)$ U.S. EPA water quality criteria for pH in freshwater suggest a range of 6.5 to 9.

Fluctuating pH or sustained pH outside this range physiologically stresses many species and can result in decreased reproduction, decreased growth, disease or death.

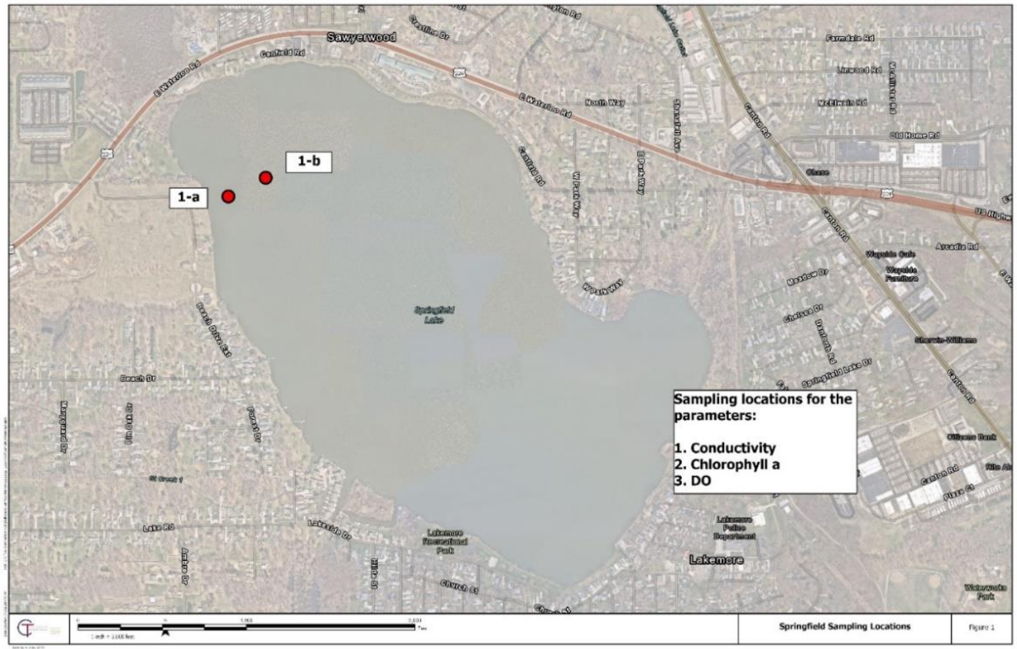


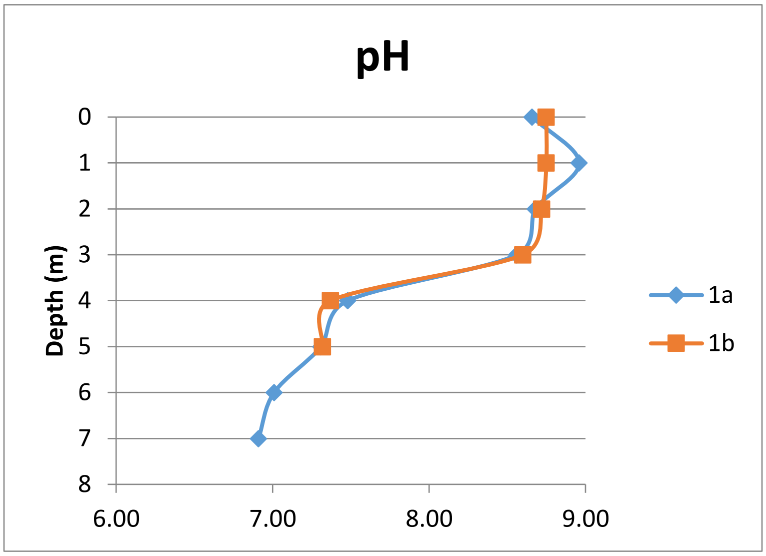
Figure 13: Springfield Lake 1a and 1b Sample Location for pH

Springfield Lake 1a		
Date	**Depth (m)**	**pH**
6/21/2023	0	8.66
	1	8.96
	2	8.68
	3	8.56
	4	7.48
	5	7.31
	6	7.01
	7	6.91

Table 22: ODNR Springfield Lake 1a pH Results

Springfield Lake 1b		
Date	**Depth (m)**	**pH**
6/21/2023	0	8.75
	1	8.75
	2	8.72
	3	8.60
	4	7.37
	5	7.32

Table 23: ODNR Springfield Lake 1b pH Results



Graph 19: pH Results for both Springfield Lake 1a and 1b

Dissolved Oxygen

Dissolved oxygen (DO) is the amount of oxygen that is present in water. Water bodies receive oxygen from the atmosphere and from aquatic plants. Running water, such as that of a swift moving stream, dissolves more oxygen than the still water of a pond or lake.

DO is an important measure of water quality as it is a direct indicator of an aquatic resource's ability to support aquatic life. For the National Aquatic Resource Surveys (NARS), levels of DO are measured with a calibrated water quality probe meter, usually in conjunction with measurements for temperature and pH. While each organism has its own DO tolerance range, generally, DO levels less than 5 mg/L are considered stressful for fish and levels less than 3 mg/L are too low to support fish. DO levels below 1 mg/L are considered hypoxic and usually devoid of complex aquatic life.

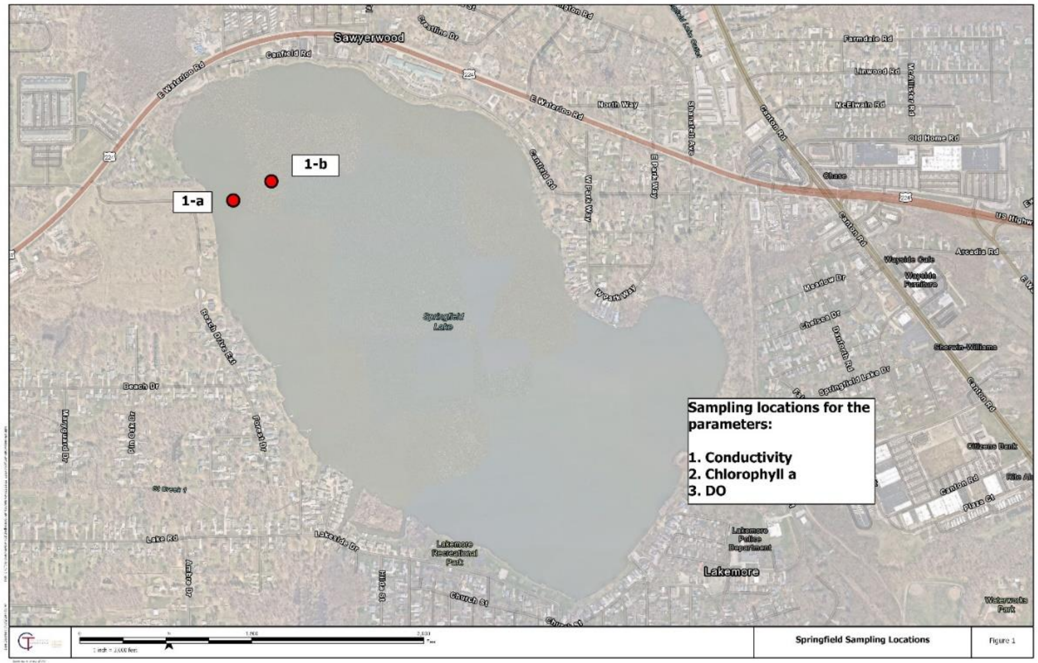


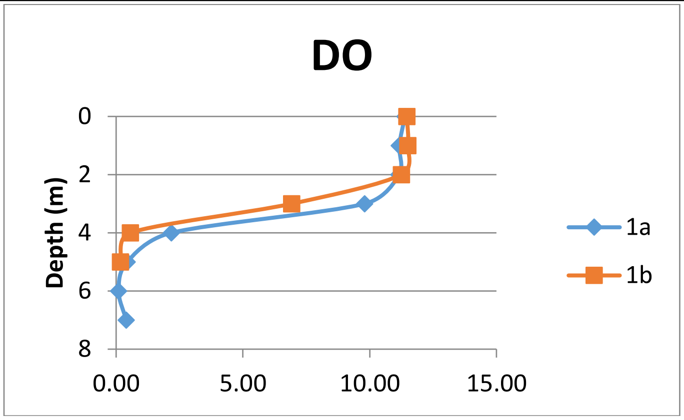
Figure 14: Springfield Lake 1a and 1b Sample Location for Dissolved Oxygen

Springfield Lake 1a		
Date	**Depth (m)**	**DO (mg/L)**
6/21/2023	0	11.39
	1	11.17
	2	11.15
	3	9.81
	4	2.18
	5	0.44
	6	0.1
	7	0.4

Table 24: ODNR Springfield Lake 1a DO Results

Springfield Lake 1b		
Date	**Depth (m)**	**DO (mg/L)**
6/21/2023	0	11.47
	1	11.51
	2	11.25
	3	6.93
	4	0.56
	5	0.18

Table 25: ODNR Springfield Lake 1b DO Results



Graph 20: DO Results for both Springfield Lake 1a and 1b

Executive Summary

Springfield Lake has had a history of water quality issues that have been preventing the public from recreational activities. The report above discusses parameter results that have been collected from 2006 to 2023. Below is an executive summary table that outlines every parameter, the safe detection ranges, and the results.

Parameter	Unit	Safe Detection Range (Unit)	Lowest Result (Unit)	Average Result (Unit)	Highest Result (Unit)	Within Safe Range*
Total Suspended Solids (TSS)	mg/l	20 (clear)- 150 mg/l (dirty)	4.3 mg/l	28 mg/l	50.1 mg/l	Cloudy
Conductivity	µS/cm	0-200 µS/cm	614 µS/cm	796 µS/cm	749 µS/cm	Non-Saline
Total Nitrogen	TSI	oligotrophic (0-40), mesotrophic (40-50), eutrophic (50-70) TSI	48 TSI	59 TSI	64 TSI	Eutrophic
Total Phosphorus	TSI	oligotrophic (0-40), mesotrophic (40-50), and eutrophic (50-70) TSI	55.86 TSI	61.14 TSI	68.92 TSI	Eutrophic

Chlorophyll A	TSI	oligotrophic (0-40), mesotrophic (40-50), and eutrophic (50-70) TSI	61.1 TSI	67.4 TSI	75.6 TSI	Eutrophic (Highest value indicated Hypereutrophic State)
Cyanobacteria (Blue Green Algae)	μg/L	0-30 μg/L	15.99 μg/L	25.42 μg/L	37.69 μg/L	Consequence of Algal Bloom
E. Coli	MPN/100mL Or cfu/100mL	0-1,030 cfu/100 mL (MPN/100 mL)	13.2 (MPN/100mL)	27,987 (MPN/ 100ML)	242,000 (MPN/ 100ML)	Public Health Nuisance

Table 25. Executive Summary of Parameters

*Safe range results are based on average results

Overall, Springfield Lake water quality is showing evidence of continual decline. Water clarity is trending towards a hypereutrophic state. Conductivity is trending to levels that may affect fish and macroinvertebrate health. Total Phosphorus levels witnessed are at hypereutrophic state. Chlorophyll *a* levels witnessed are at hypereutrophic state and indicative of potential algal blooms. Reported concentrations of microcystin in lake water samples (including April, June, and October sampling dates) ranged from 15.99 μg/L to 37.69 μg/L. Thus, the microcystin concentration reported from each sample exceeds the Ohio EPA recommended value for recreational waters of 8 μg/L (which is also the swimming advisory concentration).

It is recommended to continue to follow the recommended regimented sampling plan for the next several years in order to gather continual data that will show more accurate trends that are occurring in Springfield Lake. Also recommended is that this report be shared with the Summit County Department of Health so that proper considerations and actions may be taken to protect public heath.

References

American Water Works Association. (2015). *A Water Utility Manager's Guide to Cyanotoxins.* Water Research Foundation. A Water Utility Manager's Guide to Cyanotoxins (awwa.org)

Atlas Scientific Environmental Robotics. (2022, September 27). *What Is The Typical Water Conductivity Range?* Atlas Scientific. https://atlas-scientific.com/blog/water-conductivity-range/#:~:text=Conductivity%20ranges%20between%20water%20bodies,indicates%20that%20it%20is%20saline.

Campbell, B. (2021, September 9). *What is Total Suspended Solids (TSS)?* Wastewater Digest. https://www.wwdmag.com/utility-management/article/10939708/what-is-total-suspended-solids-tss

David W. Litke. (1999). *Review of Phosphorus Control Measures in the United States and Their Effects on Water Quality.* https://pubs.usgs.gov/wri/wri994007/pdf/wri99-4007.pdf

Environmental Protection Agency. (2019, June 28). *Cyanobacteria and Cyanotoxins: Information for Drinking Water Systems*. Environmental Protection Agency. https://www.epa.gov/sites/default/files/2019-07/documents/cyanobacteria_and_cyanotoxins_fact_sheet_for_pws_final_06282019.pdf.pdf

Environmental Protection Agency. (2021, June 16). *Factsheet on Water Quality Parameters*. Environmental Protection Agency. https://www.epa.gov/system/files/documents/2021-07/parameter-factsheet_e.-coli.pdf

Environmental Protection Agency. (2023, June 20). *Indicators: Conductivity | US EPA*. Environmental Protection Agency. https://www.epa.gov/national-aquatic-resource-surveys/indicators-conductivity

Environmental Protection Agency. (2023, September 8). *Indicators: Dissolved Oxygen | US EPA*. Environmental Protection Agency. https://www.epa.gov/national-aquatic-resource-surveys/indicators-dissolved-oxygen

Environmental Protection Agency. (2024, February 29). *pH | US EPA*. Environmental Protection Agency. https://www.epa.gov/caddis/ph

Environmental Protection Agency. (2024, April 22). *Indicators: Cyanotoxins (microcystin) | US EPA*. Environmental Protection Agency. https://www.epa.gov/national-aquatic-resource-surveys/indicators-cyanotoxins-microcystin

Environmental Protection Agency. (2024, May 10). *Indicators: Chlorophyll a | US EPA*. Environmental Protection Agency. https://www.epa.gov/national-aquatic-resource-surveys/indicators-chlorophyll

Land Air Water Aotearoa. (n.d.). *Total Phosphorus (TP)*. Land Air Water Aotearoa. https://www.lawa.org.nz/learn/glossary/t/total-phosphorus-tp

Magnolia Fisheries. (n.d.). *A Secchi disk is the universal tool used to measure water clarity.* Magnolia Fisheries. https://magnoliafisheries.com/secchi-disk-explained/

Mayo Clinic. (2022, October 1). *E. coli - Symptoms and causes*. Mayo Clinic. https://www.mayoclinic.org/diseases-conditions/e-coli/symptoms-causes/syc-20372058

MiCorps. (2020, January 24). *Stream and River Monitoring Data Sheets*. Grand Valley State University. https://www.gvsu.edu/cms4/asset/7629BB08-CDA5-EDA9-B36CECEF76D8D026/appendix_b_stream__river_monitoring.pdf

Miller, M. (2019, September 20). *Total Suspended Solids*. Between the Lakes. https://btldemofarms.org/?page_id=413

North American Lake Management Society. (n.d.). *The Robert Carlson Secchi Dip-In — What is a Secchi Disk? – North American Lake Management Society (NALMS)*. North American Lake Management Society (NALMS). https://www.nalms.org/secchidipin/monitoring-methods/the-secchi-disk/what-is-a-secchi-disk/

Process Insights. (2022, November 30). *TN Water Analysis Total Bound Nitrogen Water Analyzers*. Process Insights. https://www.process-insights.com/applications/tn-analysis/

Tuser, C. (2022, March 21). *What is Total Phosphorus?* Wastewater Digest. https://www.wwdmag.com/what-is-articles/article/10940686/kruger-veolia-water-technologies-what-is-total-phosphorus

Water Science School. (2018, June 5). *Bacteria and E. Coli in Water | U.S. Geological Survey*. USGS.gov. https://www.usgs.gov/special-topics/water-science-school/science/bacteria-and-e-coli-water

World Health Organization. (2018, February 7). *E. coli*. World Health Organization (WHO). https://www.who.int/news-room/fact-sheets/detail/e-coli

Appendix A

Data Sources from Collected Results

Appendix B
Sampling Plan

Appendix C
Master Excel Spreadsheet

Appendix A

Documents and databases reviewed include information from various sources. The sources and specific information are as follows:

1) Data provided by Springfield Township Trustees and the Springfield Lake Task Force
   a) 2019 Springfield Stormwater Report.pdf
   b) 2019 Tributary Report.pdf
   c) DFFOs II Lakemore.docx
   d) Lakemore Master Meter.pdf
   e) Lakemore NOV MS4 Sept 22, 2020.pdf
   f) Lakemore Outfalls.pdf
   g) Lakemore sewer map March 2021.pdf
   h) Springfield township outfalls.pdf
   i) Summit sewers Lakemore 2020.pdf
   j) Summit sewers Lakemore.pdf
   k) compldata_ResProd_SpringfieldLake 2002-2016.xlsx
   l) data_ResProd_SpringfieldLake_2019.xlsx
   m) 2020 Lakemore San Sys Map.pdf
   n) County sanitary east lake-heron pt.pdf
   o) County sanitary southern Lakemore.pdf
   p) Lake watershed map.pdf
   q) Summit sewers Lakemore.pdf
   r) Springfield-Lake-Task-Force---Summary-Report-and-Recommendations-PDF.pdf
   s) April 2020 SLTF Summary presentation.pdf
   t) Scanned from a Xerox Multifunction Printer

2) United States Geological Survey (USGS)
   a) Streamstats analysis completed for Springfield Lake

3) Ohio Environmental Protection Agency (OEPA)
   a) File review request submitted for Springfield Lake
   b) Nutrient criteria document

4) Summit County Engineers
   a) Health Department website reviewed for information regarding septic systems
   b) County GIS reviewed and downloaded pertinent shapefiles
      i) Sanitary system data obtained
      ii) Building parcel data utilized
      iii) Land use data utilized
   c) Springfield Lake Water Quality Report for Summit County Engineers
   d) Springfield Data

e) Springfield Lake Data
f) SpringfieldLake 3-5-24
g) Dies info 01Jul2020
    i) April 2020 SLTF Summary Presentation
    ii) Lake Road MS4 Samples
    iii) Spring_AE20062216_Final
h) Dies info 14Jul2020
    i) April 2020 Task force Summary Presentation
    ii) Water Sample 6-20-20
    iii) Water Sample 6-22-20
i) E coli test
    i) E. Coli Aug 1 2020
    ii) E. Coli July 12 2021
    iii) E. Coli July 19 2020
    iv) E. Coli July 22 2020
    v) E. Coli July 5 2022
    vi) E. Coli July 22 2020
    vii) E. Coli June 27 2022
    viii) Saw. Storm sample locator
    ix) Spirngfield Lake 04 26 23 results
j) ES cyanotoxins tests
    i) Springfield Lake 061022_Wakefield
    ii) Springfield Lake 10 06 23
    iii) Springfield lake samples 102722
    iv) Springfield_ Lake_ 08_31_23
k) From Al 15Jul2022
    i) Algal Species Killed By Sonication
    ii) ES_ Quantitative_ Springfield_20220606
    iii) Lakemore Storm 1 & 2
    iv) Lakemore Bio Summary Report 20220707
    v) Main Channel 1 & 2
    vi) Nutrient_ Criteria_ Document
    vii) Small Channel 1 & 2
    viii) Springfield Dock 1 & 2
    ix) Springfield Lake Testing

5) Ohio Department of Natural Resources (ODNR)
    a) Review and analysis of available surface water quality monitoring data

6) Northeast Ohio Regional Sewer District (NEORSD) Lab
    a) Spring_AE20062216_Final.pdf
    b) April 2020 Task force Summary presentation

c) Water sample 6-20-20
d) E. Coli Aug 1 2020
e) E. Coli July 12 2021
f) E. coli July 19, 2020
g) E. Coli July 22 2020
h) E. Coli July 5 2022
i) E. coli June 22 2020
j) E. Coli June 27 2022
k) Spring_AE20062216_Final

7) Daivid Dies
   a) Lakemore drain pipe
   b) Lakemore drain to the lake 5-29-2020
   c) Dies 14Jul2020
   d) Springfield lake
   e) Video
   f) Aerial Views of Dies 26Jun23 Videos
   g) Fwd Videos of storm sewers
   h) Dies email Jul2020.msg

8) EnviroScience
   a) Spring_AE20062216_Final
   b) Springfield Lake 04 26 23 results
   c) Springfield Lake 061022_Wakefield
   d) Springfield Lake 10 06 23
   e) Springfield Lake samples 102722
   f) springfield_lake_ 08_31_23
   g) LakemoreBioSummaryReport_20220707

9) Adam Walter Labs
   a) Lakemore Storm 1 & 2 (1)
   b) LakemoreBioSummaryReport_20220707
   c) Main Channel 1 & 2 (2) (1)
   d) nutrient_criteria_document_2010
   e) Small Channel 1 & 2 (1)
   f) Springfield Dock 1 & 2 (1)
   g) Lake Road MS4 Samples
   h) OEPA

10) Village of Lakemore
   a) Lake Level information
   b) Springfield Lake 04 26 23 results

c) Springfield Lake 061022_ Wakefield
d) Springfield Lake 061723
e) Springfield Lake 10 06 23
f) Springfield Lake microcystin results 08 31 23
g) Springfield Lake Proposed Sampling Plan 08 31 23
h) Springfield Lake Samples 102722
i) Springfield Lake Supplemental info follow up email
j) Springfield Lake.msg
k) Springfield Presentation 08.30.23
l) SpringfieldLake_20220531_3ab
m) SpringfieldLake_20220815_3ab
n) SpringfieldLake_20221107
o) Springfieldlake2
p) Springfield Lake Graphs
q) Springfield Lake Outfalls

11) Summit County Public Health (SCPH)
  a) 03.21.2024
    i) 4.9.2020 Springfield Lake_ Concrete Steps
    ii) 4.09.2020 Springfield Lake _Lakemore
    iii) 4.09.2020 Springfield Lake_ Near Tree
    iv) 6.29.2019 Springfield Lake #1 Recreation Park Lakemore
    v) 6.29.2019 Springfield Lake #2 2465 Waterloo Road Springfield
    vi) 6.29.2019 Springfield Lake #3 1417 Lake Road Lakemore
    vii) 7.11.2019 Springfield Lake-L
    viii) 7.11.2019 Springfield Lake-S
    ix) 7.20.2019 Springfield Lake Lakemore
    x) 7.20.2019 Springfield Lake Springfield
    xi) 7.25.2019 Springfield Lake- Springfield
    xii) 7-5-19 Springfield Lake- Lakemore
    xiii) 7-5-19 Springfield Lake- Springfield
    xiv) 8.10.2019. Springfield Lake -L
    xv) 8.10.2019 Springfield Lake- S
  b) Springfield Lake Complaint (9-8-2021)

12) Summit Soil and Water Conservation District (SWCD)
  a) Data ONDR Springfield Lake table
  b) Ecoli Results_ Springfield Lake 06-22
  c) Lake E. coli results 2020
  d) Parameters for sampling downstream of Springfield Lake
  e) Springfield Lake Water Quality Report for Summit County Engineers
  f) Springfield Lake presentation 2.22.24

g) Springfield Lake 04_23_21
h) Springfield Lake 04-26-23
i) Springfield Lake 06_10_21
j) Springfield Lake 06_10_22
k) Springfield Lake 06_17_23
l) Springfield Lake 08_06_21
m) Springfield Lake 08_31_23
n) Springfield Lake 10_06_23
o) Springfield Lake 10_27_22

13) 2023 MS4 Annual Reporting
  a) 2023 Springfield Stormwater Report

14) City of Akron Documents
  a) Copy of SpringfieldLakeGraphs
  b) Jessica Glowczewski intro for testing and treating had in spr lake
  c) SL algaecide costs draft
  d) Springfield Lake Proposed Sampling Plan 8.31.23
  e) Springfield Lake Sampling Plan
  f) Springfield Lake Supplemental info follow up email
  g) Springfield presentation 8.30.23
  h) Springfieldlake2

Contact Information:

1. Jessica Glowczewski (Watershed Superintendent)
   Ryan Kovach
   City of Akron Water Bureau
   3308127835

2. Ellie Miller, BS, REHS
   Environmental Health Specialist
   Summit County Public Health
   1867 West Market Street, Akron, OH 44313
   Office: (330) 812-3974

3. Julie Hansel, REHS
   Summit County Public Health
   Office: (330) 812.3956

4. Ali Rogalski, REHS
   Summit County Public Health
   Office: (330) 926-5639

5. Sarah Barrow
   Watershed Coordinator – Cuyahoga River Basin
   Summit Soil and Water Conservation
   Office: 330.926.2538

6. Katie Beitko
   Aquatic Biologist
   EnviroScienceinc.com
   O. 800.940.4025

7. Tracy Sayers
   Village Administrator
   Village of Lakemore
   330-733-6125

8. Ted Weinsheimer
   Administrative Assistant to the Board of Trustees/Road Superintendent
   Springfield Township
   Phone: 330-734-4118

9. Robert K. Holmes
   Lab Analyst II, Watershed Division
   Mobile (330) 283-4026
   Akron Watershed Division

S.No	Location		Parameter	Frequency	Duration	Dates	Weather condition		Value	Units
	X	Y					Dry	Wet		
1	41.034034 N	-81.447303 W	TN	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TP	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TSS	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Secchi Disk	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Conductivity	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			pH	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			

				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Temperature	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		

S.No	Location		Parameter	Frequency	Duration	Dates	Weather condition		Value	Units
	X	Y					Dry	Wet		
2	41.034493 N	-81.443037 W	TN	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TP	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TSS	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Secchi Disk	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Conductivity	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		

				Wet #2	1year period	Any wet weather date May thru July		x			
			pH	May #1	1year period	1-May	x				
				May #2	1year period	15-May	x				
				June #1	1year period	1-Jun	x				
				June #2	1year period	15-Jun	x				
				July #1	1year period	1-Jul	x				
				July #2	1year period	15-Jul	x				
				Wet #1	1year period	Any wet weather date May thru July		x			
				Wet #2	1year period	Any wet weather date May thru July		x			
			Temperature	May #1	1year period	1-May	x				
				May #2	1year period	15-May	x				
				June #1	1year period	1-Jun	x				
				June #2	1year period	15-Jun	x				
				July #1	1year period	1-Jul	x				
				July #2	1year period	15-Jul	x				
				Wet #1	1year period	Any wet weather date May thru July		x			
				Wet #2	1year period	Any wet weather date May thru July		x			

S.No	Location		Parameter	Frequency	Duration	Dates	Weather condition		Value	Units
	X	Y					Dry	Wet		
3	41.03233	-81.437183	TN	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TP	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TSS	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Secchi Disk	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Conductivity	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		

				Wet #2	1year period	Any wet weather date May thru July		x		
			pH	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Temperature	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		

S.No	Location X	Location Y	Parameter	Frequency	Duration	Dates	Weather condition Dry	Weather condition Wet	Value	Units
4	41.026562 N	-81.431208 W	TN	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TP	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TSS	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
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				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Conductivity	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		

				Wet #2	1year period	Any wet weather date May thru July		x		
			pH	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Temperature	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		

S.No	Location		Parameter	Frequency	Duration	Dates	Weather condition		Value	Units
	X	Y					Dry	Wet		
5	41.022853 N	-81.433993 W	TN	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TP	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TSS	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Secchi Disk	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Conductivity	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		

				Wet #2	1year period	Any wet weather date May thru July		x		
			pH	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Temperature	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		

S.No	Location		Parameter	Frequency	Duration	Dates	Weather condition		Value	Units
	X	Y					Dry	Wet		
6	41.023899 N	-81.441051 W	TN	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TP	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TSS	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Secchi Disk	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Conductivity	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			

				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			pH	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Temperature	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		

S.No	Location X	Location Y	Parameter	Frequency	Duration	Dates	Weather condition Dry	Weather condition Wet	Value	Units
7	41.026474 N	-81.444809 W	TN	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TP	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			TSS	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Secchi Disk	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Conductivity	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		

				Wet #2	1year period	Any wet weather date May thru July		x		
			pH	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		
			Temperature	May #1	1year period	1-May	x			
				May #2	1year period	15-May	x			
				June #1	1year period	1-Jun	x			
				June #2	1year period	15-Jun	x			
				July #1	1year period	1-Jul	x			
				July #2	1year period	15-Jul	x			
				Wet #1	1year period	Any wet weather date May thru July		x		
				Wet #2	1year period	Any wet weather date May thru July		x		

S.No	Entity	Contact	Folder	Number of documents	Document Name	Type	Number of pages	Test	Parameter covered	Parameter results	Category	Brief description	Zip code / Address/ Lat & Lon	Dates covered
1	Lakemore	Tracy Sayers	Lakemore Folder	18	Lake Level Information	pdf.	26	-	Lake water levels		Complaint	History of documents regarding the Lake levels and control of the lake levels from 1937 to 2020.		
					Springfield Lake 04 26 23 results	pdf.	1	Microcystin	Cyanotoxins	North: 15.99, South: 17.30, East: 18.65, West:	Test Results	Sampling for cyanotoxins for lakemore fire department and its results at North, South, East	1400 Main Street Lakemore, OH	4.26.2023
					Springfield Lake 061022_Wakefield	pdf.	1	Microcystin	Cyanotoxins	LSSS-SO02 Total Microcystin: 61.62 ug/L,	Test Results	Samples collected on June 2, 2022 for toxin analyses of Springfield Lake.		6.22.2023
					Springfield Lake 061723	pdf.	1	Microcystin	Cyanotoxins	North: 37.69, South: 28.14, East: 27.89, West:	Test Results	Sampling for cyanotoxins for lakemore fire department and its results at North, South, East	1400 Main Street Lakemore, OH	6.16.2023
					Springfield Lake 10 06 23	pdf.	1	Microcystin	Cyanotoxins	North: 23.23, South: 30.38, East: 29.06, West:	Test Results	Sampling for cyanotoxins for lakemore fire department and its results at North, South, East	1400 Main Street Lakemore, OH	10.06.2023
					Springfield Lake microcystin results 08 31 23	pdf.	1	Microcystin	Cyanotoxins	North: 14.31, South: 14.08, East: 22.06, West:	Test Results	Sampling for cyanotoxins for lakemore fire department and its results at North, South, East	1400 Main Street Lakemore, OH	8.31.2023
					Springfield Lake Proposed Smapling Plan 8.31.23	pdf.	2	-			Sample Plan	The City of Akron Water Bureau, Watershed Division proposes the following schedule for		
					Springfield Lake samples 102722	pdf.	1	Microcystin	Cyanotoxins	North: 9.54, South: 9.85, East: 8.65, West: 9.10 ug/l	Test Results	Sampling for cyanotoxins for lakemore fire department and its results at North, South, East	1400 Main Street Lakemore, OH	10.27.2022
					Springfield presentation 8.30.23	pdf.	12	-		-	Research Update	Springfield Lake Research Update on the data that was collected on June 21, 2023. Data collected was		06.21.2023
					SpringfieldLake_20220531_3ab	pdf.	1	-	Cyanobacteria Density	-	Map	Harmful Algal Bloom (HAB) Satellite Imagery NOAA-NOS Cyanobacteria Density Map	-	-
					SpringfieldLake_20220815_3ab	pdf.	1	-	Cyanobacteria Density	-	Map	Harmful Algal Bloom (HAB) Satellite Imagery NOAA-NOS Cyanobacteria Density Map	-	-
					SpringfieldLake_20221107_3ab	pdf.	1	-	Cyanobacteria Density	-	Map	Harmful Algal Bloom (HAB) Satellite Imagery NOAA-NOS Cyanobacteria Density Map	-	-
					springfieldlake2	pdf.	1	-		-	Map	Springfield Lake Fishing Map	-	-
					SpringfieldLakeGraphs	xlsx.	1	Depth, Temp, pH, DO, Blue-Green Algae, Blue-Green RFU,	Springfield Lake Results	Multiple	Excel Graphs	Water Quality data and reuslts collected from Springfield Lake on June 21, 2023. The excel	-	06.21.2023
					Springfield Lake Outfalls	pdf.	1	Outfall Locations	Storm Sewer Outfall Locations	-	Map	Springfield Lake Storm Sewer Outfall Locations within the springfield lake watershed	-	-
2	SCPH	Alison Rogalski	03.21.2024	16	4.9.2020. Springfield Lake_ Concrete Steps	.pdf	1	E Coli	E Coli	Negative ; <1.0/100mL	Test Results	Sample number 51	44305	04.09.2020
					4.9.2020. Springfield Lake Lakemore	.pdf	1	E Coli	E Coli	Positive, 4.1	Test Results	Sample number 52	44312	04.09.2020
					4.9.2020. Springfield Lake Near Tree	.pdf	1	E Coli	E Coli	Positive, 1	Test Results	Sample number 53	44305	04.09.2020
					6.29.2019 Springfield Lake #1 Recreation Park Lakemore	.pdf	1	E Coli	E Coli	21.6	Test Results	Sample number 118	James B Dodds Park	06.29.2019
					6.29.2019 Springfield Lake #2 2465 Waterloo Rd. Springfield	.pdf	1	E Coli	E Coli	4.1	Test Results	Sample number 119	2465 E Waterloo Rd	06.29.2020
					6.29.2019 Springfield Lake #3 1417 Lake Rd Lakemore	.pdf	1	E Coli	E Coli	26.2	Test Results	Sample number 164	1417 Lake rd	06.29.2021
					7.11.2019. Springfield Lake-L	.pdf	1	E Coli	E Coli	33.6	Test Results	Sample number 121	Lakemore recreation park	07.11.2019
					7.11.2019. Springfield Lake-S	.pdf	1	E Coli	E Coli	23.3	Test Results	Sample number 163	2465 E Waterloo Rd	07.11.2019
					7.20.2019 Springfield Lake Lakemore	.pdf	1	E Coli	E Coli	90.8	Test Results	Sample number 225	Lakemore recreation park	07.20.2019
					7.20.2019 Springfield Lake Springfield	.pdf	1	E Coli	E Coli	53.8	Test Results	Sample number 226	2465 E Waterloo Rd	07.20.2019
					7.25.2019 Springfield Lake - Lakemore	.pdf	1	E Coli	E Coli	13.2	Test Results	Sample number 231	Lakemore recreation park; 1367 Milton st	07.25.2019
					7.25.2019 Springfield Lake - Springfield	.pdf	1	E Coli	E Coli	35.9	Test Results	Sample number 230	2465 E Waterloo Rd	07.25.2019
					7-5-19 Springfield Lake-Lakemore	.pdf	1	E Coli	E Coli	44.8	Test Results	Sample number 160	Lakemore recreation park	07.05.2019
					7-5-19 Springfield Lake-Springfield	.pdf	1	E Coli	E Coli	11	Test Results	Sample number 161	2465 E Waterloo Rd	07.05.2019
					8.10.2019. Springfield Lake- L	.pdf	1	E Coli	E Coli	Unacceptable, 248.1	Test Results	Sample number 322	Lakemore recreation park	08.10.2019
					8.10.2019. Springfield Lake- S	.pdf	1	E Coli	E Coli	Acceptable, 57.1	Test Results	Sample number 321	2465 E Waterloo Rd	08.10.2019
			04.04.2024	13	1040 Onondago Trl, Springfield Complaint	.pdf	4							
					1067 Georgia Ave., Akron Complaint	.pdf	2							
					1572 Krumroy Rd., Springfield Complaint	.pdf	2							
					1644 Canton Rd., Lakemore Complaint	.pdf	2							
					998 Milo White Dr., Springfield Complaint	.pdf	3							
					963 Milo White Dr., Springfield Complaint	.pdf	4							
					3353 Sanitarium Rd., Springfield Complaint	.pdf	3							
					1931 Bridger Rd., Springfield Complaint		5							
					2161Manor Rd, Springfield Complaint		2							
					1739 Berger Rd., Springfield Complaint	.pdf	3				**Complaints/Evidence**			
					2602 Waterloo Rd., Sprinfield Complaint		3							
					1923 Ronald Rd., Springfield Complaint		2							
			General folder	7	lakemore drain 2	.png	1							
					Lakemore drain pipe	.png	1							
					Lakemore drain to the lake 5-29-2020	.mov	NA							
					Lakemore view from far above	.png	1							
					Springfield Lake complaint 1 of 2	.msg	1							
					Springfield Lake complaint 2 of 2	.msg	1							
					Springield Lake Complaint (9-8-2021)	pdf	2							
					DATA ODNR SpringfieldLake table	.xlsx								
					Parameters for sampling downstream of Springfield Lake	.msg	1	-	-	-	Emails	orthophosphate and ammonia, temperature, dissolved oxygen, and pH, MPN e coli and coliform,	-	-

S.No	Entity	Contact	Folder	Number of documents	Document Name	Type	Number of pages	Test	Parameter covered	Parameter results	Category	Brief description	Zip code / Address/ Lat & Lon	Dates covered
3	SWCD	Sarah Barrow	03 SWCD	15	RE Springfield Lake Water Quality Report for Summit County Engineers	.msg	1	-	-	-	Emails	• Contains 13 attachments - (1) ODNR table (1992) with some recent sampling	-	-
					Ecoli Results_Springfield Lake 06_22	.pdf	3	E Coli (E Coli/ 100 mL)		31	Test Results	• Adams Walter Laboratory Inc. • Non potable Bacterial sample report ; • water supply name : OS - SPQ1 • Date covered is the date received!!- note	Sample tap - Springfield	06.06.2022
										<10	Test Results	LSSS - SPQ2	Sample tap - Springfield	06.06.2022
										10	Test Results	LSNS - SPQ3	Sample tap - Springfield	06.06.2022
					Lake E.coli results 2020	.pdf	1	E Coli	E.coli		Test Results			
					Springfield Lake 04_23_21	.pdf	1	Total microcystin		>25	Test Results	• Samples collected were analyzed for total microcystin concentrations according to OEPA DES 701.0 v.2.3. methods. • Samples diluted 1:4 • Recreational advisory limit (OEPA) = 6 ug/L • Recreational no contact limit (OEPA) = 20 ug/L • Collected date of the samples are considered	Springfield Lake Area #1	04.23.2021
										>25	Test Results		Springfield Lake Area #2	04.23.2021
										>25	Test Results		Springfield Lake Area #3	04.23.2021
										>25	Test Results		Springfield Lake Area #4	04.23.2021
					Springfield Lake 04_26_23	.pdf	1	Microcystin		15.99	Test Results	• All samples were diluted 1:10 • Concentrations of total microcystins were evaluated according to OEPA DES 701.0 v. 2.2 methods • Recreational advisory limit set by OEPA = 8ug/L • Collected date of the samples are considered	North	04.28.2023
										17.3	Test Results		South	04.28.2023
										18.65	Test Results		East	04.28.2023
										16.79	Test Results		West	04.28.2023
					Springfield Lake 06_10_21	.pdf	1	Total microcystin		>25	Test Results	• Samples collected were analyzed for total microcystin concentrations according to OEPA DES 701.0 v.2.3. methods. • Samples diluted 1:4 • Recreational advisory limit (OEPA) = 8 ug/L • Recreational no contact limit (OEPA) = 20 ug/L • Collected date of the samples are considered	Springfield Lake Area #1	06.10.2021
										>25	Test Results		Springfield Lake Area #2	06.10.2021
										>25	Test Results		Springfield Lake Area #3	06.10.2021
										>25	Test Results		Springfield Lake Area #4	06.10.2021
					Springfield Lake 06_10_22	.pdf	1	Total microcystin		61.62	Test Results	• Samples were analyzed concentrations of total microcystin according to OEPA DES 701.0 V. 2.2 methods. • Sample OS- SP01 - analyzed for cylindrospermospin, anatoxin and saxitoxin • Samples were diluted at 1:25 • Samples collected on 06/06/2022	Sampling point: LSSS-SO02	06.10.2022
								Total microcystin		51.09	Test Results		LSNS-SP03	06.10.2022
								Total microcystin		56.641	Test Results		OS-SP01	06.10.2022
								Total cylindrospermospin		NR (<0.7 ug/L)	Test Results		OS-SP02	06.10.2022
								Total Anatoxin		0.882	Test Results		OS-SP03	06.10.2022
								Total Saxitoxin		NR (<0.3 ug/L)	Test Results		OS-SP04	06.10.2022
					Springfield Lake 06_17_23	.pdf	1	Microcystin		37.69	Test Results	• Samples were analyzed concentrations of total microcystin according to OEPA DES 701.0 V. 2.2 methods. • Samples were diluted at 1:25 • Recreational advisory set by OEPA 8ug/L • Samples collected on 06/16/2023	North	06.16.2023
										28.14	Test Results		South	06.16.2023
										27.89	Test Results		East	06.16.2023
										28.5	Test Results		West	06.16.2023
					Springfield Lake 08_06_21	.pdf	1	Total Microcystin		> 25	Test Results	• Samples were analyzed concentrations of total microcystin according to OEPA DES 701.0 V. 2.2 methods. • Samples were diluted at 1:10 • Recreational advisory set by OEPA 8ug/L and recreational no contact limit is 20ug/L • Samples collected on 08/02/2021	Springfield lake Area #1	08.02.2021
										>25 ug/L	Test Results		Springfield lake Area #2	08.02.2021
										>25 ug/L	Test Results		Springfield lake Area #3	08.02.2021
										>25 ug/L	Test Results		Springfield lake Area #4	08.02.2021
										>25 ug/L	Test Results		Springfield lake Area #5	08.02.2021
					Springfield Lake 08_31_23	.pdf	1	Microcystin		14.31	Test Results	• Samples were analyzed concentrations of total microcystin according to OEPA DES 701.0 V. 2.2 methods. • Samples were diluted at 1:5 • Recreational advisory set by OEPA 8ug/L and recreational no contact limit is 20ug/L • Samples collected on 08/30/2023	1	
										14.08	Test Results		2	
										22.06	Test Results		3	
										16.11	Test Results		4	
					Springfield Lake 10_06_23	.pdf	1	Microcystin		23.23	Test Results	• Samples were analyzed concentrations of total microcystin according to OEPA DES 701.0 V. 2.2 methods. • Samples @ South, East, West were diluted at 1:10 • Sample @ North was diluted at 1:25 • Recreational advisory set by OEPA 8ug/L and recreational no contact limit is 20ug/L • Samples collected on 10/04/2023		
										30.38	Test Results			

S.No	Entity	Contact	Folder	Number of documents	Document Name	Type	Number of pages	Test	Parameter covered	Parameter results	Category	Brief description	Zip code / Address/ Lat & Lon	Dates covered
										29.06	Test Results			
										31.44	Test Results			
					Springfield Lake 10_27_22	.pdf	1	Total Microcystin		9.54	Test Results	• Samples were analyzed concentrations of total microcystin according to OEPA DES 701.0 V. 2.2 methods. • Samples were diluted at 1:9 • Recreational advisory set by OEPA 8ug/L • Samples collected on 10/24/2022	Springfield lake Area #1	10.24.2022
										9.85	Test Results		Springfield lake Area #2	10.24.2022
										8.65	Test Results		Springfield lake Area #3	10.24.2022
							1			9.1	Test Results		Springfield lake Area #4	10.24.2022
4	Akron	Jessica (watershed superintendent)	04 Summit County_Akron OH	4	RE_ Springfield Lake Water Quality Report for Summit County Engineers	.msg	1					Email		
					Springfield Data.xls	.xls	1					Excel sheet		
					Springfield Lake Data.msg	.msg	1					Email		
					SpringfieldLake 3-5-24.xlsx	.xlsx						Excel Sheet		
5	SCE		Shared water quality data from SCE	9	Algal Species Killed By Sonication	.pdf	1				Document reference	List of Algal species killed by sonication		
			from Al 15Jul2022		ES_Quantitative_Springfield_20220606_REV	.pdf	5	Chlorophyll-a analysis		0.050463	Algae test 2 and chlorophyll-1 analysis (mg/L)		LSSS_SP02	06.16.2022
										0.051264	Algae test 2 and chlorophyll-1 analysis (mg/L)	• Volume filtered (mL) = 500 • Volumen extracted (mL) = 15 • most prevalent species (cells/mL) was planktothrix agardhii • Taxanomic list - Attachment A • Photomicrographs - Attachment B	LSNS_SP03	
					Lakemore Storm 1 & 2 (1)	.pdf	1	E coli		313	E coli/100 mL	• Storm discharge • Adam Walter Laboratory • Non potable bacterial sample report • Agency collecting sample - SCHD (Summit county Health department)	Lakeside Dr, Lakemore	5/19/2022
										579			Lakeside Dr, Lakemore	5/20/2022
					LakemoreBioSummaryReport_20220707	.pdf	46					• Contains recommendations made to village of Lakemore, Tracy Sayers • Exhibit A - contains the locations of the Bioretention ID and location (sites) • Exhibit B - findings of each site; sites that maybe acceptable and warrant additional investigation highlighted gray Exhibit B and includes ID nos 2,4,6,8 and 7 • Site IDs that should not be considered for bioretention - 1, 3, 5, 9 and 10 • Exhibit C - existing condition maps of the 10 sites		
					Main Channel 1 & 2 (2) (1)	.pdf	1	E Coli		109	E coli/100 mL	• Water channel was tested • Date collected - 05/18/2022 • Adams Water Laboratory • Non potable bacterial sample report	Heran point dr, Lakemore	5/18/2022
										98			Heran point dr, Lakemore	
					nutrient_criteria_document_2010	.pdf	69				Technical support document: nutrient criteria for inland lakes in OH			
					Small Channel 1 & 2 (1)	.pdf		E coli	E coli	160	E coli/100 mL	• Water channel was tested • Date collected - 05/18/2022 • Adams Water Laboratory • Non potable bacterial sample report	Heron Point dr, Lakemore	5/18/2022
										135			Heron Point dr, Lakemore	
					Springfield Dock 1 & 2 (1)	.pdf	1	E coli	E coli	<10	E coli/100 mL	• Lake was tested • Date collected - 05/18/2022 • Adams Water Laboratory • Non potable bacterial sample report	Springfield dock 1 Canfield Rd, Springfield	5/18/2022
										20	E coli/100 mL		Springfield dock 2 Canfield Rd, Springfield	
					Springfield Lake testing (1)	.pdf	1					Map of the above sampling locations!!!!		
			Dies info 01Jul2020	8	April 2020 SLTF Summary presentation	.pdf	11					(2006-2019) - was used in previous data review • Contains brief of all the recommendations (SW control measures, septic inspections and replacement, Sanitary system inspection and infrastructure replacement, Integrated water quality testing) • Contains brief of sanitary waste, home sewage treatment systems • Stormwater management • Correspondence with OEPA, and letter from Lakemore to OEPA		
					Dies email 01Jul2020	.msg						Email conversations bw David dies and Summit engineers (Alan Brubaker)		
					Lake Road MS4 Samples	.pdf	1	E coli	E coli	228	MPN/100 mL	Spingfield lake	Lake road, akron	6/3/2020
					Lake Road MS4 Samples					326	E coli/100 mL	• MS4 Lake road was tested • Date collected - 06/03/2020 • Adams Water Laboratory • Non potable bacterial sample report • Collected for SCPH		
					Lakemore discharge pipes location pic							• same as shared from SCPH; pics of discharge pipes		
					Lakemore drain to the lake 5-29-2020	.mov						• same as shared from SCPH		
					Scanned from a Xerox Multifunction Printer							Emails and other conversations bw Dean Young (Board of trustees) and OEPA (Richard D Blasick)		
					Spring_AE20062216_Final	.pdf		E coli	E coli	44100	MPN/100 mL	1-E		
										32850	MPN/100 mL	3-E		
										54460	MPN/100 mL	2-E		
			Dies videos 26Jun2023		Aerial Views of Dies 26Jun23 Videos	.docx						Contains the aerial views provided by David dies		

S.No	Entity	Contact	Folder	Number of documents	Document Name	Type	Number of pages	Test	Parameter covered	Parameter results	Category	Brief description	Zip code / Address/ Lat & Lon	Dates covered
												Email conversation with videos of the rainfall from 06/23/2023 sent to multiple people from David Dies		