

SKANEATELES LAKE AND WATERSHED 2023 ANNUAL REPORT VOLUME XLIX



CITY OF SYRACUSE
DEPARTMENT OF WATER
WATER QUALITY MANAGEMENT

SKANEATELES LAKE AND WATERSHED
2023 ANNUAL REPORT

VOLUME XLIX

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Appendix

Appendix A – Exhibits

1. SKANEATELES LAKE AND WATERSHED

1.1 General Lake and Watershed Characteristics

Skaneateles Lake lies within the Oswego River Drainage Basin. It is the fourth largest and third deepest of the Finger Lakes (Exhibit A) ¹. It has a surface area of 13.6 square miles and has a maximum depth of 300 feet. It was formed during the Pleistocene Era by glacial scour and morainic damming. Thus, the lake basin is very steeply sloped with a small littoral zone and is “U” shaped. Approximately 80% of the lake’s volume is below a depth of 30 feet.

The lake is dimictic, and complete turnover occurs twice per year (Spring and Fall). Strong stratification develops during the summer. In winter a weaker, inverse stratification develops colder (and at times denser) water lies above warmer water. This occurs regardless of ice formation.

Skaneateles Lake is considered oligotrophic: it is low in nutrients and biological productivity. This is most likely a result of the small drainage basin to lake surface area ratio (4:1). Other features of oligotrophy include: (a) a deep, thick metalimnion resulting from greater light penetration, which forms during summer stratification, (b) an orthograde distribution of oxygen, also forming during summer stratification, (c) a blue-green color that demonstrates deep light penetration by the blue wavelengths due to the low concentrations of phytoplankton and humic substances, and (d) high transparency. The oligotrophic state of the lake makes it ideal for drinking water supply and recreation.

Much of the lake’s shoreline is steeply sloped, especially at the southern end of the lake where cliffs can exceed 100 feet in height. Generally, the elevation is higher and the slopes are steeper in the southern portion of the watershed as compared to the northern area (Exhibit A). The highest elevation is found in the southeastern watershed at 1980 feet above sea level (USGS). Watershed acreage calculated by the Geographic Information System (GIS) is 37,724 acres or 58.94 square miles ². The physical characteristics of the lake and drainage basin are summarized in Table No. 1.

Table 1 Skaneateles Lake and Drainage Basin Characteristics

Parameter	Value
Mean High Water Elevation*	863.27 Syracuse Datum
Mean High Water Elevation*	865.02 NVD
Length	15 Miles
Average Width	0.90 Miles
Maximum Depth	300 Feet
Mean Depth	145 Feet
Lake Surface Area	13.6 Square Miles
Drainage Basin Area (Land)	58.94 Square Miles
Drainage Basin: Lake Surface Ratio	4.33: 1.0
Lake Volume	412 Billion Gallons
Highest Elevation*	1,980 NVD

* Feet Above Sea Level

¹ Lake data excerpted from: Effler, S.W., et al. 1989. Limnological Analysis of Skaneateles Lake, 1988. Upstate Freshwater Institute, Inc. Syracuse, NY

² Historically.....

1.2 Watershed Soils

There are several soil associations within the watershed (Exhibit B and Table No. 2). The associations discussed below account for 80% of the watershed area and are considered representative of the character of the watershed. The remainder (20%) will not be discussed. It is noted that the associations generated by the GIS compare well, though not exactly, with the U.S. Department of Agriculture Soil Surveys prepared for each county. It would appear that this is due to the inherent discrepancies often found between maps and mapping systems.

The major soil associations found in the northern two-thirds of the watershed are: Honeoye-Lima, Lansing-Conesus, Honeoye-Lansing, and Aurora-Angola-Darien. These associations are generally characterized as deep, medium textured silt loams and gravelly silt loams. Slopes range from 2-8%, except the Honeoye-Lansing Association that has slopes of 15-25%. They are moderately well, to well drained. Permeability is slow to moderate, and seasonal ground water is generally 15" to <36".

The Langford-Erie Association comprises the southwestern portion of the watershed (about 15% of the watershed). It is considered a deep, medium textured silt loam with slopes from 2% to 25%. The soils are poorly to well drained, and slowly to moderately permeable. A medium textured fragipan can be observed in some areas. Seasonal ground water and bedrock are shallow at 6" to 20", and 20" to 40", for the Langford and Erie series, respectively.

There are three (3) associations found primarily within Cortland County (southeastern portion of the watershed): Valois-Langford-Lansing, Volusia-Mardin-Lordstown, and Lordstown-Volusia-Mardin. This is equivalent to about 13% of the watershed. The soils are medium textured silt loams and gravelly silt loams. Slopes can be extreme and can exceed 55%. They are poorly to well drained and very slowly to moderately permeable. Seasonal ground water ranges from 18" to 60".

Typically, the soils of the watershed are gravelly to medium-textured silt loams that were formed in glacial till. Slopes are generally 2-25% but can exceed 55% in the southern portion of the watershed. The soils are poorly to moderately well drained, and very slowly to slowly permeable. The depth to seasonal ground water is generally <3.0 feet. All of the soils pose a severe risk of erosion if left bare, with increasing degree of slope compounding the potential for soil loss. The use of conventional onsite wastewater treatment systems (OWTS) is severely limited due to high seasonal ground water, degree of slope, and poor permeability.

Table 2 Soils of the Skaneateles Lake Watershed

Association	County	Percent of County	Dominant Location in Watershed	Percent of Watershed	Slope	Soil Type and Seasonal Ground Water	Drainage/ Permeability
Honeoye-Lima	Onondaga	39%	West & Northwest Onondaga	20%	2-8%	Deep, medium textured silt loams and gravelly silt loams Groundwater: 15-36"	Moderately well, to well drained and very slow to moderately permeable
Lansing-Conesus	Onondaga & Cayuga	17% and 22%	Spafford Uplands and Northeast Cayuga	16%	2-8%		
Honeoye-Lansing	Onondaga	9%	Spafford Shoreline	6%	15-25%		
Aurora-Angola-Darien	Onondaga	14%	North of Spafford Town Line	8%	2-8%		Poorly to moderately well drained
Langford-Erie	Cayuga	45%	South Cayuga	15%	2-25%	Deep, medium textured silt loams Groundwater: 6-20"	Poorly to well drained and slow to moderately permeable
Valois-Langford-Lansing	Cortland	87%	Lowlands	15%	2-55%	Medium textured and gravelly silt loams Groundwater: 18-60"	Poorly to well drained
Volusia-Mardin-Lordstown			Uplands				
Lordstown-Volusia-Mardin			Hewitt Forest				

1.3 Demographics, Land Use and Land Ownership

The watershed population totals approximately 4,158 people residing in 2,819 dwelling units (Table Nos. 3 and 4) ³. Of the total number of dwelling units, approximately 1,065 are lakeshore dwellings. Land ownership is estimated as 52% private/residential (developed or vacant), 37% agricultural, 9% public and 2% commercial (Table No. 5). Based upon the GIS land use coverages, land use is calculated as: 48.2% agricultural; 40.3% open/forest; 5.4% residential; 4.7% brush; 0.9% other development; 0.3% ponds; 0.2% commercial (Table No. 6). Land use is defined as land cover acreage derived from the aerial orthophotographs.

Political subdivisions within the watershed include parts of three counties and seven townships. However, two of the towns, Marcellus and Owasco, account for less than 300 acres (or < 1.0% of the total watershed area). Onondaga County accounts for 51% of the watershed land area and 74% of the watershed population. Within the county are parts of the Towns of Skaneateles and Spafford, and the Village of Skaneateles. Forty-five percent (45%) of county lands are owned by the agricultural community. Of the estimated 2,148 dwelling units within the county, approximately 298 are connected to the Village of Skaneateles sanitary sewer system. The Village is the only municipality in the watershed having a public sewer system. The remaining watershed homes use Onsite Wastewater Treatment Systems (OWTS) or holding tanks for waste dispersal or collection (discussed in subsequent sections of this report). Several commercial buildings located on the south side of Route 20 in the village business district are within the watershed. All are connected to the municipal sanitary sewer system. Most buildings are 3-5 story structures. Various businesses occupy

the ground level floors of these buildings, and a number of apartments/inhabitants occupy the upper stories.

Cayuga County accounts for 34% of the land and 10% of the population within the watershed, which includes two towns, Niles and Sempronius. Agricultural lands account for 29% of the county land area. Most of the residential development in this county is on the lakeshore and is predominantly seasonal. Much of the shoreline is very steeply sloped.

Cortland County accounts for 15% of the watershed. The Town of Scott is the single town within this portion of the watershed. It has a population of 655 or approximately 16% of the total watershed population. Soil conditions and extreme topography of the area limit development. Farming accounts for 28% of the watershed land area.

Table 3 Skaneateles Watershed Population Distribution and Watershed Land Area by Town

Town	Dwelling Units	Population	Percent of Total Population	Percent of Watershed Land Area
Skaneateles	1,376	2,216	53.3%	26.0%
Spafford	689	843	20.3%	25.0%
Niles	365	371	8.9%	17.0%
Sempronius	76	73	1.8%	17.0%
Scott	313	655	15.8%	15.0%
Totals	2,819	4,158	100%	100.0%

Table 4 Skaneateles Watershed Population Distribution and Watershed Land Area by County

County	Dwelling Units	County Population	Percent of Watershed Population	Percent of Watershed Land Area	Density People/mile ²
Onondaga	2,148	3,059	73.6%	51%	74.3
Cayuga	441	444	10.7%	34%	20.3
Cortland	313	655	15.8%	15%	70.3
Totals	2,819	4,158	100%	100%	57.5*

* Average density

Table 5 Land Ownership in the Skaneateles Watershed

Land Ownership	Acres	Percent of Total
Agricultural	13,734	37%
Public	3,575	9%
Commercial	672	2%
Residential/Private	19,740	52%
Total	37,720	100%

Table 6 Land Use in the Skaneateles Watershed

Land Use	Acres	Percent of Total
Agricultural	16,398	43.5%
Commercial	58	0.2%
Residential	2,029	5.4%
Forest/Open	15,817	41.9%
Brush	1,792	4.7%
Pond/Wetland	1,556	4.1%
Other Development	322	0.2%
Total	37,972	100.0%

1.4 Skaneateles Lake Watershed Water Budget

The Skaneateles Lake Watershed receives an average 42.91” of precipitation per year. Of this amount approximately 50% of the total precipitation produces runoff, or yield, to the lake ^{4,5}. Yield or runoff is the actual amount of water that reaches the lake because of precipitation. The yield coefficient (also called the hydrologic response coefficient) is an expression of the proportion of precipitation that reaches the lake.

Expressed as volume, annual precipitation produces approximately 53 billion gallons of water ⁶. The runoff (26 billion gallons) provides the equivalent of about 9 feet of lake elevation (2.836 billion gallons/foot) ⁷. Approximately one-third of the yield is precipitation that falls directly onto the lake surface, i.e., water that does not flow across or percolate through the soil before entering the lake. This is important to take into consideration when attempting to determine potential contaminant loading to the lake, since not all yield can be attributed to surface or sub-surface runoff. The remaining 26 billion gallons (50% of the total precipitation) is the net loss due to evapotranspiration, soil moisture recharge and groundwater recharge.

Of the total yield produced, the Water Department utilizes about 13 billion gallons per year for water supply to the City. The Village and Town of Skaneateles use approximately 0.27 billion gallons. About 9.0 billion gallons are discharged through the outlet of the lake to Skaneateles Creek. The latter is done to maintain elevations that satisfy the many uses of the lake: public and private water supply, storage for seasonal runoff, fishery spawning areas and recreation.

Three criteria are used to determine the rate of discharge through the lake’s outlet for lake elevation management. 1: current levels as compared to the drawdown guideline levels 2: current rates of precipitation 3: the amount of water stored in the snowpack. For the latter, cores of snowpack at eighteen (18) locations within the watershed are analyzed weekly for water content.

1.5 Watershed Precipitation, Yield, Lake Level and Dam Discharges

The lake elevation on January 1 was 860.67, below the Monthly Low Drawdown Guideline Desired Range of 861.50. The lake level increased consistently throughout the month to 861.80 on January 31. Dam discharges were maintained at a minimum for the month, averaging 6.42 MGD.

Recorded precipitation in February was below the monthly average at 2.13” (av. 2.66”). The lake level increase was minimal at 0.10’. Monthly dam discharges averaged 17.98 MGD (av. 38.61). Lake

level increased from 861.90 on March 1 to 862.70 on March 31, exceeding the Monthly High Drawdown Guideline Desired Range of 862.00. Dam discharges for March averaged 32.69 MGD (av. 38.01 MGD). There was minimal lake elevation change in April although 5.71" of precipitation was recorded for the month (av. 3.56"). Dam discharges averaged 99.36 MGD (av. 49.95 MGD). The lake elevation decreased gradually through May from 862.97 on May 1 to 862.65 on May 31. Dam discharges decreased throughout the month, from a high of 129 MGD in the first week of May to 7.10 MGD on May 24. Total precipitation for May was well below average at 1.31" (av. 3.65").

For the January-May period, precipitation totaled 17.36" (av. 15.83"). The yield and yield coefficient were 115.14 MGD (av. 118.25 MGD) and 0.80 (av. 0.89) respectively.

Snowfall for the 2022-23 season totaled 45.50" (av. 87.10"), the fourth consecutive season of below average snowfall (documented snowfall totals commenced in 1980 at the Skaneateles Lake Gatehouse). A measurable snowpack was recorded on 12 (weekly) sample dates from December 2022 through March 2023.

June's above average rainfall total of 6.14" (av. 3.98") had a moderate effect on the lake level, resulting in a monthly elevation increase of 0.35'. Dam discharges averaged 7.05 MGD (av. 21.26 MGD). July's precipitation total was 4.23" (av. 4.04"). The lake elevation decreased from 862.98 on July 1 to 862.75 on July 31.

August precipitation total was above average at 5.32" (av. 3.93"). Precipitation was recorded on 20 days throughout the month, including a 2.9" five-day event beginning on August 6. The early month wet-weather conditions resulted in a minimal lake elevation increase from 862.73 on August 5 to 862.81 on August 11, however, the lake elevation declined 0.27' for the month. Dam releases remained at the minimum discharge rate.

Precipitation for the June-August period totaled 15.69" (av. 11.96"). The yield and yield coefficient were above average at 47.57 MGD (av. 35.98 MGD) and .022 (av. 0.19) respectively.

The September 1 Lake elevation equaled the Monthly Low Drawdown Guideline Desired Range at 862.50, declining gradually throughout the month to 862.00 on October 1. Monthly rainfall total was below average at 2.05" (av. 3.97"), resulting in the lake elevation decreasing through October to 861.56 on October 31. Total rainfall for October was 3.38" (av. 4.05"). Dam discharges averaged 10.27 MGD (av. 12.25 MGD) in September and 9.64 MGD (av. 13.27 MGD) in October.

The lake level decreased 0.37' in November although precipitation was recorded on 17 days during the month. Rainfall was significantly below the monthly average at 1.91" (av. 3.67"). December's above average precipitation of 5.13" (av. 3.28") resulted in a monthly lake elevation increase of 1.08' from 861.17 on December 1 to 862.25 on December 31.

Precipitation for the September-December period totaled 12.87" (av. 15.13"). Yield for the period was 44.04 MGD (av. 48.13 MGD) and the yield coefficient was 0.33 (av. 0.28). Dam discharges for the period averaged 10.74 MGD (av. 20.43 MGD).

The Skaneateles Watershed received 45.93" of precipitation for the year (av. 42.91"). The average annual yield to the lake was 74.55 MGD (av. 74.31 MGD) with a yield coefficient of 0.47 (av. 0.49). Total discharge through the lake outlet for 2023 was 8,204 MG or 2.89' of elevation (av. 10,378 MG or 3.66', respectively). A summary of the above information can be found in Table No. 7.

Table 7 Skaneateles Watershed Data

Month	Precipitation in Inches		Yield in MGD		Elevation Feet Above Sea Level ^{*,**}		Dam Discharges in MGD	
	72 Year Average	2023	72 Year Average	2023	72 Year Average	2023	72 Year Average	2023
January	2.77	4.37	81.94	158.34	860.79	860.67	44.57	38.81
February	2.66	2.13	100.69	57.19	860.72	861.90	45.68	37.26
March	3.20	3.85	155.05	146.15	860.88	861.90	45.24	39.69
April	3.56	5.71	163.47	167.55	861.66	862.70	44.98	42.06
May	3.65	1.31	90.11	46.51	862.38	862.97	45.23	41.87
June	3.98	6.14	61.12	79.80	862.47	862.63	45.94	38.93
July	4.04	4.23	33.17	38.03	862.01	862.98	46.49	36.53
August	3.93	5.32	13.67	24.89	861.50	862.77	46.59	38.75
September	3.97	2.05	12.29	2.09	861.01	862.50	45.57	38.44
October	4.05	3.38	30.15	8.09	860.70	862.00	44.11	39.89
November	3.67	1.91	61.14	11.48	860.66	861.54	42.92	38.56
December	3.43	5.53	88.93	154.50	860.79	861.17	43.36	41.30
Annual	42.91	45.93	74.31	74.55			45.06	39.34

* Syracuse Datum

** 1st Day of Month Lake Elevation

2. SAMPLING AND ANALYSIS

2.1 Turbidity Sampling and Analysis

The City of Syracuse Department of Water continued to operate under the guidelines of Title 10, Part 5 of the Official Compilation of Codes, Rules and Regulations of New York (10 NYCRR Part 5). All water quality criteria were met. Turbidity for each intake was recorded continuously using Hach 1720E turbidimeters (one per intake). The meters are calibrated routinely against readings taken on a Hach TU5200 model. The latter is calibrated every three months using the formazin method outlined in *Standards Methods for the Examination of Water and Wastewater, 20th Edition*.

Readings were recorded by Water Plant personnel at four-hour intervals using the Hach TU5200 turbidimeter and Hach 1720E continuously recording turbidimeters. The results were included in the monthly reports submitted to the New York State Department of Health (NYSDOH) and are summarized in Table No. 8 of this report. The 2023 average turbidity readings for Intakes #1 and #2 were 0.42 NTU and 0.49 NTU, respectively.

Figure 1 illustrates relatively stable annual turbidity averages at Intake #1 and #2 through 2023. Following a significant spike in the September average from 2012 – 2014 (Figure 2), the trend line declined significantly through 2016 resulting in turbidity recordings consistent with the long-term average. A spike in 2021 September turbidity averages was comparable to averages recorded from 2012 – 2014, however September 2023 turbidity recordings on Intake #1 decreased to averages below 2018 – 2020 recordings.

Daily maximum turbidity measurements at Intake #1 over the period from 2004 through 2016 indicate that fluctuations in turbidity have become more pronounced beginning in 2009 (Figure 3).

The turbidity range narrowed in 2017, resembling pre-2014 measurements. In 2023, daily recordings ranged from 0.11 NTU to 25.27 NTU.

Since monthly average data can mask spikes in turbidity, Figure 4 illustrates the number of occurrences with a daily maximum turbidity over 1 NTU for each month from 2004 – 2023. Daily maximum turbidity above 1 NTU was recorded on 20 days in 2023 at Intake #1 (Figure 4 & Table No. 9).

Both Table No. 9 and Figure 4 display the variance in the number of days with maximum turbidity greater than 1 NTU at Intake #1 from 2004 to 2023.

Figure 1 2000-2023 Annual Turbidity Average

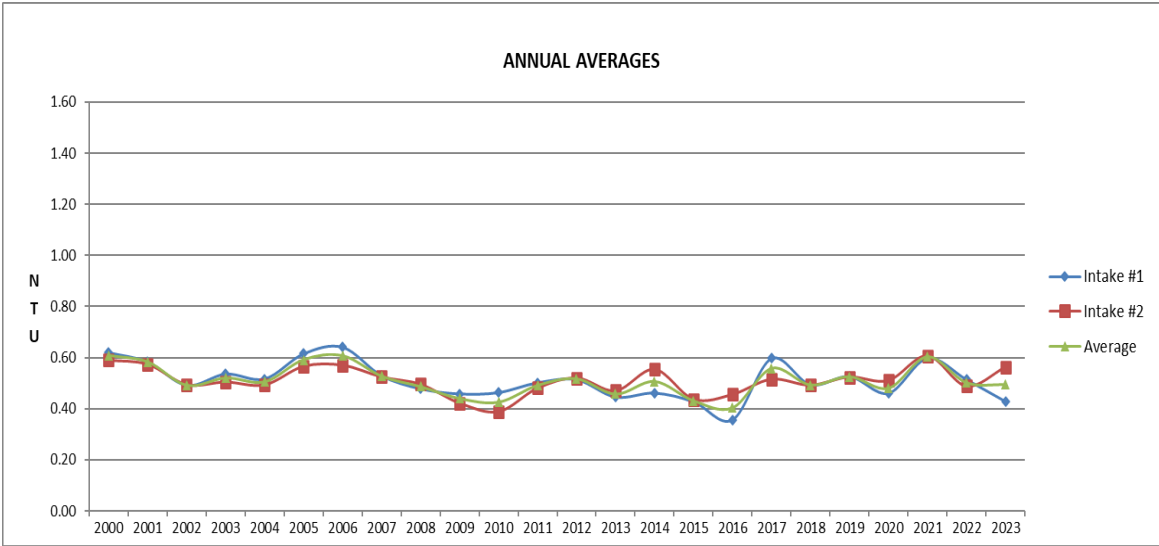


Figure 2 2000-2023 September Annual Turbidity Average

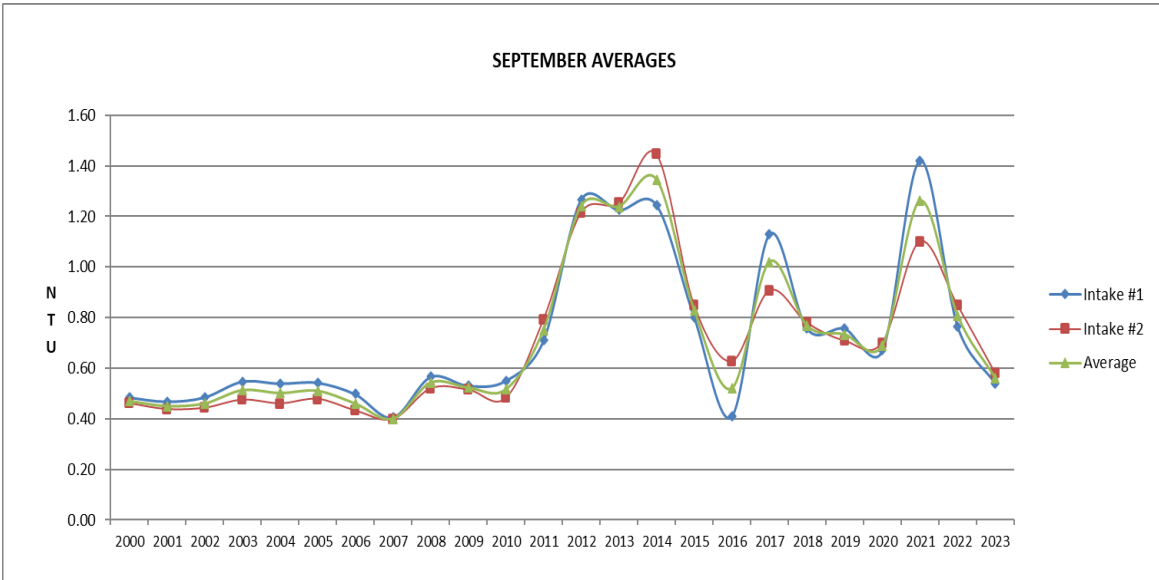


Figure 3 2004-2023 Daily Maximum Turbidity (NTU) Intake #1 & Intake #2

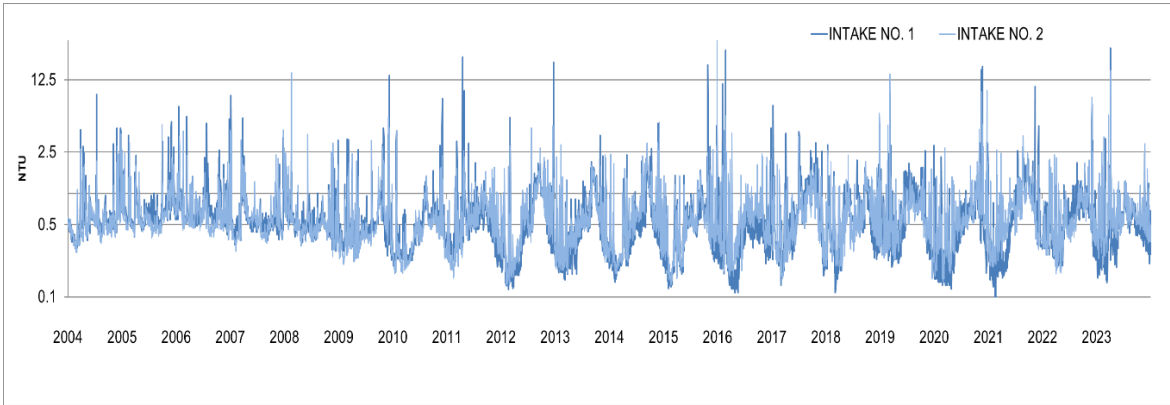


Figure 4 Monthly Counts of Turbidity >1 NTU at Intake 1, 2004-2023

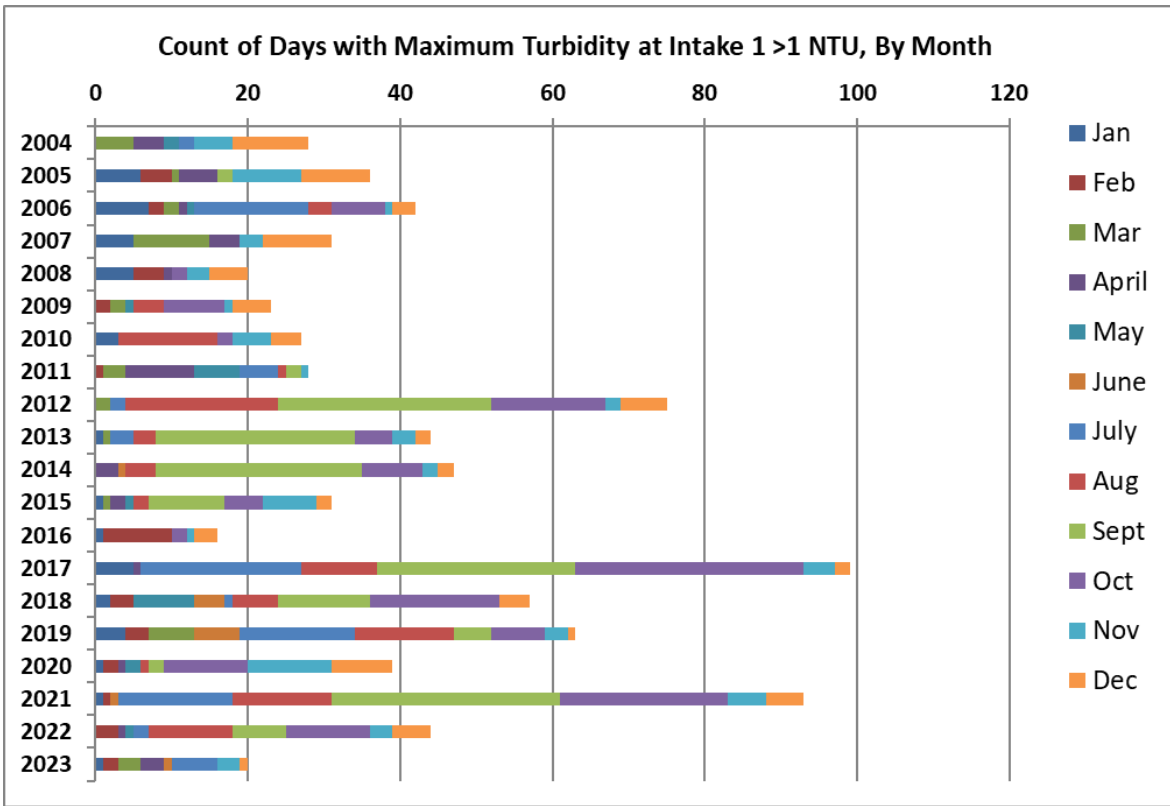


Table 8 Syracuse Water Plant Raw Water Maximum, Minimum, and Average Monthly Turbidity in NTU for 2023 (Both Intake 1 & 2)

Month	Intake 1 Maximum	Intake 1 Minimum	Intake 2 Maximum	Intake 2 Minimum	Intake 1 Average	Intake 2 Average
January	1.28	0.15	1.56	0.19	0.22	0.39
February	3.38	0.14	3.51	0.17	0.26	0.39
March	1.86	0.11	5.68	0.21	0.29	0.51
April	25.27	0.16	15.30	0.26	0.56	1.05
May	0.79	0.16	1.30	0.20	0.30	0.52
June	1.06	0.33	1.00	0.35	0.50	0.48
July	1.29	0.43	1.33	0.42	0.65	0.64
August	0.89	0.40	1.01	0.40	0.55	0.60
September	0.84	0.37	0.82	0.47	0.54	0.58
October	0.67	0.33	1.19	0.36	0.43	0.52
November	2.44	0.19	3.00	0.22	0.40	0.51
December	1.25	0.18	1.71	0.21	0.30	0.41
				Cumulative Average	0.42	0.49

Table 9 Number of Days with Maximum Turbidity > 1 NTU, Intake 1

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Summed by Month
Jan	0	6	7	5	5	0	3	0	0	1	0	1	1	5	2	4	1	1	0	1	43
Feb	0	4	2	0	4	2	0	1	0	0	0	0	9	0	3	3	2	1	3	2	36
Mar	5	1	2	10	0	2	0	3	2	1	0	1	0	0	6	0	0	0	0	3	36
April	4	5	1	4	1	0	0	9	0	0	3	2	0	1	0	1	0	1	3	3	35
May	2	0	1	0	0	1	0	6	0	0	0	1	0	0	8	0	2	0	1	0	22
June	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	6	0	1	0	1	13
July	2	0	15	0	0	0	0	5	2	3	0	0	0	21	1	15	0	15	2	6	87
Aug	0	0	3	0	0	4	13	1	20	3	4	2	0	10	6	13	1	13	11	0	104
Sept	0	2	0	0	0	0	0	2	28	26	27	10	0	26	12	5	2	30	7	0	177
Oct	0	0	7	0	2	8	2	0	15	5	8	5	2	30	17	7	11	22	11	0	152
Nov	5	9	1	3	3	1	5	1	2	3	2	7	1	4	3	3	11	5	3	3	72
Dec	10	9	3	9	5	5	4	0	6	2	2	2	3	2	4	1	8	5	5	1	86
Summed by Year	28	36	42	31	20	23	27	28	75	44	47	31	16	99	57	63	39	93	44	20	

2.2 Intake Closures

The Intakes may be closed to prevent a Treatment Technique Violation (TTV: any day with a turbidity reading exceeding 5.0 NTU) or Turbidity Event (a series of consecutive days during which at least one turbidity measurement each day exceeds 5.0 NTU).

Typically, Intake #2 is impacted by high wind events that re-suspend bottom sediments. This causes turbid water to enter the intake. Intake #1 may be impacted by significant runoff resulting from a high precipitation event. The high runoff causes sediment laden storm flows in Shotwell Brook. This brook is a main tributary on the north end of the lake that discharges approximately 1200 feet south of Intake #1. When the wind speeds are high enough and the wind direction is southerly, this plume of highly turbid water discharged into the lake can be transported over the intake. The majority of intake closures are to Intake #2.

Intake #2 was closed on 7 occasions to prevent a TTV or a Turbidity Event. There was one Intake #1 closure in 2023 related to turbidity concerns (Table No. 10).

Table 10 Raw Water Intake Closures

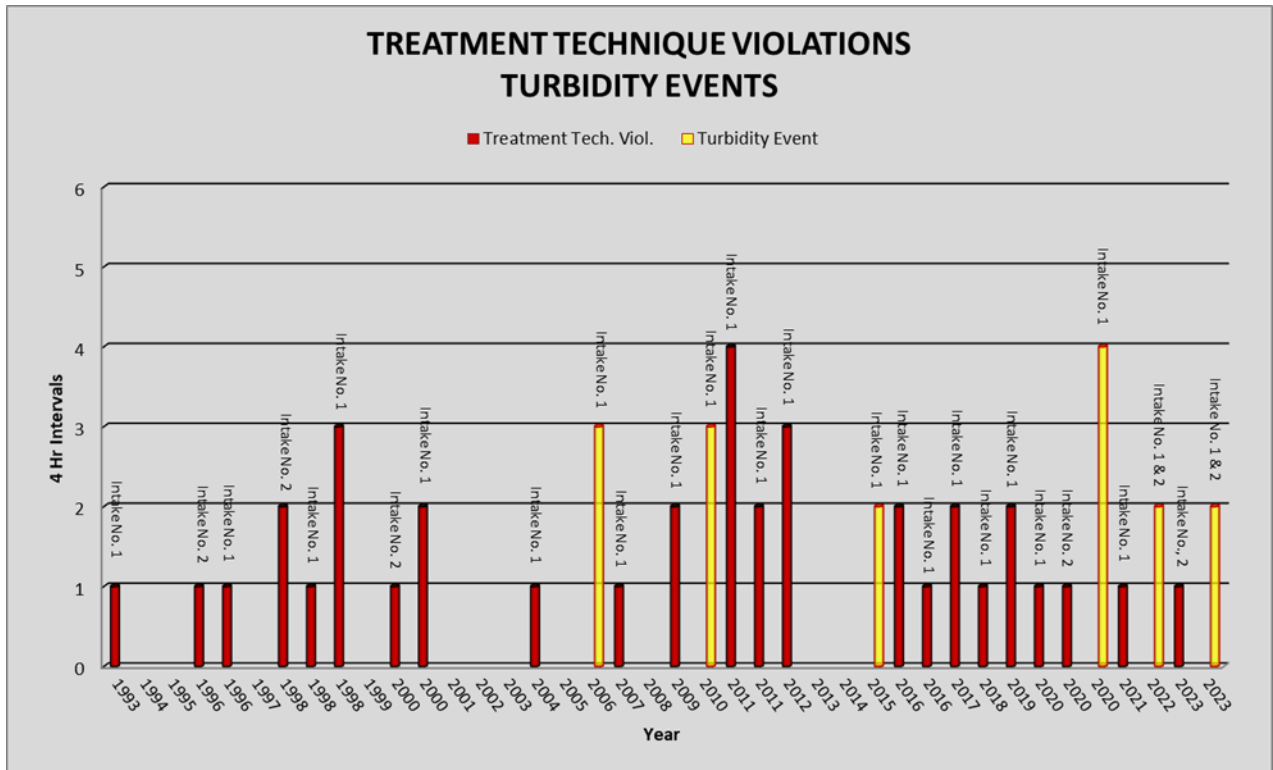
Date Intake Closed	Date Intake Opened	Intake Affected	Violation (Yes/No)
2/7/2023	2/8/2023	2	No
2/10/2023	2/11/2023	2	No
2/19/2023	2/21/2023	2	No
2/28/2023	3/1/2023	2	No
3/25/2023	3/27/2023	2	Yes
4/6/2023	4/7/2023	1	Yes
11/21/2023	11/22/2023	2	No
12/17/2023	12/19/2023	2	No

One TTV was recorded in 2023. The violation occurred on March 25, on Intake #2. Sustained southerly winds resulted in a turbidity recording of 5.68 NTU at 4:00 pm. Intake #2 was completely closed by 4:50 pm on March 25 and re-opened on March 27.

One Turbidity Event occurred in 2023. A multi-day weather event commenced on April 5 with high mid-day southwest winds, followed by intense afternoon/evening rainfall. Sustained winds on April 6 and 7 resulted in Intake #1 and Intake #2 exceeding 5 NTU on separate consecutive days. A turbidity recording of 25.27 NTU was documented at 8:00 am on April 6 (Intake #1) and a recording of 8.06 NTU at 12:00 am on April 7 (Intake #2). Intake #2 was completely closed by 6:00 pm on April 5 and re-opened on April 6 at 6:15 am. Intake #1 was closed on April 6 at 7:50 am and re-opened on April 7 at 9:30 am.

Refer to Figure 5 for TTV and Turbidity Events recorded since 1993. The Graph also displays the frequency that 5.0 NTU was exceeded (on a four-hour interval) during the TTV or Turbidity Event. Note that in 2015, 2022 and 2023, Turbidity Events consisted of only two 5.0 NTU exceedances at four-hour intervals, comparable to numerous TTV's illustrated in the graph. However, because the intervals were at 8:00 pm and 12:00 am, the conditions set forth by NYSDOH defining a Turbidity Event (a series of consecutive days during which at least one turbidity measurement each day exceeded 5.0 NTU) was attained.

Figure 5 1993-2023 Treatment Technique Violations vs Turbidity Events



2.3 Turbidity Analysis at City Reservoirs

Additional turbidity analyses were done Monday-Friday at the Woodland Reservoir and Westcott Reservoir effluent conduits, and four locations within the distribution system. These additional analyses were conducted by Department of Water, Maintenance and Operations Section personnel. Hach 2100N turbidimeters are also located at the Woodland and Westcott Reservoir Gatehouses. The turbidimeters are also calibrated monthly by Water Plant personnel. During 2023 no monthly average turbidity in the distribution system exceeded 5.0 NTU. The results of this monitoring routine are included in the monthly reports sent to the NYSDOH.

2.4 Total and Fecal Coliform Sampling and Analyses

Total coliform and fecal coliform samples were collected at the Water Plant (raw water) five times/week/intake as directed by Title 10, Part 5 of the Official Compilation of Codes, Rules and Regulations of New York (10 NYCRR Part 5). The samples were analyzed by a NYSDOH certified commercial laboratory using the membrane filter (MF) technique. Of the 523 samples collected for total coliform analyses, there were no samples that exceeded 100 coliform forming units (cfu). Note that only the fecal coliform results are used to determine compliance with the City’s filtration avoidance. Of the 525 samples collected for fecal coliform analyses, there was one sample that exceeded 20 cfu. No six-month threshold for fecal coliform density was exceeded. Table Nos. 11 and 12 summarize the monthly analyses for total and fecal coliform, for each intake, respectively.

In addition to the sampling conducted at the Water Treatment Plant, samples were routinely collected within the distribution system in Syracuse to ensure water quality. Samples were collected

at 51 locations within the City. Approximately 196-246 samples were collected per month or 2,637 samples for the year.

Table 11 Skaneateles Lake Raw Water Total Coliform Analyses Rolling Six-month 10% Threshold for Part 5 Violation Criteria

For 6-Month Period Ending	Number of Samples Analyzed		Number of Samples >100 Colonies		Percent >100 Colonies	
	Number 1	Number 2	Number 1	Number 2	Number 1	Number 2
Intake:	Number 1	Number 2	Number 1	Number 2	Number 1	Number 2
January	137	136	1	1	0.73%	0.74%
February	134	133	1	1	0.75%	0.75%
March	135	134	0	0	0.00%	0.00%
April	135	134	0	0	0.00%	0.00%
May	134	134	0	0	0.00%	0.00%
June	132	132	0	0	0.00%	0.00%
July	130	130	0	0	0.00%	0.00%
August	133	133	0	0	0.00%	0.00%
September	130	130	0	0	0.00%	0.00%
October	131	131	0	0	0.00%	0.00%
November	130	129	0	0	0.00%	0.00%
December	130	129	0	0	0.00%	0.00%

Table 12 Skaneateles Lake Raw Water Fecal Coliform Analyses Rolling Six-month 10% Threshold for Part 5 Violation Criteria

For 6-Month Period Ending	Number of Samples Analyzed		Number of Samples >20 Colonies		Percent >20 Colonies	
	Number 1	Number 2	Number 1	Number 2	Number 1	Number 2
Intake:	Number 1	Number 2	Number 1	Number 2	Number 1	Number 2
January	137	136	0	0	0.00%	0.00%
February	135	134	0	0	0.00%	0.00%
March	136	135	0	0	0.00%	0.00%
April	136	135	0	1	0.00%	0.74%
May	135	135	0	1	0.00%	0.74%
June	133	133	0	1	0.00%	0.75%
July	131	131	0	1	0.00%	0.76%
August	133	133	0	1	0.00%	0.75%
September	130	130	0	1	0.00%	0.77%
October	131	131	0	0	0.00%	0.00%
November	130	129	0	0	0.00%	0.00%
December	130	129	0	0	0.00%	0.00%

2.5 Giardia and Cryptosporidium Sampling and Analyses

Analyses for the presence of Giardia cysts and Cryptosporidium oocysts began in 1985 and 1988, respectively. During 2023, samples were collected monthly from the raw water intakes (Intake #1 and Intake #2). A total of 24 samples were collected for Giardia and Cryptosporidium in 2023. Environmental Protection Agency (EPA) Method 1623 was the analysis utilized.

There were no confirmed Giardia cysts or Cryptosporidium oocysts detected in 2023. Since 1986, there have been 1,301 samples analyzed for Giardia and 1,289 samples for Cryptosporidium. Confirmed Giardia cysts have been observed in ten samples. Of these, eight were samples collected from tributaries within the watershed, one was a sample collected from Raw Water Intake #2 and one was collected from the Water Shop in 2003 (Table No. 13). Cryptosporidium oocysts have been observed on nine occasions since 1988. Of these, three sample locations were tributaries and three were from Raw Water Intake samples (Table No. 14).

Table 13 Skaneateles and Watershed *Giardia* Detection: Incidents of Confirmed Cysts

Incident Number	Date	Location	Cysts Detected	Calculated as Cysts/100 Liters
1	December 11, 1990	Grout Brook	2	2.6
2	March 14, 1991	Intake 2	1	0.1
3	March 14, 1991	Grout Brook	3	1.6
4	June 22, 1992	Shotwell Brook	2	6.6
5	June 22, 1992	One Mile Brook	4	4.2
6	August 28, 1992	Shotwell Brook	1	5.3
7	November 23, 1992	Willow Brook	1	0.3
8	November 23, 1992	Harrold Brook	2	2.1
9	March 24, 1993	Harrold Brook	1	1.1
10	May 13, 2003 *,**	Water Shop	1	2.0

* As of 2000, results are listed as cysts/liter

** As of August 2000, Method 1623 used for analyses

Table 14 Skaneateles and Watershed *Cryptosporidium* Detection: Incidents of Confirmed Oocysts

Incident Number	Date	Location	Oocysts Detected	Calculated as Oocysts/100 Liters
1	July 26, 1988	Intake 1	1	2.1
2	March 15, 1989	Intake 1	1	0.1
3	December 11, 1990	Grout Brook	2	2.6
4	November 23, 1992	Willow Brook	1	0.3
5	November 23, 1992	Harrold Brook	1	1.1
6	September 15, 2004 *,**	Intake 2 ***	2	4.0
7	September 21, 2011	Water Shop	5	0.1
8	October 3, 2011	Water Shop	1	0.02
9	October 3, 2011	Woodland Reservoir	2	0.01

* As of 2000, results are listed as cysts/liter

** As of August 2000, Method 1623 is used for analyses

*** Previous reports list Intake 1 as the affected intake. That was incorrect. The oocysts were in a sample from Intake 2

2.6 Skaneateles Lake Limnological Sampling and Analyses

2.6.1 Algal Analyses

The sampling regime included station samples and depth profile samples. The station sampling consists of collecting one-liter samples at eight locations on the lake at a depth of 20'. The sites are approximately two miles apart. Sampling was conducted on ten dates with 80 one-liter samples being collected and analyzed for algal content.

It is noted that the Secchi disk readings effected during the station sampling can be somewhat skewed. Since stations I and VIII are shallow, the readings are consistently at the bottom, which is usually about six meters (as a result, samples are collected at about 15 feet). It is not unusual for the readings at the other Stations to vary considerably throughout the spring, summer and fall seasons, ranging from four to 16 meters (Figure 6). Figures 7 and 8 illustrate Secchi disk depth variations between early summer and fall. References to Secchi disk readings in the narrative below are adjusted, i.e., only Stations II – VII were used to determine averages.

Depth profile samples were collected at a location approximately four miles from the northern shore in the center of the lake. On each of the six sampling dates, 21 one-liter samples were collected at 10-foot intervals from the surface to a depth of 200 feet. Each was analyzed for temperature and turbidity. Algal content was determined on those samples representing the different layers of stratification: six of the 21 samples collected on each date were analyzed for algal content. Thirty-six one-liter samples were analyzed for algal concentration during the season.

Sampling was conducted from May through October 2023. The majority of genera observed were blue-green algae of the Phylum Cyanophyta (genus, Polycystis and Cyclotella) (Table No. 15). For Station Samples, four genera accounted for 86.89% of the total cell count: Polycystis (47.37%), Cyclotella (20.45%), Dinobryon (10.46%) and Cyanobium (8.61%). For Depth Profile samples, three genera accounted for 81.99% of the total cell count. Polycystis was the dominant form at 37.13%. Cyclotella accounted for 34.53% and Chroococcus Type I accounted for 10.33%.

The station and depth profile sample collection and analyses are discussed in greater detail below. Table No. 16 lists the dates and results of the Station analyses. Table No. 17 is a summary of the Depth Profile analyses.

Note: There have been changes to the identification (or naming) of the various genera over the past several years. For the most part, the changes apply to growth in the city reservoirs. A complete summary can be found in the draft document: City of Syracuse Water Department: Woodland Reservoir Treatment Procedures for Algal Control.

Table 15 Genera of Phytoplankton Typically Found in Skaneateles Lake

Phylum: Chrysophyta (Diatoms)

Achnanthes	Coscinodiscus	Diatoma	Meridion	Pinnularia	Surirella
Asterionella	Cyclotella	Fragellaria	Navicula	Stauroneis	Synedra
Cocconeis	Cymbella	Gomphonema	Nitzschia	Stephanodiscus	Tabellaria

Phylum: Chrysophyta (Golden-Brown)

Centritractus	Tribonema
Dinobryon	Mallomonas

Phylum: Chlorophyta (Green)

Botryococcus	Cosmarium	Palmella	Straurastrum
Chlorococcum	Hydrodictyon	Pediastrum	Tetraedron
Chlorella	Nitella	Phytoconis	Ulothrix
Coelastrum	Oocystis	Scenedesmus	Volvox

Phylum: Cyanophyta (Blue-Green)

Anabaena	Cyanarcus	Merismopdia
Aphanothece	Gomphosphaeria	Rivularia
Polycystis	Lyngbya	Oscillatoria
Chroococcus	Cyanobium	

Phylum: Euglenophyta (Flagellates)

Euglena	Trachelomonas
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Phylum: Pyrrophyta (Dinoflagellates)

Ceratium	Peridinium
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Table 16 Station Sampling Analyses Skaneateles Lake Algal Content 2023

Date	Average Total Cell Count	Dominant Form	Percent of Total	Average Secchi Disk Meters	Average Water Temperature °F
May 30	465	Polycystis 61.3% Cyclotella 16.8% Cyanobium 11.4%	89.5%	10.2	55.2
June 8	687	Polycystis 44.8% Cyclotella 28.9% Cyanobium 18.5%	92.2%	7.3	58.8
June 29	857	Polycystis 45.9% Cyclotella 21.6% Cyanobium 17.8%	85.3%	5.6	66.8
July 14	1561	Polycystis 40.6% Dinobryon 27.3% Cyanobium 12.9% Synedra 11.0%	91.8%	-	-
July 25	1708	Polycystis 30.9% Dinobryon 26.2% Cyclotella 21.5% Synedra 4.2%	90.1%	5.9	73.1
August 9	912	Polycystis 68.5% Cyclotella 18.0% Synedra 4.2%	90.7%	9.2	71.9
August 28	778	Polycystis 61.9% Cyclotella 17.7% Achnanthes 6.5%	86.1%	5.8	69.6
September 6	1237	Polycystis 41.4% Cyclotella 41.2% Chroococcus Type I 8.6%	91.2%	6.0	71.0
September 27	430	Polycystis 61.3% Cyclotella 17.2% Achnanthes 9.7%	88.2%	10.7	65.8
October 12	228	Polycystis 73.8% Cyclotella 11.6% Cyanobium 7.6%	93.0%	10.0	61.9
Average				7.9	68.9

Table 17 Depth Profile Sampling Analyses Skaneateles Lake Algal Content 2023

Date	Average Total Cell Count	Dominant Form	Percent of Total	Average Turbidity	Average Water Temperature °F
May 22	216	Polycystis 62.4% Cyanobium 10.2% Cyclotella 8.6% Achnanthes 8.3%	89.5%	0.30	47.7
June 20	860	Cyclotella 47.0% Polycystis 31.5% Achnanthes 9.1%	87.5%	0.44	52.7
July 19	1552	Cyclotella 48.6% Polycystis 28.5% Synedra 8.2% Chroococcus type I 6.7%	92.0%	0.34	56.3
August 21	1082	Cyclotella 27.9% Polycystis 27.0% Chroococcus Type I 22.5% Achnanthes 9.6%	87.0%	0.42	49.0
September 12	632	Polycystis 48.4% Chroococcus Type I 20.3% Cyclotella 18.1% Achnanthes 4.9%	91.7%	0.57	58.3
October 18	281	Polycystis 88.2% Cyanobium 8.2%	96.4%	0.31	52.1
Average	771			0.40	52.68

2.6.2 Station Sample Analysis

Total cell counts for station samples collected on May 30 averaged 465 cells/mL. Polycystis was the dominant form accounting for 61.3% of the total, Cyclotella and Cyanobium accounted for 16.8% and 11.4% respectively. Secchi disc readings averaged 10.2 meters. The water temperature averaged 55.20 degrees Fahrenheit.

The total monthly cell counts for June averaged 772 cells/mL. On June 8 the total average cell count was 687 cells/mL. Polycystis and Cyclotella accounted for 44.8% and 28.9% of the total respectively. Cyanobium accounted for 18.5% of the total. The June 29 total cell count averaged 857 cells/mL. Cyclotella, Polycystis, and Cyanobium were dominant, accounting for 45.9%, 21.6% and 17.8% of the total respectively. Secchi disk readings averaged 7.3 meters on June 8, decreasing to 5.6 meters on June 29. The average water temperature recordings increased between sample events from 58.80 degrees Fahrenheit (June 8) to 66.80 degrees Fahrenheit (June 29).

The July monthly average total cell count of 1,634 cells/mL. On July 14, the total average cell count was 1,561 cells/mL. Polycystis and Dinobryon were the dominant forms accounting for 40.6% and 27.3% respectively. On July 25, the average total cell count remained low at 1,708 cells/mL.

Polycystis, Dinobryon and Cyclotella were the dominant forms accounting for 30.9%, 26.2% and 21.5% of the total cell count respectively. Average water temperature increased to 73.10 degrees Fahrenheit. Secchi disk readings averaged 5.9 meters.

The total average cell counts on August 9 decreased significantly from July sample events, averaging 912 cells/mL. The dominant forms were Polycystis (68.5%) and Cyclotella (18.0%). On August 28, the average total cell count remained low for late summer at 845 cells/mL. Polycystis and Cyclotella were dominant, accounting for 61.9% and 17.7% respectively. For the month of August, water temperatures averaged 70.80 degrees Fahrenheit and Secchi disk readings averaged 7.5 meters.

Total cell counts for September 6 and September 27 averaged 1,237 cells/mL. and 430 cells/mL. respectively. For the September 6 sample event, dominant forms included Polycystis (41.4%), and Cyclotella (41.2%). Chroococcus Type I accounted for 8.6%. Polycystis was the dominant form for the September 27 event totaling 61.3%. Cyclotella totaled 17.2%. Water temperatures for the month of September averaged 68.40 degrees Fahrenheit. Secchi disk readings averaged 8.3 meters.

Total cell counts for October 12 averaged 228 cells/mL. Polycystis was the dominant form accounting for 73.8% of the total cell count. Cyclotella and Cyanobium accounted for 11.6% and 7.6% respectively. Water temperatures averaged 61.90 degrees Fahrenheit and Secchi disc readings averaged 10.0 meters.

2.6.3 Depth Profile Sample Analysis

The total cell count for the May 22 depth profile averaged 216 cells/mL. Water temperatures averaged 47.70 degrees Fahrenheit, ranging from 54.60 degrees Fahrenheit at the surface, declining to 45.10 degrees Fahrenheit (170'). Polycystis was dominant at 72.4% of the total cell count. Cyclotella and Achnanthes accounted for 8.6% and 8.3% of the total respectively. The lake was still exhibiting spring turnover, the depth profile indicated weak thermal stratification.

The total cell count for the June 20 depth profile averaged 860 cells/mL. Cyclotella was the dominant form, accounting for 47.0% of the total cell count. Polycystis and Achnanthes accounted for 31.5% and 9.1% of the total cell count respectively. The surface temperature was 64.50 degrees Fahrenheit. Vertical mixing was still evident throughout the upper water column with no defined epilimnion or metalimnion.

The July 19 depth profile total cell count average increased significantly from the June average to 1,552 cells/mL. The dominant forms were Cyclotella (48.6%) and Polycystis (28.5%). The lake surface temperature increased to 74.00 degrees Fahrenheit. The epilimnion was established to 30', the metalimnion extended to 90' and the hypolimnion from 90' downward.

On August 21 the depth profile average total cell count decreased from July's count, averaging 1,082 cells/mL. The three dominant forms included: Cyclotella (27.9%), Polycystis (27.0%), and Chroococcus Type I (22.5%). The surface water temperature decreased to 71.00 degrees Fahrenheit. Thermal stratification was evident; the epilimnion extended to 40', the thermocline extended to 120' and the hypolimnion from 120' downward.

The September 12 depth profile average total cell count was seasonally low at 632 cells/mL. Polycystis was the dominant form comprising 48.4% of the total cell count. Chroococcus Type I and Cyclotella accounted for 20.3% and 18.1% of the sample respectively. The epilimnion remained shallow, extending to a depth of 40', the metalimnion extended to 90'. A temperature gradient was evident through the hypolimnion ranging from a high of 55 degrees Fahrenheit at 90' to 48 degrees Fahrenheit at 160'. The lake's surface temperature was 72.00 degrees Fahrenheit.

The average total cell count on the October 18 sample event was 281 cells/mL. Polycystis was the dominant form at 88.2%. Cyanobium accounted for 8.2% of the sample. The epilimnion extended to 60', the metalimnion to 90' and hypolimnion from 90' downward.

2.7 Skaneateles Lake Algal Blooms

Algal blooms observed by the Skaneateles Lake Watershed Protection staff in 2023 were small, localized and limited to near-shore areas. Microcystin was not detected in raw water samples collected from Intake #1 or Intake #2 in 2023.

Monitoring, identifying, sampling, and reporting algae blooms involved a collaborative effort between the NYSDEC Finger Lakes HAB Volunteer Surveillance, the Skaneateles Lake Association (SLA) Shoreline HABs Program and the City of Syracuse Water Department. The SLA Shoreline HABs Program comprising of select volunteers continued to monitor 25 zones around the perimeter of Skaneateles Lake in 2023. Suspicious algal blooms were reported to the NYSDEC Division of Water website HABsInfo@dec.ny.gov. Syracuse Water Department personnel routinely collected surface water skim samples following reports of suspicious blooms. Algal forms were identified, and cell counts performed on one-liter centrifuged samples under light microscopy to determine dominant algal forms.

As a result of the numerous volunteers and professional staff monitoring Skaneateles Lake and the heightened awareness of lakefront property owners and watercraft operators, the lake was intensely monitored, and lake conditions assessed in a timely manner. The frequent monitoring and the lake-wide surveillance program were instrumental in the early detection of algal blooms.

2.8 HAB Action Plan for Managing Microcystin in Skaneateles Lake

In coordination with the NYSDOH, a HAB Action Plan was developed in 2018 to ensure that the City's drinking water remained of high quality and microcystin was not detected in treated water above 0.3 µg/L. The Action Plan included short-term and long-term measures and is updated annually.

2.8.1 Short Term Measures

The short-term measures provided for an aggressive monitoring program. Microcystin sampling at the City's drinking water intakes was initiated on July 5 and extended through October 10 of 2023. Raw water was analyzed weekly unless blooms were identified within the North basin or microcystin was detected in either raw or treated samples, triggering a more frequent sampling schedule. Samples were collected and transported to an ELAP certified lab on 17 occasions for analysis in 2023. No raw water samples were reported with microcystin levels above the limit of quantitation (LOQ) of 0.3 µg/L (Table No. 18).

Table 18 Skaneateles Lake Microcystin Levels (ug/L) July 5 – October 10, 2023

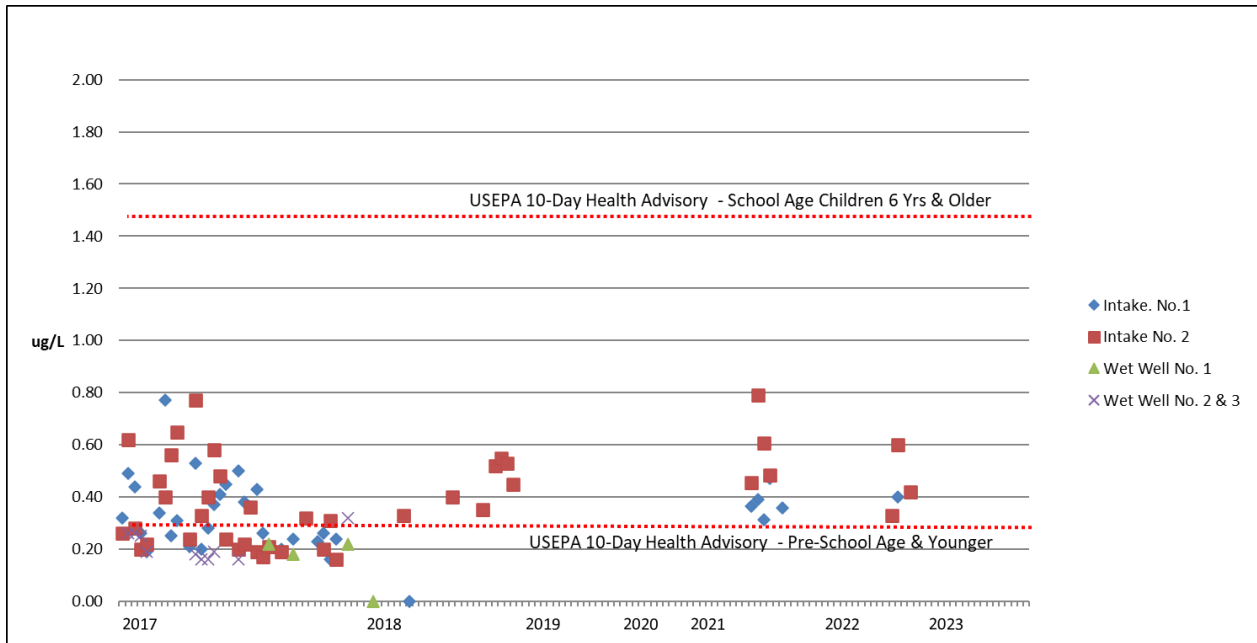
SKANETELES LAKE MICROCYSTIN LEVELS (ug/L)
July 5 - October 10, 2023

Date Sampled	7/5	7/10	7/17	7/24	7/31	8/7	8/14	8/21	8/28	9/5	9/11
Intake 1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Intake 2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Clear Well 1 & 2	-	-	-	-	-	-	-	-	-	-	-
Clear Well 3	-	-	-	-	-	-	-	-	-	-	-
Skaneateles UV plant	-	-	-	-	-	-	-	-	-	-	-
Elbridge UV plant	-	-	-	-	-	-	-	-	-	-	-
Westcott incoming	-	-	-	-	-	-	-	-	-	-	-
Westcott outgoing	-	-	-	-	-	-	-	-	-	-	-
Woodland incoming	-	-	-	-	-	-	-	-	-	-	-
Wooland outgoing	-	-	-	-	-	-	-	-	-	-	-
Skaneateles HS	-	-	-	-	-	-	-	-	-	-	-
Byrne Dairy	-	-	-	-	-	-	-	-	-	-	-
Elbridge North	-	-	-	-	-	-	-	-	-	-	-
Jordan Town Hall	-	-	-	-	-	-	-	-	-	-	-
Syracuse Burnet Ave	-	-	-	-	-	-	-	-	-	-	-

Date Sampled	9/18	9/25	10/2	10/3	10/4	10/10
Intake 1	ND	ND	ND	ND	ND	ND
Intake 2	ND	ND	ND	ND	ND	ND
Clear Well 1 & 2	-	-	-	-	-	-
Clear Well 3	-	-	-	-	-	-
Skaneateles UV plant	-	-	-	-	-	-
Elbridge UV plant	-	-	-	-	-	-
Westcott incoming	-	-	-	-	-	-
Westcott outgoing	-	-	-	-	-	-
Woodland incoming	-	-	-	-	-	-
Wooland outgoing	-	-	-	-	-	-
Skaneateles HS	-	-	-	-	-	-
Byrne Dairy	-	-	-	-	-	-
Elbridge North	-	-	-	-	-	-
Jordan Town Hall	-	-	-	-	-	-
Syracuse Burnet Ave	-	-	-	-	-	-

Throughout periods of microcystin detections in raw water intakes (2017, 2018, 2021 & 2022), the City has demonstrated that by boosting chlorine levels at the water intake cribs and wet wells and maintaining an elevated chlorine concentration in finished water, microcystin detection within the water distribution system could be avoided. Figure No. 9 shows the number of microcystin detections for both raw and treated water samples and the range of detections for the previous four years. Note that microcystin was not detected in 2019, 2020 and 2023.

Figure 9 Skaneateles Lake Microcystin Levels 2017-2023



Short term measures also addressed the City’s response to finished water microcystin levels above the 0.3 µg/L. regarding public messaging and agency coordination. These measures included identifying specific agencies and principal contacts involved in decision making and communications and resources immediately available, such as alternate potable water.

2.8.2 Long Term Measures

Long term measures include extending the City’s shallow water intake. In September 2019, the City’s Engineering Consultant submitted a report titled; Conceptual Design of the Extension of Intake No. 2 for review. The document updated key elements of the 2004 Conceptual Design which comprised of extending Intake #2 (3,400 feet in length) to a depth of approximately 60 feet. The report included cost estimations, a preliminary schedule, water quality assessment, hydraulic analysis, pipe design and construction and permitting strategy. In March of 2023 the awarded design team scheduled a kick-off meeting with City representatives to present a timeframe for completion of engineering services relative to the design phase of the Intake #2 extension project. Deliverables initiated or completed in 2023 included deployment of water quality monitoring buoys, a bathymetric survey and soil borings along the proposed Intake #2 extension route, water quality modeling and hydraulic modeling.

Additional measures include continued and advanced source water protection activities. Source water protection activities are also part of the HAB Action Plan that the New York State Department of Environmental Conservation (NYSDEC) is developing in collaboration with steering committees.

3. CHEMICAL SAMPLING AND ANALYSIS

3.1 Organic and Inorganic Sampling Results

Skaneateles Lake water was sampled and analyzed for several chemicals and/or compounds during 2022. The analyses included: trihalomethanes (THM), haloacetic acids (HAA5), volatile organic compounds (VOC) with methyl-tertiary butyl ether (MTBE), synthetic organic compounds (SOC), inorganic chemicals and physical characteristics.

The monitoring results are listed in Tables Nos. 19-27, respectively. The frequency of sampling and methods of analyses were in accordance with 10 NYCRR Part 5-1 and/or Environmental Protection Agency (EPA) regulations. The results of the chemical analyses show that all concentrations were below the New York State Department of Health (NYS DOH) or EPA Maximum Contaminant Levels (MCLs).

Table 19 Total Trihalomethane Analyses of Chlorinated Skaneateles Lake Water for 2023

Results in ug/L	4000 East Genesee St.	Serpicos Diner	Functional Comm. Corp.	McChesney Center	Quarterly Average (All Sites)
February 23	23.20	18.50	20.30	16.80	19.70
May 2	35.00	28.80	33.60	25.80	30.80
August 9	44.00	57.80	43.10	40.60	46.38
November 27	25.10	26.80	20.80	20.00	23.18
Locational Annual Average	31.83	32.98	29.45	25.80	

40/30 Certification Exemption per Disinfection Byproducts Rules: <40 ug/L

Table 20 Haloacetic Acids (5) Analyses of Skaneateles Lake Water for 2023

Results in ug/L	400 East Genesee St.	Serpicos Diner	Functional Comm. Corp.	McChesney Center	Quarterly Average (All Sites)
February 23	25.00	16.50	21.70	16.40	19.90
May 2	14.40	11.00	12.40	11.80	12.40
August 9	14.70	15.40	15.10	16.80	15.50
November 27	11.70	13.90	13.50	12.60	12.93
Locational Annual Average	16.45	14.20	15.68	14.40	

Table 21 Volatile Organic Compounds, Vinyl Chloride and MTBE: February 23, 2023, Skaneateles Lake Water

Volatile Organic Compound	ug/L	Volatile Organic Compound	ug/L
Benzene	<0.5	Cis-1,3-Dichloropropene	<0.5
Bromobenzene	<0.5	trans-1,3-Dichloropropene	<0.5
Bromochloromethane	<0.5	Ethylbenzene	<0.5
Bromomethane	<0.5	Hexachlorobutadiene	<0.5
N-Butylbenzene	<0.5	Isopropylbenzene	<0.5
sec-Butylbenzene	<0.5	4-Isopropyltoluene	<0.5
tert-Butylbenzene	<0.5	Methylene Chloride	<0.5
Carbon Tetrachloride	<0.5	n-Propylbenzene	<0.5
Chlorobenzene	<0.5	Styrene	<0.5
Chloroethane	<0.5	1,1,1,2-Tetrachloroethane	<0.5
Chloromethane	<0.5	1,1,2,2-Tetrachloroethane	<0.5
2-Chlorotoluene	<0.5	Tetrachloroethene	<0.5
4-Chlorotoluene	<0.5	Toluene	<0.5
Dibromomethane	<0.5	1,2,3-Trichlorobenzene	<0.5
1,2-Dichlorobenzene	<0.5	1,2,4-Trichlorobenzene	<0.5
1,3-Dichlorobenzene	<0.5	1,1,1-Trichloroethane	<0.5
1,4-Dichlorobenzene	<0.5	1,1,2-Trichloroethane	<0.5
Dichlorodifluoromethane	<0.5	Trichloroethene	<0.5
1,1-Dichloroethane	<0.5	Trichlorofluoromethane	<0.5
1,2-Dichloroethane	<0.5	1,2,3-Trichloropropane	<0.5
1,1-Dichloroethene	<0.5	1,2,4-Trimethylbenzene	<0.5
cis-1,2-Dichloroethene	<0.5	1,3,5-Trimethylbenzene	<0.5
trans-1,2-Dichloroethene	<0.5	m-Xylene	<0.5
1,2-Dichloropropane	<0.5	o-Xylene	<0.5
1,3-Dichloropropane	<0.5	p-Xylene	<0.5
2,2-Dichloropropane	<0.5	Vinyl Chloride	<0.5
1,1-Dichloropropene	<0.5	MTBE	<0.5

Table 22 Volatile Organic Compounds, Vinyl Chloride and MTBE: May 2, 2023, Skaneateles Lake Water

Volatile Organic Compound	ug/L	Volatile Organic Compound	ug/L
Benzene	<0.5	Cis-1,3-Dichloropropene	<0.5
Bromobenzene	<0.5	trans-1,3-Dichloropropene	<0.5
Bromochloromethane	<0.5	Ethylbenzene	<0.5
Bromomethane	<0.5	Hexachlorobutadiene	<0.5
N-Butylbenzene	<0.5	Isopropylbenzene	<0.5
sec-Butylbenzene	<0.5	4-Isopropyltoluene	<0.5
tert-Butylbenzene	<0.5	Methylene Chloride	<0.5
Carbon Tetrachloride	<0.5	n-Propylbenzene	<0.5
Chlorobenzene	<0.5	Styrene	<0.5
Chloroethane	<0.5	1,1,1,2-Tetrachloroethane	<0.5
Chloromethane	<0.5	1,1,2,2-Tetrachloroethane	<0.5
2-Chlorotoluene	<0.5	Tetrachloroethene	<0.5
4-Chlorotoluene	<0.5	Toluene	<0.5
Dibromomethane	<0.5	1,2,3-Trichlorobenzene	<0.5
1,2-Dichlorobenzene	<0.5	1,2,4-Trichlorobenzene	<0.5
1,3-Dichlorobenzene	<0.5	1,1,1-Trichloroethane	<0.5
1,4-Dichlorobenzene	<0.5	1,1,2-Trichloroethane	<0.5
Dichlorodifluoromethane	<0.5	Trichloroethene	<0.5
1,1-Dichloroethane	<0.5	Trichlorofluoromethane	<0.5
1,2-Dichloroethane	<0.5	1,2,3-Trichloropropane	<0.5
1,1-Dichloroethene	<0.5	1,2,4-Trimethylbenzene	<0.5
cis-1,2-Dichloroethene	<0.5	1,3,5-Trimethylbenzene	<0.5
trans-1,2-Dichloroethene	<0.5	m-Xylene	<0.5
1,2-Dichloropropane	<0.5	o-Xylene	<0.5
1,3-Dichloropropane	<0.5	p-Xylene	<0.5
2,2-Dichloropropane	<0.5	Vinyl Chloride	<0.5
1,1-Dichloropropene	<0.5	MTBE	<0.5

Table 23 Volatile Organic Compounds, Vinyl Chloride and MTBE: August 9, 2023, Skaneateles Lake Water

Volatile Organic Compound	ug/L	Volatile Organic Compound	ug/L
Benzene	<0.5	Cis-1,3-Dichloropropene	<0.5
Bromobenzene	<0.5	trans-1,3-Dichloropropene	<0.5
Bromochloromethane	<0.5	Ethylbenzene	<0.5
Bromomethane	<0.5	Hexachlorobutadiene	<0.5
N-Butylbenzene	<0.5	Isopropylbenzene	<0.5
sec-Butylbenzene	<0.5	4-Isopropyltoluene	<0.5
tert-Butylbenzene	<0.5	Methylene Chloride	<0.5
Carbon Tetrachloride	<0.5	n-Propylbenzene	<0.5
Chlorobenzene	<0.5	Styrene	<0.5
Chloroethane	<0.5	1,1,1,2-Tetrachloroethane	<0.5
Chloromethane	<0.5	1,1,2,2-Tetrachloroethane	<0.5
2-Chlorotoluene	<0.5	Tetrachloroethene	<0.5
4-Chlorotoluene	<0.5	Toluene	<0.5
Dibromomethane	<0.5	1,2,3-Trichlorobenzene	<0.5
1,2-Dichlorobenzene	<0.5	1,2,4-Trichlorobenzene	<0.5
1,3-Dichlorobenzene	<0.5	1,1,1-Trichloroethane	<0.5
1,4-Dichlorobenzene	<0.5	1,1,2-Trichloroethane	<0.5
Dichlorodifluoromethane	<0.5	Trichloroethene	<0.5
1,1-Dichloroethane	<0.5	Trichlorofluoromethane	<0.5
1,2-Dichloroethane	<0.5	1,2,3-Trichloropropane	<0.5
1,1-Dichloroethene	<0.5	1,2,4-Trimethylbenzene	<0.5
cis-1,2-Dichloroethene	<0.5	1,3,5-Trimethylbenzene	<0.5
trans-1,2-Dichloroethene	<0.5	m-Xylene	<0.5
1,2-Dichloropropane	<0.5	o-Xylene	<0.5
1,3-Dichloropropane	<0.5	p-Xylene	<0.5
2,2-Dichloropropane	<0.5	Vinyl Chloride	<0.5
1,1-Dichloropropene	<0.5	MTBE	<0.5

Table 23 Volatile Organic Compounds, Vinyl Chloride and MTBE: November 27, 2023, Skaneateles Lake Water

Volatile Organic Compound	ug/L	Volatile Organic Compound	ug/L
Benzene	<0.5	Cis-1,3-Dichloropropene	<0.5
Bromobenzene	<0.5	trans-1,3-Dichloropropene	<0.5
Bromochloromethane	<0.5	Ethylbenzene	<0.5
Bromomethane	<0.5	Hexachlorobutadiene	<0.5
N-Butylbenzene	<0.5	Isopropylbenzene	<0.5
sec-Butylbenzene	<0.5	4-Isopropyltoluene	<0.5
tert-Butylbenzene	<0.5	Methylene Chloride	<0.5
Carbon Tetrachloride	<0.5	n-Propylbenzene	<0.5
Chlorobenzene	<0.5	Styrene	<0.5
Chloroethane	<0.5	1,1,1,2-Tetrachloroethane	<0.5
Chloromethane	<0.5	1,1,2,2-Tetrachloroethane	<0.5
2-Chlorotoluene	<0.5	Tetrachloroethene	<0.5
4-Chlorotoluene	<0.5	Toluene	<0.5
Dibromomethane	<0.5	1,2,3-Trichlorobenzene	<0.5
1,2-Dichlorobenzene	<0.5	1,2,4-Trichlorobenzene	<0.5
1,3-Dichlorobenzene	<0.5	1,1,1-Trichloroethane	<0.5
1,4-Dichlorobenzene	<0.5	1,1,2-Trichloroethane	<0.5
Dichlorodifluoromethane	<0.5	Trichloroethene	<0.5
1,1-Dichloroethane	<0.5	Trichlorofluoromethane	<0.5
1,2-Dichloroethane	<0.5	1,2,3-Trichloropropane	<0.5
1,1-Dichloroethene	<0.5	1,2,4-Trimethylbenzene	<0.5
cis-1,2-Dichloroethene	<0.5	1,3,5-Trimethylbenzene	<0.5
trans-1,2-Dichloroethene	<0.5	m-Xylene	<0.5
1,2-Dichloropropane	<0.5	o-Xylene	<0.5
1,3-Dichloropropane	<0.5	p-Xylene	<0.5
2,2-Dichloropropane	<0.5	Vinyl Chloride	<0.5
1,1-Dichloropropene	<0.5	MTBE	<0.5

Table 24 Synthetic Organic Compound Analyses of Skaneateles Lake Water May 2, 2023

Part 5 Group Number	Parameter	EPA Standard in ug/L	Results in ug/L
1	Alachlor	0.2	Not Detected
1	Aldicarb	3	Not Detected
1	Aldicarb sulfone	2	Not Detected
1	Aldicarb sulfoxide	4	Not Detected
1	Atrazine	3	Not Detected
2	Benzo(a)pyrene	0.2	Not Detected
1	Carbofuran	40	Not Detected
1	Chlordane, Total	2	Not Detected
2	Bis(2-ethylhexyl)phthalate	6	Not Detected
1	1,2-dibromo-3-chloropropane	0.2	Not Detected
1	2,4-D	50	Not Detected
2	Dinoseb	7	Not Detected
1	Endrin	2	Not Detected
1	1,2-dibromoethane (EDB)	0.05	Not Detected
1	Heptachlor	0.4	Not Detected
1	Heptachlor epoxide	0.2	Not Detected
2	Hexachlorobenzene	1	Not Detected
1	Gamma-BHC (Lindane)	0.2	Not Detected
+1	Methoxychlor	40	Not Detected
1	Pentachlorophenol	1	Not Detected
1	PCB, Total	0.5	Not Detected
2	Simazine	4	Not Detected
1	Toxaphene	3	Not Detected
1	2,4,5-TP Silvex	10	Not Detected
2	3-Hydroxy Carbofuran	5	Not Detected
2	Aldrin	5	Not Detected
2	Butachlor	50	Not Detected
2	Carbaryl	5	Not Detected
2	Dalapon	50	Not Detected
2	Dicamba	50	Not Detected
2	Dieldrin	5	Not Detected
2	Glyphosate	50	Not Detected
2	Hexachlorocyclopentadiene	5	Not Detected
2	Methomyl	5	Not Detected
2	Metolachlor	50	Not Detected
2	Metribuzin	50	Not Detected
2	Oxamyl	5	Not Detected
2	Propachlor	50	Not Detected

Table 25 Inorganic Chemicals and Physical Characteristics Analysis of Skaneateles Lake Water May 2, 2023

Parameter	EPA Standard in mg/L	Results in mg/L
Antimony	0.006	Not Detected
Arsenic	0.010	Not Detected
Barium	2.0	0.0273
Beryllium	0.004	Not Detected
Bromate	0.01	Not Detected
Cadmium	0.005	Not Detected
Chlorite	1.0	Not Detected
Chromium	0.10	Not Detected
Cyanide	0.02	Not Detected
Mercury	0.002	Not Detected
Nickel	None	Not Detected
Selenium	0.05	Not Detected
Thallium	0.002	Not Detected
Fluoride	2.2	<0.10
Chloride	250	23.3
Magnesium	None	7.80
Manganese	0.30	Not Detected
Potassium	None	0.454
Silver	0.10	Not Detected
Sodium	None	11.9
Sulfate	250	11.4
Color	15 units	<5
Odor	3 units	2 units
Nitrate	10.0	0.41
Nitrite	1.0	Not Detected
Zinc	5.0	Not Detected

Table 26 Radionuclide Analyses of Skaneateles Lake Water August 9, 2023

Parameter	EPA Standard in picocuries/liter (pCi/l)	Results in pCi/l
Gross Alpha Particle	15	0.928
Radium 226	5	0.487
Radium 228	5	0.337

Table 27 Emerging Contaminants Detected – PFAS / 1-4 Dioxane Analysis of Skaneateles Lake Water

Contaminant	Unit	Regulatory Limit (MCL)	MCLG	Level Detected	Sample Date	Violation
Perfluorooctanoic acid (PFOA) (1)	ng/L	10	N/A	0.96 (2)	11/15/2022	No
Perflurobutanoic acid (PFBA) (10)	ng/L	50,000	N/A	1.9	11/27/2023	No

Notes:

1: Released into the environment from widespread use in commercial and industrial applications

2: Level detected below reporting limit of 1.8 ng/L

4. SKANEATELES LAKE WATERSHED PROTECTION PROGRAM

4.1 Watershed Inspection Program Overview

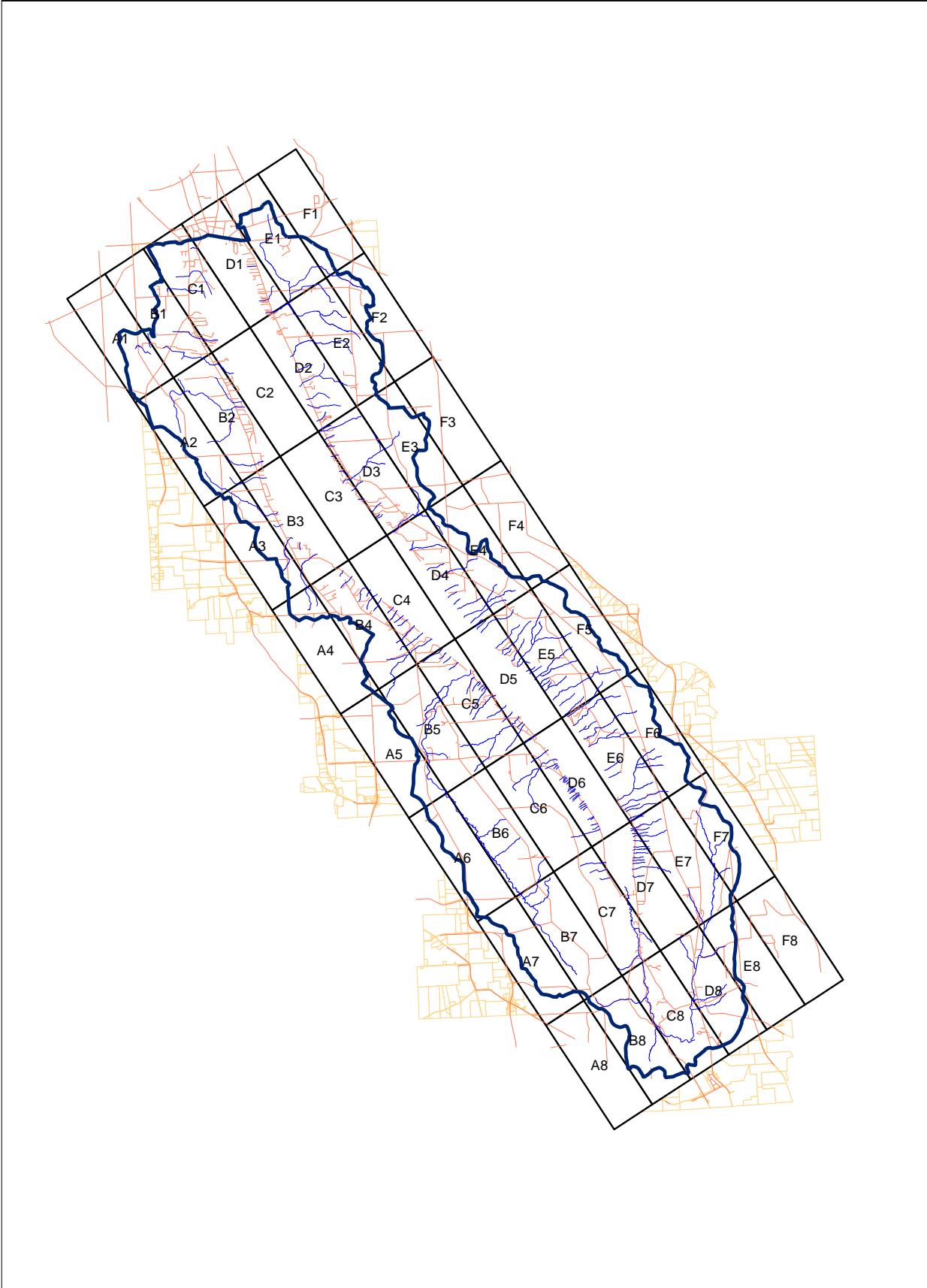
The Watershed Protection Program operated by the City of Syracuse consisted of (a) an Inspection Program to detect violations of the Watershed Rules and Regulations, NYSDOH and county Sanitary Codes, NYS Department of Environmental Conservation (DEC) Environmental Conservation Law (ECL), Navigation Law and local rules and regulations, (b) direct involvement in the procedures for installation of new and repair of existing OWTS, (c) reviewing all design and site plans for proposed building and land disturbing activity and (d) the OWTS Inspection Program.

Two City of Syracuse personnel routinely patrol the lake and watershed: a Watershed Inspector and a Water Department Sanitarian. Typically, there is an increase in regulated activities within the watershed during the summer months (May-September). This is due, in large part, to the influx of seasonal residents and non-resident recreational users (boaters, anglers, hikers, etc.). The activities include construction and/or repair of dwellings, OWTS and shoreline structures and recreation.

To address this increased seasonal activity, Inspectors conduct intensive morning investigations of lakeshore properties. This includes walking properties, looking under structures, inspecting for OWTS failures, and investigating construction activities of any kind. When required, a boat detail is implemented for those areas that are difficult to access by truck or foot. To more effectively survey the entire land area within the watershed annually, watershed zones were digitally overlaid and labeled on a GIS map in 2012 (Figure 10). The zones appear on the Skaneateles Lake Watershed Map as 48 rectangular grids, each representing approximately 870 acres of land. Inspectors are assigned to individual zones based on the time of year. Zones comprising of lakefront seasonal cottages are inspected during the summer months and remote areas located off seasonal roads are typically inspected in the spring and fall.

The afternoon schedule allows for flexibility, and no specific areas are selected for inspection. This affords the Inspectors the latitude to conduct general inspections, pursue compliance of outstanding violations, conduct site surveys for OWTS proposals and meet with property owners, Environmental Conservation Officers (ECOs), Building Inspectors, or County Public Health Technicians/Sanitarrians.

Figure 10 Skaneateles Lake Watershed Inspection Zones



4.2 Onsite Wastewater Treatment System Review and Inspection

Soil tests were witnessed by the Inspectors on 30 occasions in 2023. All soil tests were done in accordance with 10 NYCRR Part 75 (Appendix 75-A) and witnessed by the inspection team. All proposed systems for new dwellings require a plan designed by a licensed Design Professional. Typically, property owners hire a private consultant. However, Cortland County Department of Health personnel are responsible for conventional system design in their county. Sites requiring non-conventional systems require designs by a private consultant. Plans are submitted to the Department of Water for review and comment, and to the respective county health department for approval or rejection based on 10 NYCRR Part 75 guidelines. A total of 29 OWTS design proposals for new construction or alternative engineering design were recommended for approval. One proposal was reviewed for repair of existing septic system components. Watershed personnel also conducted backfill inspections on repairs, as well as assisted county Sanitarians and design engineers with final inspections for new construction.

4.3 Housing Starts in the Watershed

A total of 13 building permits were issued for new dwellings during 2023 (Table No. 27 & Fig. 11). Nine of the permits were in Onondaga County. Four were in the town of Skaneateles (one lakefront), and five were issued in the town of Spafford (three lakefront). Three permits were issued in Cayuga County, two in the town of Niles (both lakefront) and one in the town of Sempronius (not lakefront). One permit was issued in Cortland County, in the town of Scott, (not lakefront).

Table 28 Construction Activity in the Skaneateles Watershed for 2023

Township	New Construction	Lakefront*	Additions & Renovations	Lakefront**
Village of Skaneateles	0	0	1	0
Town of Skaneateles	4	1	7	1
Spafford	5	3	5	2
Niles	2	2	2	2
Sempronius	1	0	0	0
Scott	1	0	0	0
Total	13	6	15	5

* Included in new construction figures

** Included in additions & renovations figures

4.4 Building Permit Application Review

The Watershed Protection Program reviewed a total of 61 Building and Zoning Permit Applications in 2023. As discussed above, 13 were new construction. Fifteen applications were additions or renovations to existing dwellings and the remaining 33 applications included shoreline structures, accessory structures, landscape features or proposed subdivisions and lot line relocations. Figures 11 through 14 illustrate new construction and renovation proposals reviewed by the City of Syracuse and monitored throughout project duration in the Skaneateles Lake Watershed since 1993.

Figure 11 New Construction Activity within the Skaneateles Lake Watershed 1993-2023

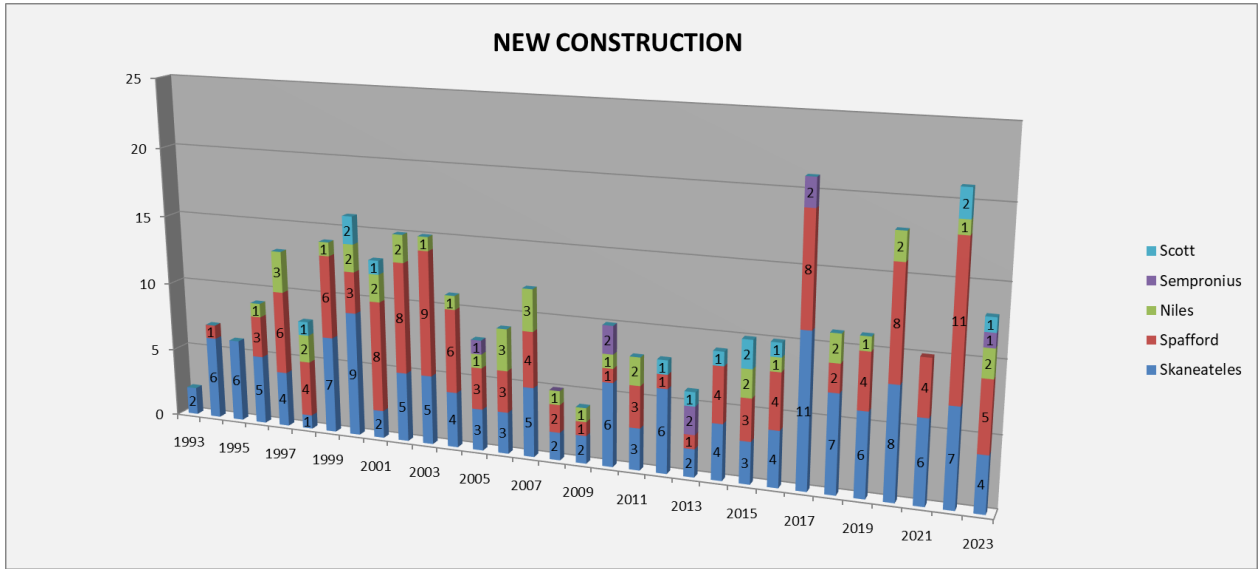


Figure 12 Renovation Activity within the Skaneateles Lake Watershed 1993-2023

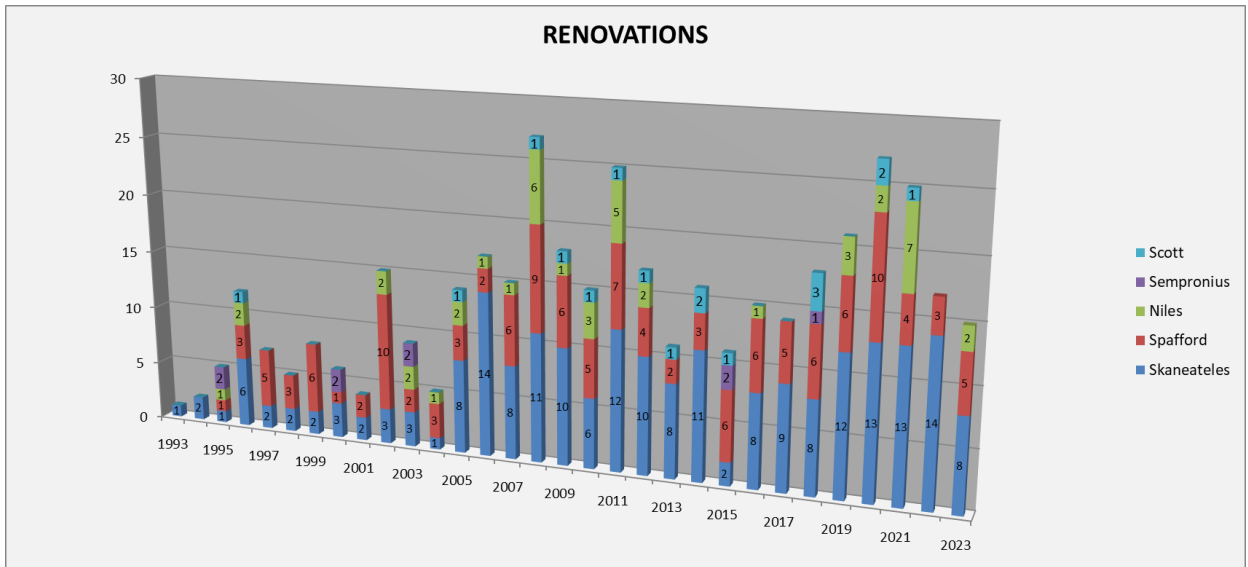


Figure 13 Map of New Construction Activity within the Skaneateles Lake Watershed 1993-2023

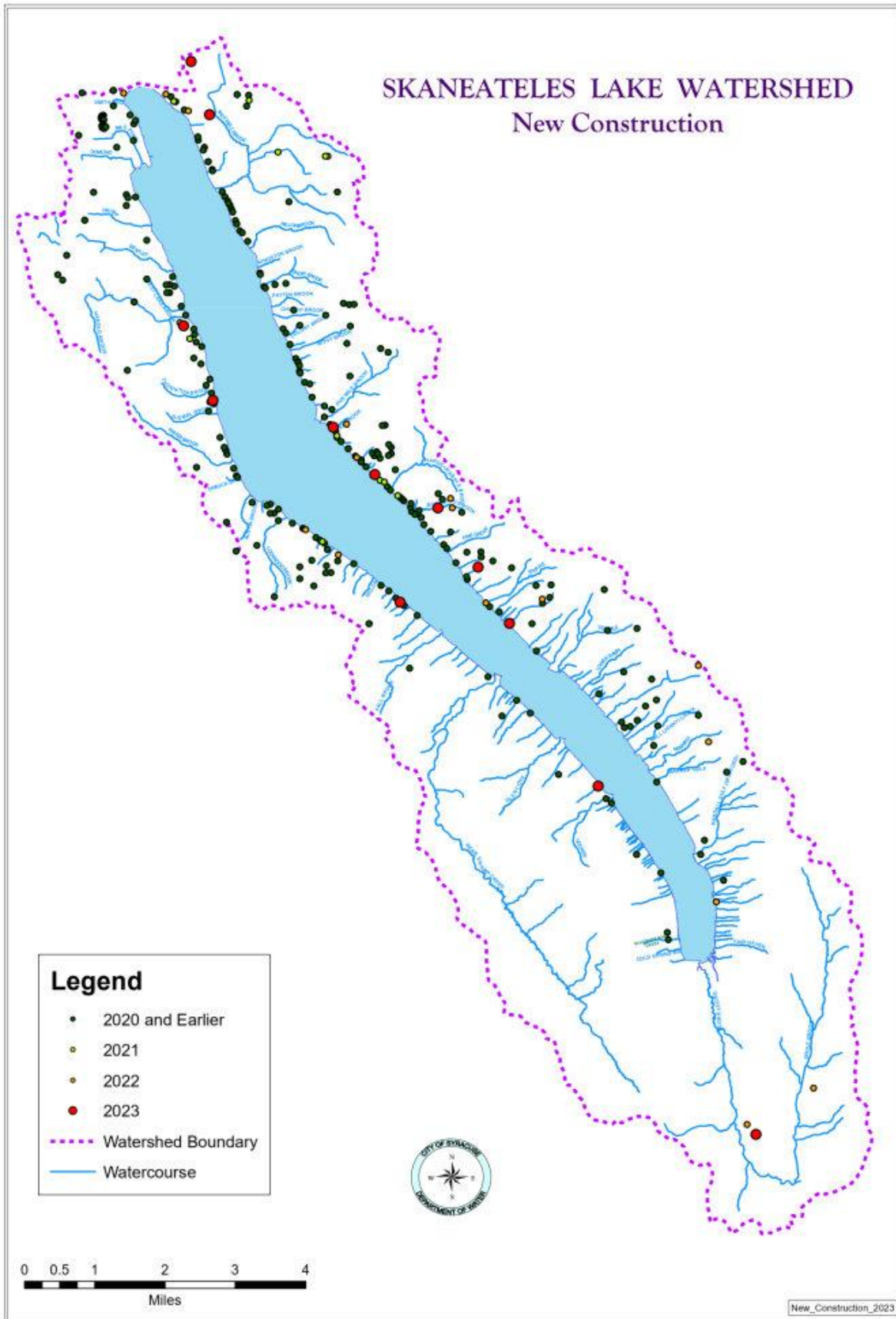
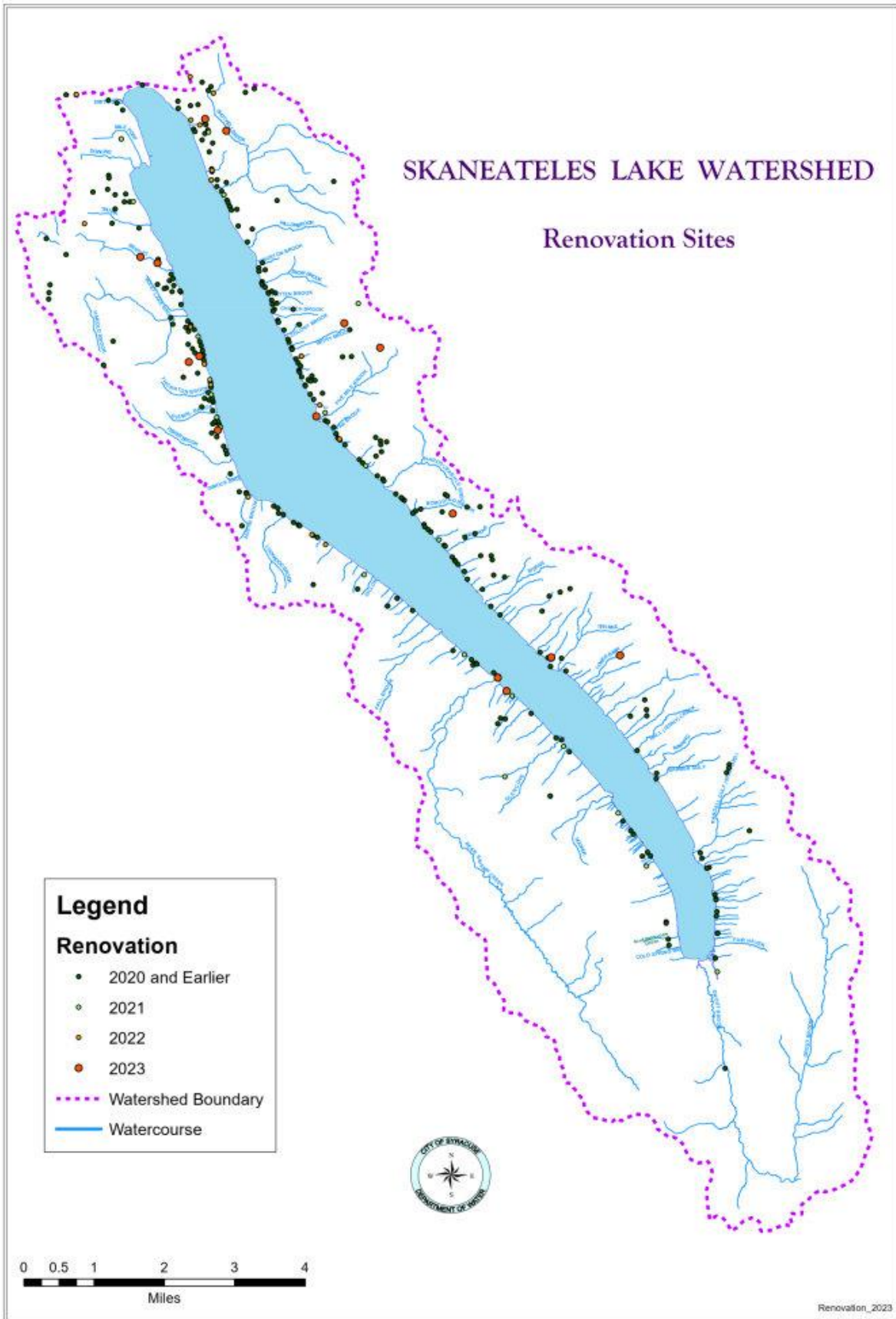


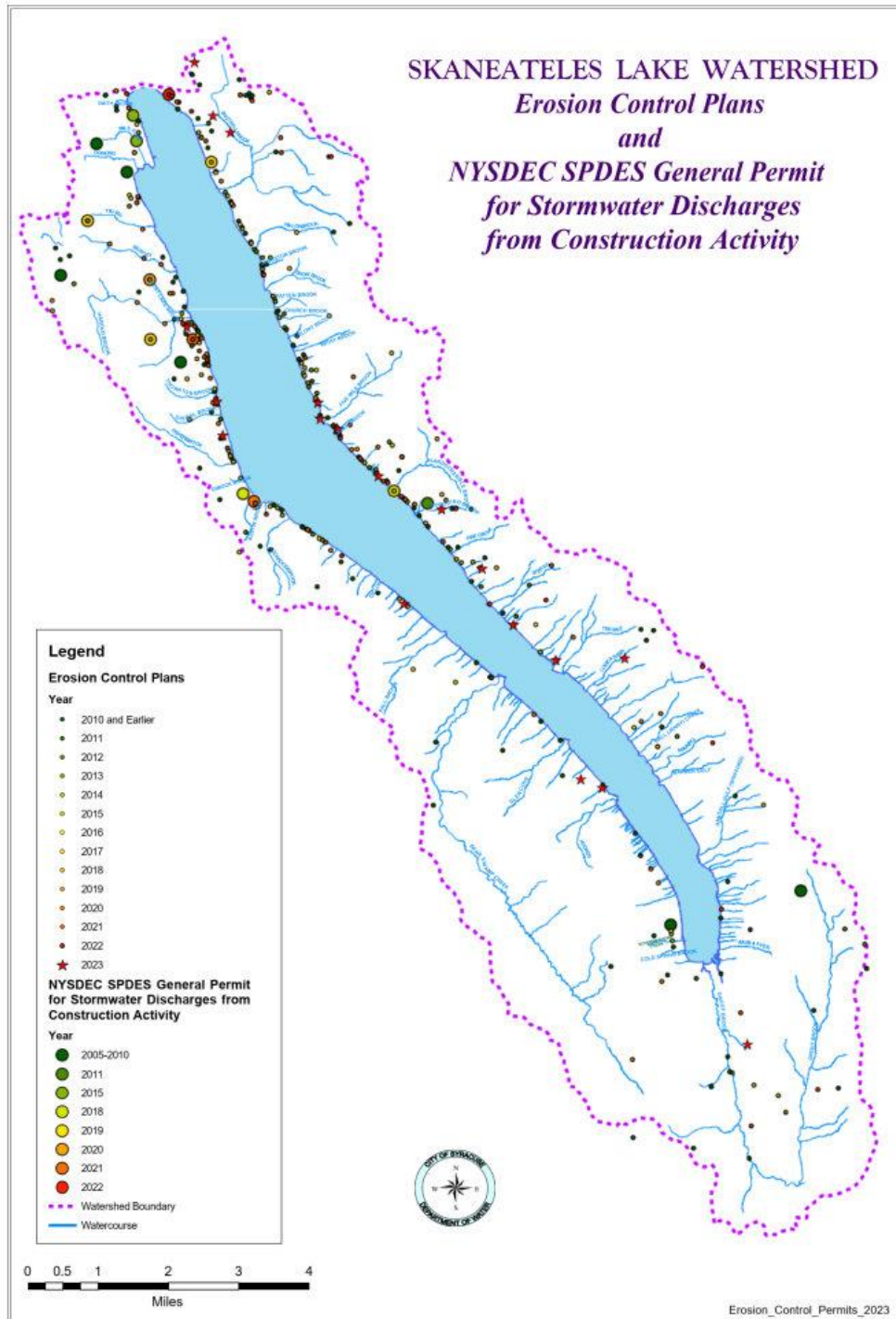
Figure 14 Map of Renovation Activity within the Skaneateles Lake Watershed 1993-2023



4.5 Erosion and Sediment Control Plan Review

As of 2004, the Skaneateles Watershed Rules and Regulations require property owners proposing to disturb 5,000 square feet or greater of land in defined environmentally sensitive areas to submit a Sediment and Erosion Control Plan (SECP) to the City of Syracuse for review. In 2023, 24 SECPs were reviewed. A NYSDEC SPDES General Permit for Storm water Discharges (GP-0-20-001) is required in New York State for all construction activity over one acre. No permits were issued for construction activity in the Watershed in 2023 under GP-0-20-001. Figure 15 illustrates SECP's reviewed and SPDES General Permits issued within the Skaneateles Lake Watershed since 2004.

Figure 15 Erosion Control Plans/NYSDEC SPDES Permits



4.6 Skaneateles Lake Watershed Rules and Regulations Violations

A total of 31 violations of the Skaneateles Lake Watershed Rules and Regulations were recorded in 2023. The violations are discussed in detail below.

4.6.1 County Sanitary Code Violations

Sixteen violations of County Sanitary Code were reported in 2023. Thirteen violations were the result of failing OWTS. Two property owners were cited for illegal discharges from outdoor showers and one property owner was cited for a broken effluent pipe. (Table No. 28 at end of next section).

- All Sanitary Code violations were abated in 2023 or in the process of abatement. Corrective actions included performing scheduled maintenance, replacement of failing septic system components and contract renewals.

The enforcement of Sanitary Code violations is the responsibility of the respective county health departments. Alleged violators are issued a Violation Notice from the City of Syracuse and given five working days to reply and declare their intent to affect the necessary repairs. If there is no response, or if the property owner refuses to abate the problem, the violation is forwarded to the respective county health department for enforcement. Sanitary Code violations identified by Watershed Inspectors since 1994 are shown in Figure 16.

Figure 16 Skaneateles Lake Watershed Sanitary Code Violations 1994-2023

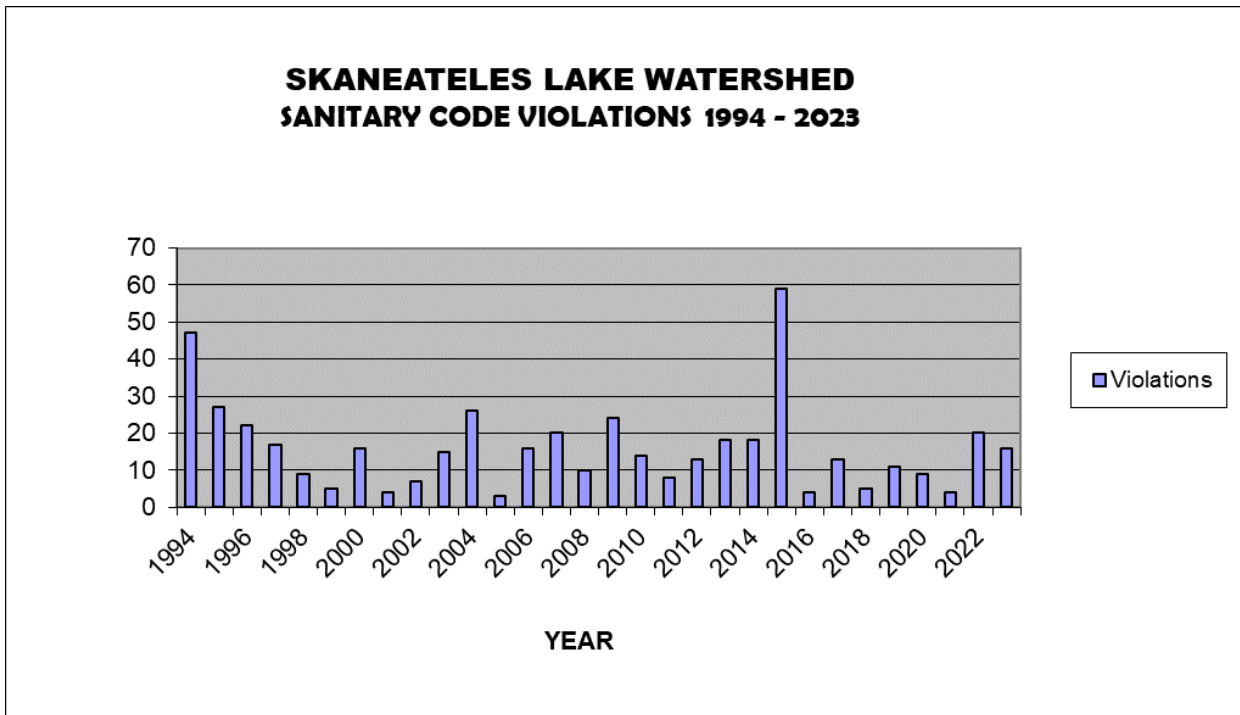
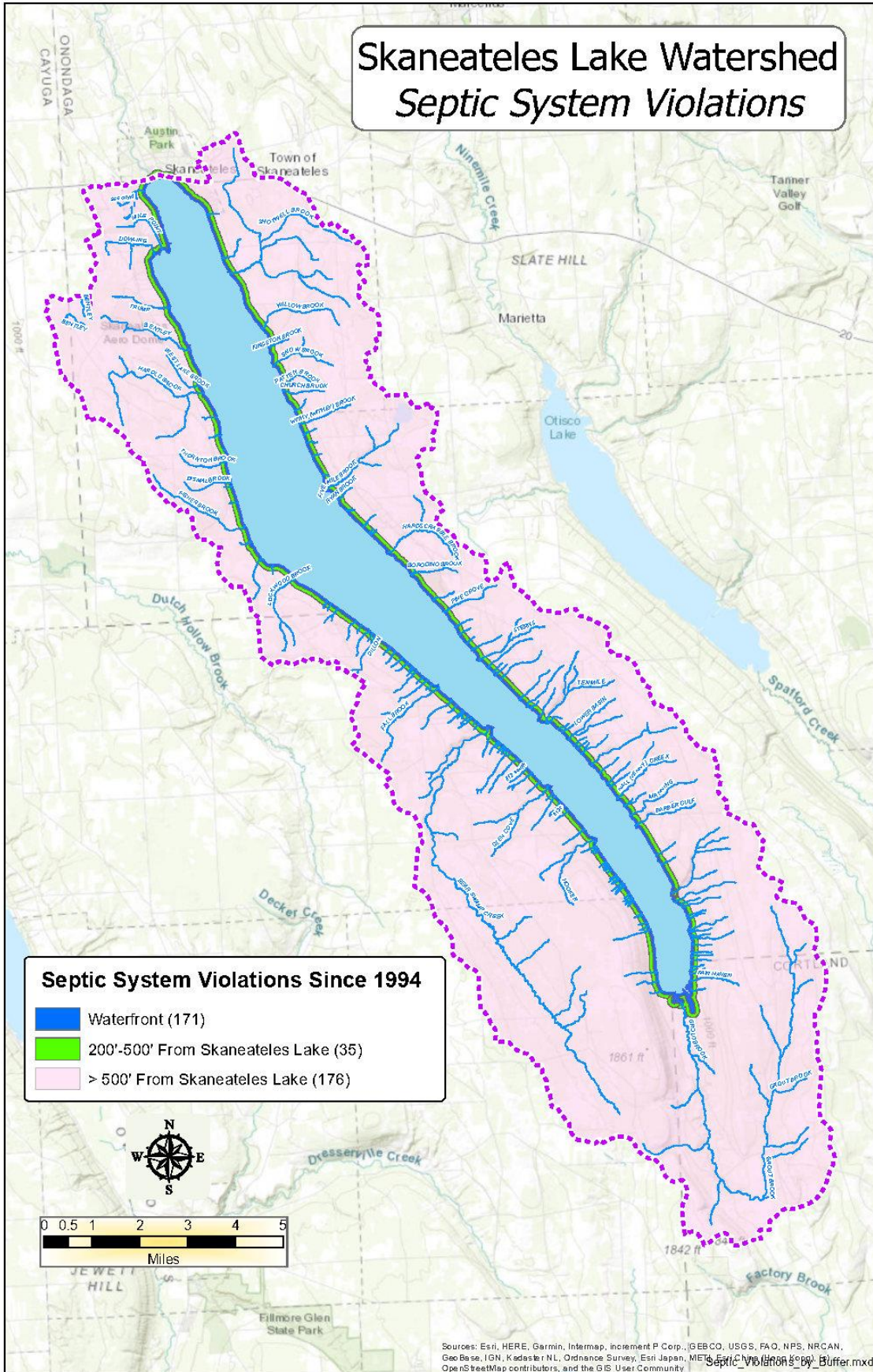


Figure 17 Sanitary Code Violation – Proximity To Skaneateles Lake 1994-2023



4.6.2 Erosion and Sediment Control Violations

Thirteen violations were issued for non-compliance of sediment and erosion control practices in 2023. All violations were abated in 2023 (Table No. 28).

Table 29 Violations for the Past Five Years: NYSDOH and Local DOH Sanitary Code Erosion and Sediment Control

Year	Number of Violations DOH/Sanitary Code	Number of Violations Erosion and Sediment	Abated or Pending Action by City	Reported to DOH or NYSDEC
2019	11	13	24	1
2020	10	12	22	0
2021	4	9	13	0
2022	20	13	33	1
2023	16	13	29	0

* New regulations became effective in 2004

4.6.3 Petroleum/Hazardous Material Spills

There were five potentially hazardous incidents or material releases identified by City personnel or reported by NYSDEC Division of Environmental Remediation in 2023.

- Friday, January 20, 2023** - A tanker truck transporting diesel fuel overturned on Rt. 41A in the Town of Skaneateles (South of Russell’s Landing). The accident did not result in a release of fuel or fluids following inspection of the cargo tank, diesel fuel tanks and fuel lines.
- Thursday, April 13, 2023** - A fuel tank dispenser automatic shutoff was not activated during re-fueling of a tractor located on a Carver Rd. property in the town of Niles. Fifty to 75 gallons of product overflowed before the spill was identified. Fuel spilled into a catch basin located next to the tractor, discharging into a road ditch. Booms and absorbent pads were placed in the ditch in numerous locations above a temporary berm collecting the fuel. No product or sheen was visible in the ditch down slope of the berm. NYSDEC Spill Response coordinated the cleanup activity which included flushing the catch basin and subsurface drainpipe.
- Sunday June 11, 2023** – An abandoned boat was reported to have run aground along a steep bank on the W. shoreline of Skaneateles Lake. NYSDEC Spill Response was notified, however, were informed they did not need to respond. Petroleum was not observed on the lake surface or bank during removal from the rocky shoreline. The boat was towed to the NYSDEC Boat Launch and removed from the Lake.
- June 22, 2023** – City personnel responded to a call of a sheen observed along the retaining wall in the Village of Skaneateles. The sheen was traced to a boat stored on a lift behind the Village Buildings on E. Genesee St. An effort to contain the leak was attempted utilizing booms and absorbent pads. The owner was located and contacted a marine service company to remove the boat from the lift.
- July 11, 2023** - NYSDEC and City of Syracuse Water Dept. responded to a call of an overturned concrete mixer on Spafford Landing Rd. The accident did not result in a release of fuel or fluids. Due to the steep incline, position of the mixer, and hazardous site conditions the mixer was hauled up the gravel drive to Spafford Landing Rd. with two hauler trucks and an excavator. A small amount of hydraulic fluid was observed towards the top of the gravel

drive because of dragging the mixer. Crews were onsite with speedy dry absorbent to collect the fluid.

4.7 Composting Toilet Operation

Currently 35 property owners utilize composting toilets provided by the City of Syracuse. Compost toilet users are responsible for removing finished compost from their units and emptying the compost in clean 5-gallon buckets provided by the City. Finished compost is collected in the spring by City Water Department personnel and placed in 4-foot (w) x 4-foot (l) x 4 foot (d) wooden containers, allowing for additional composting on the City's Glen Haven property. The storage containers have been constructed to allow thermophilic composting (internal temperature exceeding 105 degrees Fahrenheit) to take place, further reducing or eliminating any pathogens remaining from the collected compost. The compost piles are monitored to ensure the required temperatures are attained. Carbon based materials such as grass clippings, mulch and wood chips are added to the piles periodically to maintain a balanced carbon/nitrogen ratio. A balanced ratio allows for optimum digestion of compost by microorganisms, resulting in accelerated temperatures in the pile. Sampling for fecal coliform coincides with monitoring for thermophilic conditions within the compost pile to ensure pathogen reduction. Compost is typically stored for a minimum of three years allowing for a significant reduction in volume and pathogens. Provided that fecal coliform results are below water quality indicator levels specified by New York State Department of Health for bathing beaches, the remaining organic material is mixed within the leaf litter.

5. FILTRATION AVOIDANCE WAIVER

5.1 Filtration Avoidance Waiver Conditions

The City of Syracuse applied for and received a filtration avoidance waiver extension on June 28, 2004. The waiver has no termination date and will remain in effect for as long as the City complies with the conditions of that filtration avoidance waiver.

Progress continues to be made on the programs implemented by the City in order to enhance the Skaneateles Lake Watershed Management Program. The programs are: The Data Gathering and Management Program, Conservation Easement Acquisition Program (now complete), the Skaneateles Lake Watershed Agricultural Program (SLWAP), and the Water Quality Public Education Program.

For a detailed discussion of these programs, refer to the [Skaneateles Lake Watershed Program Annual Report 2023-2024](#).

6. PESTICIDE AND FERTILIZER INVENTORY

6.1 Agricultural Pesticide and Fertilizer Use Survey

The annual Agricultural Survey was conducted by the Skaneateles Lake Watershed Agricultural Program staff. A total of 37 farms were involved in the survey. These farms are actively participating in the Skaneateles Lake Watershed Agricultural Program (SLWAP) with the majority of these farms located entirely in the watershed. A total of 30,089 acres were found to have been worked by the 37 farms with active Whole Farms Plans.

A total of 1,115 tons of granular fertilizer and 35,657 gallons of liquid fertilizer were applied to cropland. A total of 1,174 tons of lime were applied to cropland. A total of 3,106 tons of manure,

and 16,898,752 gallons were utilized for nutrient value and soil organic matter enhancement. This manure was produced by approximately 1,969 animals (1,508 dairy animals, 76 horses, 85 sheep, 109 beef, 170 bison, 16 alpacas, 3 goats, 2 pigs).

A total of 2,805 gallons of liquid pesticide and 833 pounds of granular pesticide were applied to cropland. These numbers represent totals for all pesticides (herbicides, insecticides, and fungicides) that were applied at the rate specified by the label.

A total of 132,911 gallons of diesel and 24,012 gallons of gasoline were used by the 37 farms.

Watershed Inspectors conducted an annual survey of agricultural operations focusing on petroleum and chemical storage, disposal practices and solid and hazardous waste. There was no evidence of petroleum spills or leakage from bulk storage tanks, dispensers, or hoses during the inspections.

6.2 Pesticide Use by State and Local Departments of Transportation

Herbicides were not used by New York State Department of Transportation (NYSDOT) Region 3, Cayuga Residence of the NYSDOT or the Cayuga and Cortland County DOTs in 2023. The NYSDOT Cortland Residency applied Roundup Pro Concentrate and Viewpoint around guiderails and signposts on Route 41 from the Onondaga County line south to the watershed boundary. The NYSDOT Onondaga Residency applied Plainview SC, Arsenal Powerline and Roundup Pro Concentrate around guiderails and signposts on Route 41 and Route 41A. Onondaga County DOT applied Roundup Pro Concentrate, Esplanade 200 SC, and Whetstone for guiderail vegetation control on several road rights-of-way in the towns of Skaneateles and Spafford. Roundup Pro Concentrate and Whetstone was applied for shoulder vegetation encroachment control in the towns of Skaneateles and Spafford. This information was based on personal communication and/or information provided by Regional Engineers for the respective NYS Residences, the Environmental Specialist with the Onondaga County DOT, General Foreman of the Cayuga County DOT and the Superintendent of Highways for the Cortland County DOT.

7. PETROLEUM AND HAZARDOUS MATERIALS INVENTORY

7.1 Inventory

Petroleum products were the most abundant and potentially hazardous materials stored on the watershed. In addition to the petroleum products stored on farms (see above), 19 commercial enterprises and seven municipal facilities stored a total of 51,855 gallons of petroleum products as of January 1, 2024. Gasoline accounted for 34,350 gallons of the total. Other products stored were propane (47,690 gallons), diesel (12,725 gallons), heating oil (1,375 gallons) and used oil (3,405 gallons).

Road salts are used by the local highway departments and the NYSDOT for vehicle safety. There is one covered storage facility in the Town of Scott. The average rate of application of salt or salt/sand mixtures on watershed roads by each agency was unchanged from previous years.

7.2 Road Ditch Survey

All road ditches within the watershed are inspected routinely for contamination sources. Watershed Inspectors document evidence of sewage discharge, agricultural runoff, petroleum spills,

etc., on Survey Sheets and take necessary steps to identify the source of contamination through sampling point source discharges and investigating property records.

8. WATERSHED MANAGEMENT PROJECTS

8.1 Watershed Management Approach to Controlling Hemlock Woolly Adelgid (HWA)

HWA was identified in the Skaneateles Lake Watershed in 2014. Once infested with HWA, mature hemlock trees die within four to 20 years. The hemlock loss and replacement with hardwood species has the potential to impact water quality by altering nutrient cycling in the watershed and changing water temperature and water quantity going into the lake over the course of the year. Hemlocks' deep shade and often streamside habitat helps keep streams cool, and their evergreen shade keeps snow on the ground into the spring, providing cold runoff into groundwater farther into the growing season. Because hemlocks draw the most water during spring and fall, and relatively little in the summer, they also help stabilize stream flows.

HWA has been found on both shores of Skaneateles Lake in the southern portion of the lake. As of February 2020, the northernmost points where HWA has been found are in the area of Fire Lane 22A on the western shore, and around Ten Mile Point on the eastern shore. (For the most up to date information, please visit the NY iMapInvasives map at nyimapinvasives.org/data-and-maps). In an effort to minimize the spread of HWA, the City of Syracuse Water Department has collaborated with the Onondaga County Soil and Water District, Cornell University, CCE of Onondaga County and several volunteers residing with the watershed. In May 2015, 100 Eastern Hemlock trees were planted within this region of the watershed in an effort to grow populations of biological controls to resist the spread of HWA.

Three insects that feed on HWA (biocontrols) have been released in the Skaneateles Watershed in 2015 and 2016. These are a beetle referred to as 'Little Larry', *Laricobius nigrinus*, and two species of silver fly, *Leucopis piniperda* and *L. argenticollis*. All three species are imported from their native range in the Northwestern US where they are natural predators of HWA. Establishment has not been verified in the Skaneateles watershed for any of the three species, but establishment can take many years to be detected.

To enhance and support this biocontrol management option, in November of 2017 a new, \$1.2 million biocontrol laboratory was established on the Cornell University campus, focused on researching and rearing biological controls to stop the spread of HWA. The lab is funded through NYSDEC's monies from the NYS Environmental Protection Fund and is headed by a Cornell entomologist.

Biological control is a long-term solution for HWA, but landowners with trees that are currently infested are strongly encouraged to consider treatment of their trees. Treatment is relatively inexpensive and lasts for three - seven years. More information on HWA management options can be found at the NYS Hemlock Initiative website, nyshemlockinitiative.info.

In 2018, the agencies included HWA-specific iMap-Invasives training in their HWA workshop. IMap-Invasives is an on-line, GIS-based data management system used to assist citizen scientists and natural resource professionals working to protect our natural resources from the threat of invasive species. Attendees learned how to identify and report HWA infestations and, of equal importance, the absence of infestations around the Skaneateles watershed. Since the training, workshop participants on their own have logged over three dozen entries in the database project shared between CCE of

Onondaga and the NYSHI. Including first reports of known infestations in the watershed, this citizen science effort has largely contributed to the NYSHI research, is proving to be an efficient use of agency resources and aids our partners at the state PRISMs in following early detection, rapid response protocol.

8.2 Watershed Data Scanning Project

Records of septic system designs dating back to the 1930's are archived in numerous file cabinets at the Skaneateles Gatehouse. As the Watershed Protection Program evolves and Watershed Rules and Regulations were updated, documentation collected on individual properties expanded to include all regulated activity involving local health departments, townships, and the New York State Department of Conservation. A database which records all activity in the watershed is maintained by City personnel and includes over 150 categories. The database is linked to a GIS database, which allows for tracking of watershed activity such as new housing starts, violations of watershed rules and regulations, OWTS design approvals, etc.

In January 2010 the City initiated the scanning of all file folder documents. The electronic images will allow for indexing of data on individual tax parcels according to regulatory agencies, increase storage space, provide a back-up in the event of a permanent loss and allow for prompt retrieval through a GIS hyperlink. Scanning is conducted by City personnel and is typically scheduled for afternoons during the winter months when there is limited activity and access to property on the watershed. Due to the intermittent scanning schedule and extensive file folders, the project has taken numerous years.

8.3 Shotwell Brook Pathogen, Nutrient and Sediment Loading Reduction Initiative

Shotwell Brook is located along the northeast section of the Watershed and enters the Lake within close proximity to one of the City's drinking water intakes. Agriculture accounts for approximately 70% of the land use in the 3.3 square mile Shotwell Brook Watershed. *The Land Protection Plan for the Skaneateles Lake Watershed* dated June 20, 1995, prioritizes Critical Management Zones, and divides the Skaneateles Lake Watershed into six Watershed Protection Zones. The Shotwell Brook tributaries and sub-watershed comprise the three highest levels of protection priority designated in the Report.

High intensity storm events frequently result in substantial sediment loading to Skaneateles Lake from Shotwell Brook. Storm events combined with strong southerly winds often result in sediment plumes which are transported from the Shotwell Brook outlet in the direction of Intake #1, causing elevated turbidity through the intake.

In 2018 the SLWAP was awarded a \$181,000 grant for storm water attenuation on the NE branch of Shotwell Brook. The project completed in September 2020, involved the establishment of a constructed wetland and an extensive floodplain on one acre of fallow agricultural land. An unexpected budget surplus allowed for a portion of the grant to be redirected to a floodplain restoration project located on the main branch of Shotwell Brook, east of the NYS Rt. 41 bridge. The restoration project involved the creation of four shallow pocket wetlands along 600 feet of Shotwell Brook. A rock cross vein was installed at the upstream section of the project to convey discharges above bank-full flow into the enhanced wetland, allowing for temporary storage and attenuation of peak flows. The project was completed in October 2021.

In August of 2023 the SLWAP contracted with a private drone operator for the use of large aerial drone technology for planting seed on Skaneateles Lake Watershed farmland. One-hundred and fifty-nine acres of standing corn silage fields located in the Shotwell Brook watershed were seeded with an annual ryegrass cover crop. The seed was applied at 25 lbs./acre allowing for satisfactory

fall establishment on all but one field. Ryegrass was selected as a cover crop for its shade tolerance, allowing for germination and establishment under the canopy of corn leaves. Aerial seeding ensures a timely application that is often delayed with conventional farm equipment when extended wet weather patterns saturate fields, delaying corn harvesting and cover crop planting.

Focusing on a comprehensive multi-agency approach to reducing the amount of sediment discharging to Skaneateles Lake through Shotwell Brook has been and will continue to be a watershed protection priority.

8.4 Subsurface Agricultural Drain Tile Outlet Survey

In 2016 the Watershed Protection Program initiated a program to identify and record GPS coordinates of agricultural subsurface drain tile outlets throughout the Watershed. Watershed Inspectors are surveying every watercourse, road ditch, swale, grassed waterway, etc., that border agricultural fields. Outlet locations and observations noted within drainage ways such as erosion of embankments, excessive algae growth and foam which may be a result of subsurface discharges will be conveyed to the SLWAP for further analysis and possible modifications of Whole Farm Plans. Due to the limited time that can be allocated to the inventory, and the significant amount of land area to be covered (approximately 28 square miles of land use coverage in the watershed is agricultural) surveying all conveyances bordering farmland has extended over several years. In 2022, Watershed Inspectors completed the survey, logging a total of 227 drain tile outlet locations.

9. WATERSHED PERSONNEL TRAINING, CERTIFICATIONS AND PRESENTATIONS

The following Environmental Construction Solutions on-demand and live webinars were attended by the Watershed Quality Coordinator in 2023: The webinars focused on innovative new technologies related to stormwater management.

- ***Repair Your Shoreline with SOX Erosion Solutions & native Plantings – January 31, 2023***
- ***Stormwater Ponds: Function and Management Best Practices Explained – August 2, 2023***
- ***Erosion Control Blankets: Updated Options and E&S Strategies – August 4, 2023***
- ***Trackout Control Mats for Construction Entrances – August 22, 2023***
- ***Tied Concrete Flight Block Mat: Flexamat Design and Install – October 10, 2023***
- ***Erosion Control BMP Products for Challenging Solar Sights – September 5, 2023***

The Watershed Quality Coordinator completed the following coursework (June 16 – June 26, 2023) through PESTED – an online pest control training and continuing education organization. The training was necessary to maintain an aquatic vegetation pesticide license.

- ***Aquatic Vegetation (Category 5a)***
- ***Aquatic Insect (Category 5b)***
- ***Aquatic Fish (Category 5c)***

10. ACKNOWLEDGMENTS

The City of Syracuse continued in its efforts to control pollution within the Skaneateles Lake Watershed in 2023. It is with appreciation that the Water Department acknowledges the efforts, assistance and expertise of the Onondaga, Cayuga and Cortland County Health Departments and the NYS Department of Environmental Conservation Division of Law Enforcement and Division of Regulatory Affairs in the enforcement of the Watershed Rules and Regulations. In addition, the Water Department acknowledges the combined efforts of the City of Syracuse Department of Law, the New York State Department of Health, Natural Resources Conservation Service, Soil and Water Conservation Districts, and the Cornell Cooperative extension for their efforts in assisting the Water Department in its endeavors to enhance the watershed environment.

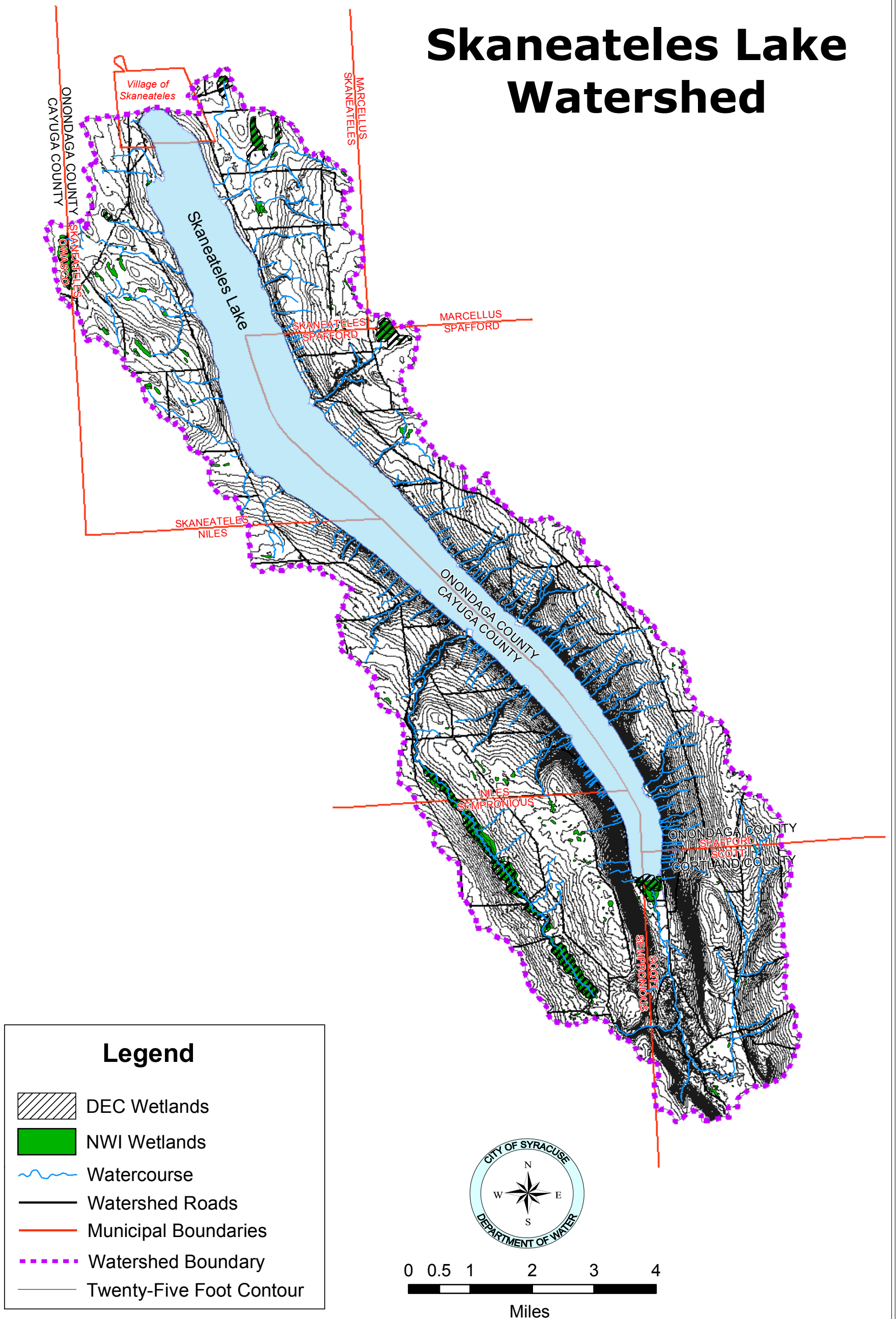
11. ENDNOTES/FOOTNOTES

1. Lake data excerpted from: Effler, S.W., et al. 1989. Limnological Analysis of Skaneateles Lake, 1988. Upstate Freshwater Institute, Inc. Syracuse, NY.
2. Historically, the City of Syracuse Department of Water has used 59.3 sq. miles or 37,952 acres as the watershed area when calculating the water budget. As of the current recalculation of land use and cover, the GIS calculates the watershed area as 58.94 sq. miles or 37,720 acres with acreage for Onondaga, Cayuga and Cortland Counties at 19,310, 12,583 and 5,827 acres, respectively.
3. The data is based on the 2020 Census.
4. Average historical data is based upon City data for the 72 years between 1951 and 2022 inclusive, i.e., total inputs versus total withdrawals plus lake elevation changes.
5. There are two City operated rain gauges within the watershed. One is at the Water Plant in the Village of Skaneateles (Cooperating Observer for the national Weather Service) and the second is located at the southern end of the watershed in the Town of Sempronius on City owned property. Precipitation amounts referred to within this report are weighted values, i.e., 75% of the recorded amount at the Plant plus 25% of the amount recorded at Sempronius.
6. Volume is determined based upon a drainage area of 72.54 square miles.
7. Based upon a lake surface area of 13.6 square miles.
8. This is required by Decision 609B, 1958 between the New York State Conservation Department/Water Power and Control Commission and the City of Syracuse








Appendix

Appendix A – Exhibits

Skaneateles Lake Watershed



Legend

-  DEC Wetlands
-  NWI Wetlands
-  Watercourse
-  Watershed Roads
-  Municipal Boundaries
-  Watershed Boundary
-  Twenty-Five Foot Contour

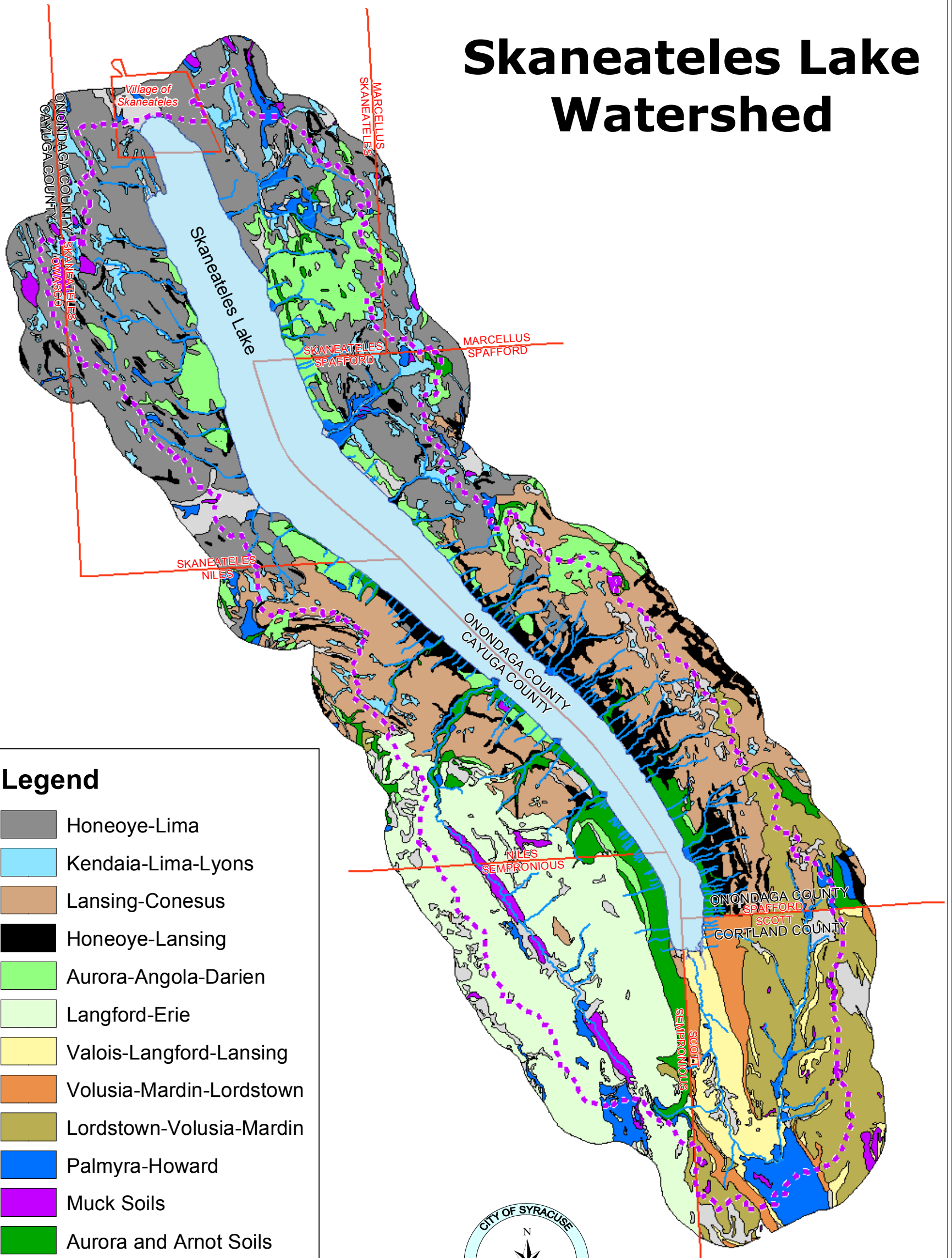


0 0.5 1 2 3 4

Miles

Exhibit A: General Watershed Map

Skaneateles Lake Watershed



Legend

- Honeoye-Lima
- Kendaia-Lima-Lyons
- Lansing-Conesus
- Honeoye-Lansing
- Aurora-Angola-Darien
- Langford-Erie
- Valois-Langford-Lansing
- Volusia-Mardin-Lordstown
- Lordstown-Volusia-Mardin
- Palmyra-Howard
- Muck Soils
- Aurora and Arnot Soils
- Minor Soil Associations
- Streams in the Watershed
- Watershed Boundary
- Municipal Boundaries

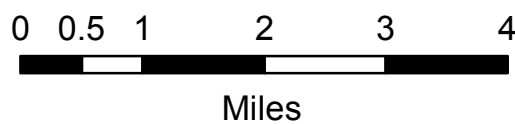
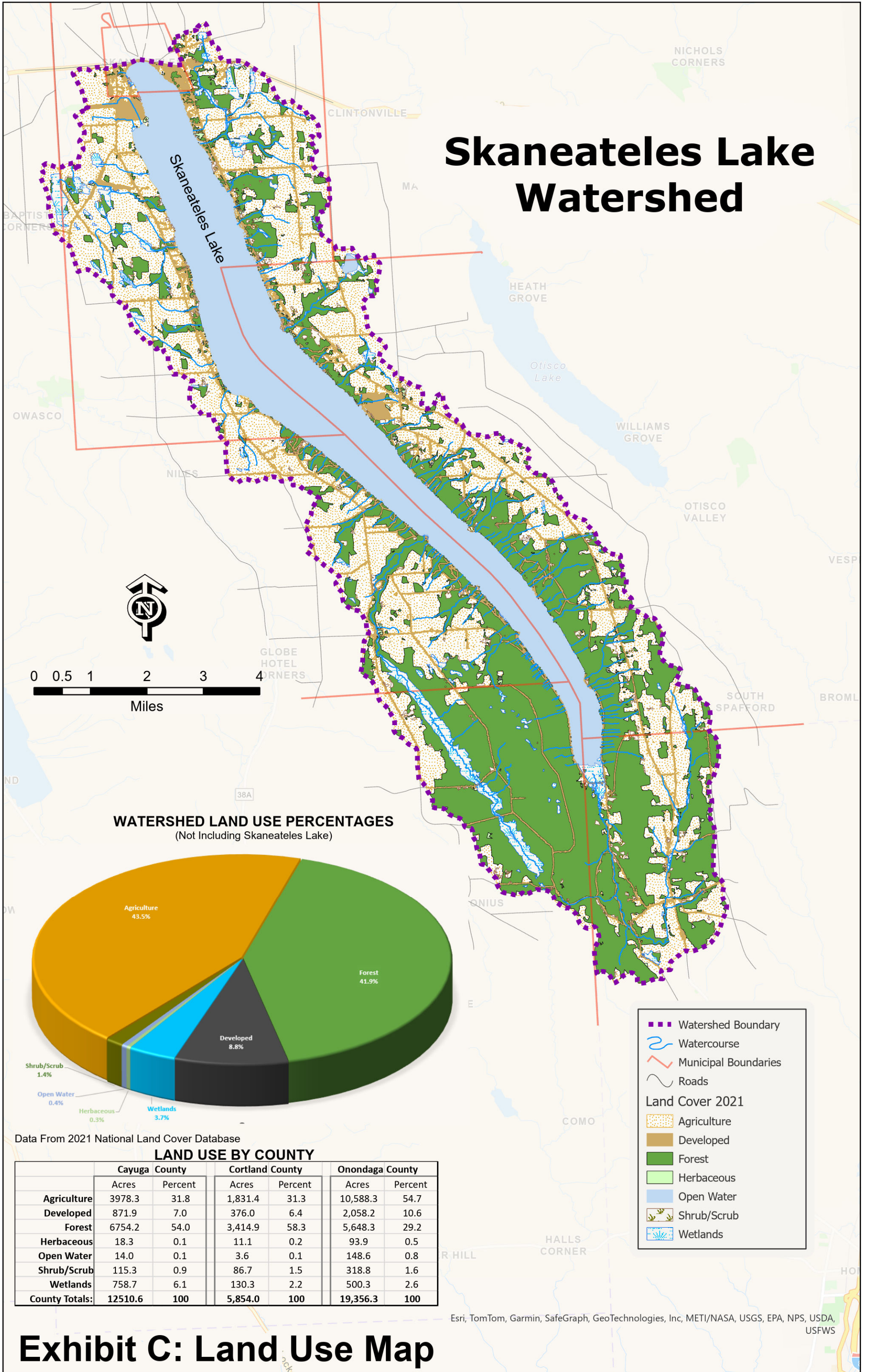


Exhibit B: Soil Associations Map

Skaneateles Lake Watershed



Data From 2021 National Land Cover Database

LAND USE BY COUNTY

	Cayuga County		Cortland County		Onondaga County	
	Acres	Percent	Acres	Percent	Acres	Percent
Agriculture	3978.3	31.8	1,831.4	31.3	10,588.3	54.7
Developed	871.9	7.0	376.0	6.4	2,058.2	10.6
Forest	6754.2	54.0	3,414.9	58.3	5,648.3	29.2
Herbaceous	18.3	0.1	11.1	0.2	93.9	0.5
Open Water	14.0	0.1	3.6	0.1	148.6	0.8
Shrub/Scrub	115.3	0.9	86.7	1.5	318.8	1.6
Wetlands	758.7	6.1	130.3	2.2	500.3	2.6
County Totals:	12510.6	100	5,854.0	100	19,356.3	100

Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS

Exhibit C: Land Use Map

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