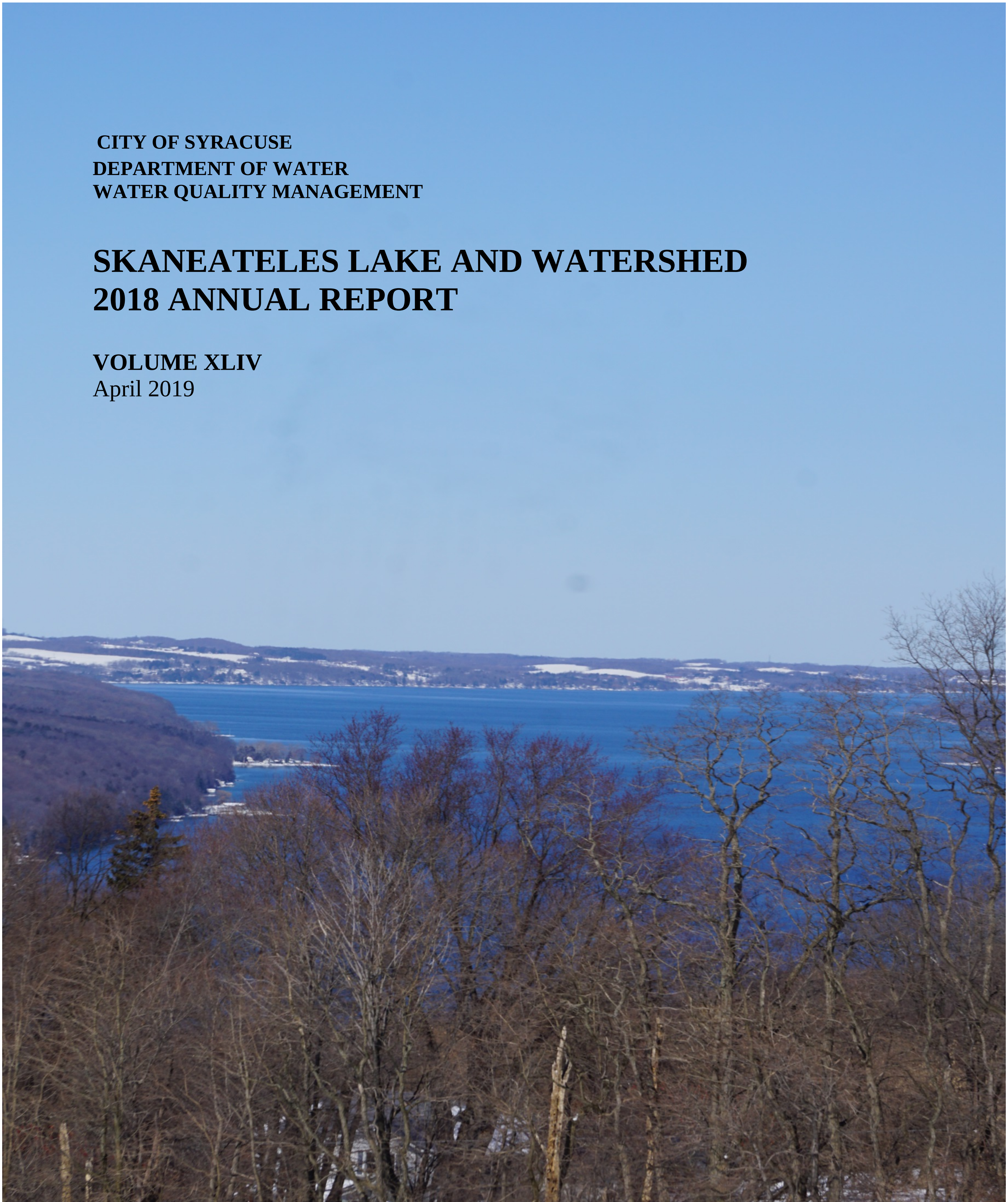
CITY OF SYRACUSE
DEPARTMENT OF WATER
WATER QUALITY MANAGEMENT

SKANEATELES LAKE AND WATERSHED 2018 ANNUAL REPORT

VOLUME XLIV

April 2019



DEPARTMENT OF WATER

CITY OF SYRACUSE, MAYOR BEN WALSH

Joseph Awald, PE
Commissioner

John Walsh
Deputy Commissioner

April 10, 2019

Howard A. Zucker, M.D., J.D.
Commissioner of Health
New York State Department of Health
Flanigan Square
547 River Street
Troy, New York 12180

Re: 2018 Skaneateles Lake and Watershed Annual Report XLIV

Dear Commissioner Zucker,

This 2018 Skaneateles Lake and Watershed Annual Report was prepared by the City of Syracuse Department of Water. The Annual Report illustrates and discusses various programs performed by the City according to 10 NYCRR Part 5 and 10 NYCRR Part 131. Discussed within the report are the City's filtration avoidance status, land use and demography within the watershed, and a summary of the City's water quality monitoring and watershed inspection programs.

The 2018 sampling, inspection and survey programs demonstrate the continued excellent quality of Skaneateles Lake water and watershed environment. This Department continues its efforts to maintain the quality of this valuable resource.

Sincerely,

Rich Abbott, Public Health Sanitarian

Attachments

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DEPARTMENT OF WATER
WATER QUALITY MANAGEMENT

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AND
WATERSHED
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VOLUME XLIV

PREPARED BY:

Rich Abbott
April 2019

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SKANEATELES LAKE AND WATERSHED

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.

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.

Demographics, Land Use and Land Ownership

The watershed population totals approximately 4,487 people residing in 2,941 dwelling units (Table Nos. 3 and 4).[3] Of the total number of dwelling units, approximately 1065 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 706 or 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.

SKANEATELES LAKE WATERSHED WATER BUDGET

The Skaneateles Lake Watershed receives an average 42.62" 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 as a result 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 in order 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: current levels as compared to the drawdown guideline levels, current rates of precipitation, and 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.

The water year seasons occur as would be expected for the watershed's geographic location. The season of maximum recharge extends from October through January, the season of maximum runoff occurs between February and May, and the season of maximum evapotranspiration occurs between June and September.

WATERSHED PRECIPITATION, YIELD, LAKE LEVEL AND DAM DISCHARGES

Snowfall for the month of January was significantly above average at 39.75” (av. 22.55”). The lake elevation increased .36’, from 861.38 (av. 860.72) on January 1 to 861.74 by February 1, just below the Monthly High Drawdown Guideline Desired Range of 861.75. Dam discharges were increased from 6 MGD to 72 MGD on January 13 as a result of a three-day precipitation event totaling 2.43”. The event included 1.15” of rainfall on January 11 and an 8” snowfall event extending from January 12 through 13. Dam discharge was increased on January 18, to 119 MGD.

February’s snowfall total of 24.50” was above average (av. 21.57”). Dam discharges were not adjusted throughout the month. The lake elevation on February 28 was 861.60, within the Monthly Drawdown Guideline Desired Range.

Snowfall was recorded on 12 of the first 16 days of March totaling 32.50” accounting for the total month’s snowfall. The equivalent feet of lake elevation in snowpack on March 20 was .67’. Dam discharges were gradually decreased throughout the month to 6 MGD on March 25. The lake elevation on March 31 was 861.74, resulting in a lake level increase of .34’. Total precipitation for March was above average at 4.45” (av. 3.22”).

Precipitation totals for April, May and June were below average at 3.25” (av. 3.55”), 2.80” (av. 3.69”) and 2.32” (av. 3.97”) respectively. For the January-May period, precipitation was 17.72” (av. 15.81”). The yield and yield coefficient were 122.90 MGD (av. 117.46 MGD) and 0.82 (av. 0.88) respectively.

Snowfall total for the 2017-18 season was significantly above average at 121.00” (av. 87.61”). Measurable snowpack was recorded on fifteen (weekly) sample dates from December 2017 through April 2018.

The June 1 lake elevation was 862.55 (av. 862.47), below the Monthly Low Drawdown Guideline Desired Range of 862.85. Monthly precipitation totaled 2.32” (av. 3.97”). The only significant monthly rainfall event (.83”) occurred on June 27, resulting in minimal impact on the lake elevation. The lake elevation on June 30 was 862.25, accounting for a monthly elevation loss of 0.31’. Dam discharges remained at a minimum throughout the month.

Despite July’s above average rainfall total of 5.12” (av. 3.96”), the Lake elevation declined 0.14’ for the month. From July 1 to July 21 the Lake declined from 862.24 to 861.90. Following a seven-day, 4.11” rain event commencing on July 21, the lake elevation increased to 862.15 on July 27. Dam discharges remained at the minimum throughout the month.

The August 1 lake elevation of 862.10 (av. 862.00), was below the monthly Drawdown

Guideline Desired Range (863.05 – 863.27). The Lake elevation declined 0.39’ for the month resulting in an August 31 lake elevation of 861.73. Monthly precipitation was slightly above average at 3.97” (av. 3.81”).

Precipitation for the June-August period totaled 11.41” (av. 11.77”). The yield and yield coefficient were below average at 19.93 MGD (av. 35.14 MGD) and .13 (av. 0.19) respectively.

The September 1 lake elevation was 861.71 (av. 861.45). Although five rainfall events exceeding 0.5” were recorded throughout the month, precipitation was below the monthly average at 3.75” (av. 3.99”). The lake elevation declined 0.33’ for the month, resulting in a September 30 elevation of 861.38. Dam discharges were maintained at a minimum.

The rainfall patterns for October and November were remarkably similar with precipitation recorded on 24 days each month. Monthly precipitation totaled 5.36” (av. 3.97”) in October and 5.45” (av. 3.71”) in November. The above average rainfall in October had minimal effect on the lake level which gained 0.03’ of elevation for the month. The net gain in lake elevation for November was 0.71’. Dam discharges were increased twice in November; from 5.6 MGD to 51 MGD on November 16 and to 118 MGD on November 28. The lake elevation on November 30 was 862.05.

December’s precipitation total was 3.33” (av. 3.40”). The lake level on December 31 was 862.41, accounting for a .42’ increase in monthly lake elevation.

Precipitation for the September-December period totaled 17.89” (av. 15.07”). Yield for the period was 98.64 MGD (av. 46.06 MGD) and the yield coefficient was 0.53 (av. 0.27).

The Skaneateles Watershed received 47.03” of precipitation for the year (av. 42.62”). The average annual yield to the lake was 89.07 MGD (av. 72.08 MGD) with a yield coefficient of 0.54 (av. 0.49). Total discharge through the lake outlet for 2018 was 14,263 MG or 5.03’ of elevation (av. 9,756 MG or 3.44’, respectively). A summary of the above information can be found in Table No. 7.

TURBIDITY SAMPLING AND ANALYSES

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 2100N 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 2100N 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 2018 average turbidity readings for Intakes #1 and #2 were 0.48 NTU and 0.49 NTU, respectively**.**

Graph No. 1 illustrates relatively stable annual turbidity averages at Intake #1 and #2 through 2018. Following a significant spike in the September average from 2012 – 2014 (Graph No. 2), the trend line declined significantly through 2016 resulting in turbidity recordings consistent with the long-term average. Spikes in 2017 and 2018 September turbidity averages did not reach averages recorded from 2012 – 2014, however, both years were above the long term averages.

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 (Graph No. 3). The turbidity range narrowed in 2017, resembling pre-2014 measurements. In 2018, maximum turbidity levels decreased significantly. Since monthly average data can mask spikes in turbidity, Graph No. 4 illustrates the number of occurrences with a daily maximum turbidity over 1 NTU for each month from 2004 – 2018. Note that following four consecutive years (2012–2015) of elevated September occurrences, maximum turbidity did not exceed 1 NTU in September of 2016. Daily maximum turbidity above 1 NTU was recorded on 99 days in 2017 and 57 days in 2018 at Intake #1. Eighty seven of the occurrences were between July and October in 2017 compared to only 36 occurrences within the same time frame in 2018 (Table No. 9).

Both Table No. 9 and Graph No. 4 display the variance in the number of days with maximum turbidity greater than 1 NTU at Intake #1 from 2004 to 2018.

<u>Intake Closures</u>

The Intakes may be closed in order to prevent a Treatment Technique Violation (TTV: any day with a turbidity reading exceeding 5 NTU) or Turbidity Event (a series of consecutive days during which at least one turbidity measurement each day exceeds 5 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 ten occasions in order to prevent a TTV or a Turbidity Event. There were no Intake #1 closures in 2018 related to turbidity concerns (Table No. 10).

One TTV was recorded in 2018. The violation occurred on December 28, on Intake #2. A turbidity measurement of 5.94 NTU was recorded at 12:00 am (during the shutdown procedure).

Intake #2 was completely closed by 1:15 am on December 28 and re-opened on December 29.

Refer to Graph No. 6 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, a Turbidity Event 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 NTU* was attained.

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 2017 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.

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 459 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 455 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 insure water quality. Samples were collected at 51 locations within the City. Approximately 204-286 samples were collected per month or 2773 samples for the year.

GIARDIA AND CRYPTOSPORIDIUM SAMPLING AND ANALYSES

Analyses for the presence of *Giardia* cysts and *Cryptosporidium* oocysts began in 1985 and 1988, respectively. During 2018, 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 2018. Environmental Protection Agency (EPA) Method 1623 was the analysis utilized.

There were no confirmed *Giardia* cysts or *Cryptosporidium* oocysts detected in 2018. Since 1986, there have been 1181 samples analyzed for *Giardia* and 1169 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).

SKANEATELES LAKE LIMNOLOGICAL SAMPLING AND ANALYSES

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 11dates with 123 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 (Graph No. 7). Graphs No. 8 and 9 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' intervals from the surface to a depth of 200'. 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 2018. The majority of genera observed were blue-green algae of the Phylum Cyanophyta (genus, *Polycystis* and *Cyanobium*) and diatoms of the Phylum Chrysophyta (genus, *Cyclotella*) (Table No. 15). For Station Samples, three genera accounted for 83.14% of the total cell count; *Polycystis* (52.37%), Cyanobium (20.00%) and *Synedra* (10.77%). For Depth Profile samples, three genera accounted for 85.99% of the total cell count. *Polycystis* was dominant at 58.30%, *Cyanobium* and *Synedra* accounted for 17.50% and 10.19% of the total respectively.

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.

Station Sample Analyses

Total cell counts for Station Samples collected on May 24 averaged 409 cells/ml. *Polycystis* was the dominant form accounting for 81.1%, *Cyanobium* accounted for 6.9%. Secchi disc readings were exceptional, averaging 16 meters. Water temperature averaged 57.4^0F.

The total monthly cell count for June was low, averaging 534 cells/ml. The June 15 total average cell count was marginally above the May 24 count at 444 cells/ml. *Polycystis* was the dominant form at all eight stations, accounting for 78.0% of the total, (consistent with the May sample). Achnanthes accounted for 7.8% of the total. The June 26 total cell count average increased to 624 cells/ml. Although *Polycystis* was still dominant at 55.3% of the total, the species richness increased from 12 genera (June 15) to 21 genera. *Cyanobium* and *Synedra* accounted for 22.2% and 13.3% of the total respectively. Monthly average water temperatures and Secchi disk readings averaged 61.1^0F and 8.5 meters respectively.

The July 11 average total cell count increased to 2,016 cells/ml. Dominant forms included *Polycystis* (48.0%), Synedra (25.3%) and *Cyanobium* (15.0%). Water temperatures increased significantly from June recordings to 75.8^0F. The average Secchi disk reading for June 11 was 8.9 meters, above the June 2018 average, despite a notable increase in the total cell count.

The July 26 total cell count average increased to 2,794 cells/ml. *Polycystis* remained dominant and consistent with the July 11 samples totaling 45.8% of the count. *Cyanobium* and *Synedra* reversed dominance from the July 11 totals, accounting for 26.4% and 14.4% of the total cell count respectively. Water temperature remained consistent with the July 11 readings at 75.6^0F, Secchi disk readings averaged 8.5 meters.

The August 9 average total cell count decreased to 2,013 cells/ml. Dominant forms were consistent with the July 26 sample event. *Polycystis* accounted for 54.0%, *Cyanobium*, 27.9% and *Synedra* 11.5%. The August 23 Station Samples average total cell count decreased to 1,612 cells/ml. *Polycystis* and *Cyanobium* were the dominant forms at 6,010 cells/ml. (62.0%) and 2,201 cells/ml. (22.7%) respectively. Synedra counts decreased to 5.5% of the total cell count. Water temperatures averaged 74.9^0F. Secchi disk readings averaged 7.4 meters.

The total cell count for September 13 averaged 1,174 cells/ml. *Polycystis* decreased to 3,817 cells/ml., comprising 40.6% of the total cell count. *Chroococcus Type II* cells increased from 117 cells/ml. or 1.2% of the total cell count on August 23, to 2,215 cells/ml. (23.6% of the total count). *Cyanobium* counts were 2,143 cells/ml or 22.8% of the total count. Water temperatures were seasonally warm averaging 76.3^0F. Secchi disk readings averaged 7.7 meters. The September 27 total cell count averaged 622 cells/ml., a significant decrease from the September 13 total cell count. Dominant forms were *Polycystis* (58.4%), *Cyanobium* (19%) and *Chroococcus Type II* (13.4%). Water temperatures averaged 69.6^0F. Secchi disk readings averaged 7.1 meters.

Species diversity changed significantly from the September 27 to the October 10 Station Samples. *Achnanthes* and *Polycystis* were the dominant forms accounting for 48.9 % and 39.1% of the total cell count (814 cells/ml.) respectively. *Achnanthes* cell count increased significantly from 12 cells/ml. on the September 27 sample event to 3,182 cells/ml. *Chroococcus Type II* counts decreased to 21 cells/ml. (0.3%) on October 10 from 668 cells/ml. (13.4%) on September 27. Water temperatures averaged 66.6^{0}F, Secchi disc readings averaged 7.7 meters. The average total cell count for the final set of Station Samples collected on October 26 was 336 cells/ml. *Polycystis* increased in dominance from the October 10 sample event to 76.8% of the sample total. *Cyclotella* and *Stephanodiscus* accounted for 6.9% and 5.9% of the total respectively. The average water temperature decreased to 55.1^{0}F. Average Secchi disk readings were consistent with the October 10 recordings at 7.8 meters.

Depth Profile Sample Analyses

The total cell count for the May 17 Depth Profile averaged 447 cells/ml. *Polycystis* was the dominant form at 84.2% of the total cell count. *Cyclotella* accounted for 11.2%. Water temperature averaged 48.4^{0}F, ranging from 55.0^{0}F at the surface to 45.0^{0}F at 200'. The epilimnion was shallow, extending to 10', the thermocline and hypolimnion were not established.

The total cell count for the June 20 Depth Profile averaged 843 cells/ml. *Polycystis* was the dominant form accounting for 69.3% of the total cell count. *Cyanobium* was second at 24.4%. The surface temperature was 64.0^{0}F. The epiliminion was established to 30' and the thermocline extended to 70'. The hypoliminion was establishing from 100'downward.

The total cell count for the July 19 Depth Profile averaged 1,724 cells/ml. Dominant forms were *Polycystis, Synedra and Cynaobium* at 41.8%, 24.8% and 24.2% respectively. The water surface temperature and epilimnion layer was warm at 78.0^{0}F and 77.0^{0}F respectively. The epiliminion extended to 30', the metalimnion extended to 90'. Water temperatures in the hypolimnion ranged from 56.0^{0}F to 54.0^{0}F.

On August 15 the Depth Profile average total cell count was 1,177 cells/ml. The dominant form was *Polycystis* (75.5% of the total cell count). *Synedra and Cyanobium* accounted for 8.6%, and 8.0% of the total cell count respectively. The epilimion remained exceptionally warm at 78.0^{0}F - 79.0^{0}F and extended to 40'. The thermocline and hypolimnion were still not well formed. The water temperature declined gradually from 77.0^{0}F at 50' to 60.0^{0}F at 190', decreasing significantly to 51.0^{0}F at 200'.

The September 19 Depth Profile average total cell count was 926 cells/ml. *Polycystis* was the dominant form at 39.6%. A*chnanthes* and *Cyanobium* accounted for 25.2% and 18.9% of the total cell count respectively. For the third consecutive month the epilimnion remained warm at 78.0^{0}F - 79.0^{0}F. The metalimnion commenced at 60'. Water temperatures in the lower metalimnion and hypolimnion fluctuated significantly, not typical for late summer stratification. Due to the significant variation in water temperatures; 59.0^{0}F (100'), 70.0^{0}F (110'), 55.0^{0}F (120'), 55.0^{0}F (120'), 60.0^{0}F (130'), it appears there was errors in data collection, or instrument failure.

The total cell count for the October 16 Depth Profile averaged 553 cells/ml. Dominant forms were *Polycystis and Cynaobium* at 66.6% and 16.1% respectively. The water surface temperature decreased to 62.0^{0}F, a significant drop from the September 19 Depth Profile temperature of 79.0^{0}F. The colder epilimnion water was extending deep, the metalimnion extended from 90' to 110'. The hypolimnion was not well defined ranging from 55.0^{0}F to 50.0^{0}F.

SKANEATELES LAKE HARMFUL ALGAE BLOOMS

The NYSDEC reported four *Confirmed HABs* and six *HABs With High Toxins* on Skaneateles Lake in 2018. All of the reported and observed blooms were small, localized and limited to near-shore areas. Monitoring, identifying, sampling and reporting HABs involved a collaborative effort between the NYSDEC Finger Lakes HAB Volunteer Surveillance, NYSDEC Finger Lakes Water Hub, the Skaneateles Lake Association (SLA) Shoreline HABs Program, CSLAP, the City of Syracuse Water Department and water quality measurement stations operated by the USGS and Jefferson Project at Lake George. The SLA Shoreline HABs Program comprised of select volunteers responsible for monitoring 25 zones around the perimeter of Skaneateles Lake. Volunteers report suspicious algal blooms to the HABs Program Coordinator, NYSDEC Division of Water HABsInfo@dec.ny.gov. Water samples collected, were transported to the Syracuse Water Department Treatment Facility in Skaneateles for algal identification. If Microcystis was observed or additional forms of cyanobacteria were identified in significant numbers, samples were transported to an ELAP certified lab for a FluoroProbe algal "finger printing" and microcystin analysis.

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. A HAB reported within the Lake's North basin or a detection of microcystin at either water intake also initiated sampling of raw water sample taps for algal identification and dominant forms. Watershed Inspectors also collected surface samples over the water intakes when bloom size and location warranted. The frequent monitoring and the lake-wide surveillance program were instrumental in the early detection of HABs.

NYSDOH Action Plan for Managing Microcystin In Skaneateles Lake

In coordination with the NYSDOH, an 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.

Short Term Measures

The short-term measures provided for an aggressive monitoring program. Microcystin sampling at the City's drinking water intakes were initiated on July 5 and extended through October 29. Initially, raw water from both of the City's Intakes was sampled weekly. If microcystin was detected, repeat samples were collected for both raw and treated water at that Intake until results were below detectable levels of microcystin for three consecutive days. Samples were collected and transported to an ELAP certified lab on 34 occasions for analysis in 2018. Nine raw water samples were reported with microcystin levels above the limit of quantitation (LOQ) of 0.3 µg/L, the highest level detected was 0.76 ug/L on October 12. One treated water sample (prior to distribution) collected on October 11, tested above the LOQ at 0.419 ug/L (Table No. 18).

Throughout 2017 and 2018, the City demonstrated that by boosting chlorine levels at the water intake cribs and wet wells and maintaining an elevated chlorine concentration in treated water, microcystin detection was prevented in the water distribution system. (Figure No. 1).

Short term measures also addressed the City's response to finished water microcystin levels above the 0.3 µg/L. in regards to 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.

Long Term Measures

Measures currently under evaluation include extending the City's shallow water intake and developing and/or enhancing interconnections between neighboring public water systems, and 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.

CHEMICAL SAMPLING AND ANALYSES

Skaneateles Lake water was sampled and analyzed for several chemicals and/or compounds during 2018. 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. 19-24, 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).

SKANEATELES LAKE WATERSHED PROTECTION PROGRAM

Watershed Inspection Program

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 and Dye Testing Program.

Three full-time City of Syracuse personnel routinely patrol the lake and watershed: two Watershed Inspectors 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.

In order 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. In an effort 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 No. 2). 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/Sanitarians.

Onsite Wastewater Treatment System Review and Inspection

Soil tests were witnessed by the Inspectors on 40 occasions in 2018. 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 32 OWTS design proposals for new construction or alternative engineering design were recommended for approval. Watershed personnel also conducted backfill inspections on repairs, as well as assisted county Sanitarians and design engineers with final inspections for new construction.

New Housing Starts in the Watershed

A total of 11 building permits were issued for new dwellings during 2018 (Table No. 25). Nine of the permits were in Onondaga County. Seven were in the Town of Skaneateles (one lakefront) and two were in the town of Spafford (one lakefront). Two permits were issued in the Town of Niles, Cayuga County (both lakefront). No permits were issued in the town of Sempronius (Cayuga County) or Scott, Cortland County.

Building Permit Application Review

The Watershed Protection Program reviewed a total 65 Building and Zoning Permit Applications in 2018. As discussed above, 11 were new housing starts. Seventeen applications were additions or renovations to existing dwellings and the remaining 37 applications included shoreline structures, accessory structures, landscape features or proposed subdivisions and lot line relocations. Graphs No. 14 and 15 and Figures No. 3 and 4 illustrate new construction and renovation proposals reviewed by the City of Syracuse and monitored throughout project duration in the Skaneateles Lake Watershed since 1993.

Sediment and Erosion Control Plan Review

As of 2004, the Watershed Rules and Regulations require property owners proposing to disturb 5000 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 2018, 33 SECPs were reviewed. A NYSDEC SPDES General Permit for Stormwater Discharges (GP-0-15-002) is required in New York State for all construction activity over one acre. Two permits were issued for construction activity in the Watershed in 2018 under GP-0-15-002. Figure No. 5 illustrate SECP's reviewed and SPDES General Permits issued within the Skaneateles Lake Watershed since 2004.

Violations

A total of 24 violations of the Skaneateles Lake Watershed Rules and Regulations were recorded in 2018. The violations are discussed in detail below.

County Sanitary Code Violations

Five violations of County Sanitary Code were reported by City personnel. Two violations were the result of failing OWTS. Three property owners were cited for failure to renew O&M contracts for Enhanced Treatment Units (ETU's) (Table No. 26).

Maintenance and or select replacement of septic components was performed on both Sanitary Code violations involving failing OWTS in 2018. Two property owners renewed O&M contracts for ETU's and one property owner has still not provided documentation of a signed contract agreement with a ETU service provider. The enforcement of Sanitary Code violations is the responsibility of the respective 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. Table No. 27 documents Sanitary Code violations identified by Watershed Inspectors since 1993.

Sediment Generation and Control Violations

Fourteen violations were issued for non-compliance of sediment and erosion control practices in 2018. Ten were abated in 2018. Two violations will be addressed when site conditions allow. (Table No. 26).

Modifications to Existing Dwellings Five violations resulted from the failure of property owner's to submit a building application packet to the City prior to initiating renovation projects. Three projects resulted in temporary stop work orders by Code Enforcement Officer's until the appropriate documentation, i.e., architectural drawings, site plans, erosion control plans, etc., were submitted to the City. One of the stop work orders is still in effect. Four violations were addressed by property owners or their designated representatives.

Petroleum/Hazardous Material Spills

There were three potentially hazardous material releases or spills identified by City personnel or reported by NYSDEC Division of Environmental Remediation in 2018. The first spill was the result of a ruptured above ground heating oil tank servicing a residential property in the Town of Spafford. The release of product was estimated between 200 – 250 gallons. NYSDEC Environmental Remediation Division coordinated the contaminated soil clean-up effort.

The second release of heating oil in the Watershed in 2018 occurred two days after the spill detailed above. On January 18, NYSDEC Spill Response and Skaneateles Lake Watershed Protection Program staff investigated a report of a leaking heating oil tank in the basement of a residence in the Town of Spafford. The release was estimated to be less than 20 gallons. A NYSDEC spill contractor applied absorbent pads to the basement floor and sump, emptied the tank of remaining heating oil and removed the tank offsite.

On November 11, a tractor trailer hauling residential waste overturned into an agricultural field in the Town of Spafford. The contents of the trailer were off-loaded into the field and removed with heavy equipment and trailers dispatched to the site. A small amount of diesel fuel (not quantified) was released from the fuel tank vent. A NYSDEC spill contactor applied absorbent pads and booms to contain the product and removed the contaminated soil.

Composing Toilet Operation

Currently 50 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 personnel and placed in 4' (w) x 4' (l) x 4' (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.

FILTRATION WAIVER

Filtration Waiver Conditions

The City of Syracuse applied for and received a filtration avoidance extension 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 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 2018-2019.*

AGRICULTURAL PESTICIDE AND FERTILIZER INVENTORY

The annual 2018 Agricultural Survey was conducted by the Skaneateles Lake Watershed Agricultural Program staff. A total of 40 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 28,671 acres were found to have been worked by the 40 farms with active Whole Farms Plans.

A total of 1,260 tons of granular fertilizer and 17,457 gallons of liquid fertilizer were applied to cropland. A total of 437 tons of lime were applied to cropland. A total of 10,413 tons of manure, and 16,732,786 gallons were utilized for nutrient value and soil organic matter enhancement. This manure was produced by approximately 2,318 animals (1,789 dairy animals, 54 horses, 74 sheep, 300 beef, 70 bison, 28 alpacas, 3 goats).

A total of 3,231 gallons of liquid pesticide and 608 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 128,165 gallons of diesel and 21,545 gallons of gasoline were used by the 40 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.

PESTICIDE USE BY STATE AND LOCAL DEPARTMENTS OF TRANSPORTATION

Pesticide Use by State and Local Departments of Transportation

Herbicides were not used by NYSDOT Region 3, Onondaga and Cayuga Residences of the NYS Department of Transportation (DOT) or the Cayuga and Cortland County DOT's in 2018. The NYSDOT Cortland Residency applied Accord XRT 2, Esplanade, and Viewpoint around guide rails on Rt. 41 from the Onondaga County line south to the watershed boundary. Onondaga County DOT applied Glyphosate and Sulfometuron to control weed growth around guide rails in the towns of Skaneateles and Spafford. Diuron and Glyphosate was applied for shoulder vegetation encroachment (prior to pre-pave) on Coldbrook Rd. 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.

HAZARDOUS MATERIALS STORED ON THE SKANEATELES LAKE WATERSHED

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), 18 commercial enterprises and seven municipal facilities stored a total of 47,875 gallons of petroleum products as of January 2019. Gasoline accounted for 33,485 gallons of the total. Other products stored were propane (44,700 gallons), diesel (9,970 gallons), heating oil (1,250 gallons) and used oil (3,170 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.

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.

WATERSHED MANAGEMENT APPROACH TO CONTROLLING HEMLOCK WOOLLY ADELGID

HWA was identified in the Skaneateles Lake Watershed in 2014. Once infested with HWA, mature hemlock trees die within three to 12 years. The subsequent loss of forest canopy and root failure has the potential to impact water quality by increasing sediment loading to the lake through destabilizing steep slopes and creating excessive soil erosion. In an effort to minimize the spread of HWA, the City of Syracuse Water Department has collaborated with the Onondaga County Soil and Water, Cornell University Cooperative Extension (CCE) of Onondaga County and several volunteers residing with the watershed. Since HWA has been located primarily along the southern shoreline of Skaneateles Lake, 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. Once the trees are healthy enough to sustain low populations of HWA, predator insects will be introduced to feed on HWA, and rear a larger population of predator beetles for introduction throughout the Watershed.

Three biologic controls (biocontrols) for HWA were released in the Skaneateles Watershed in 2015 and 2016, marking the first time these species were released as a means of biocontrol in New York State. Biocontrols released include 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. The biocontrols feed only on HWA and will naturally spread to control HWA infestations in the watershed.

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 run by the New York Hemlock Initiative (NYSHI) and is funded through NYSDEC's monies from the NYS Environmental Protection Fund. CCE Onondaga works closely with technicians at the NYSHI to share new developments in management options - including additional biocontrol releases mentioned above-with watershed stakeholders and property owners.

CCE of Onondaga and trained volunteers will be actively monitoring hemlock stands in the watershed to detect changes in canopy cover and monitor for HWA. To expand reach and impact of hemlock monitoring, CCE of Onondaga County will encourage community participation by offering HWA training and monitoring opportunities for watershed residents. In collaboration with the NYSHI, CCE of Onondaga sponsored hemlock hikes, monitoring, and management workshops throughout the watershed in 2018 and will continue to offer similar opportunities in the future. These workshops are developed with two goals: to provide attendees with the skills to identify HWA and hemlock trees and become a part of a wider citizen science watershed protection effort and to connect property owners with HWA infestations to sound management options.

In 2018, the agencies included an 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 3 dozen entries in the database shared between CCE 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.

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 evolved 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, 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, project completion is estimated to take numerous years.

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* – 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 may result in sediment plumes which are transported from the Brook outlet in the direction of Intake #1, causing elevated turbidity through the intake.

The Skaneateles Lake Watershed Protection Program is coordinating with multiple agencies including the Finger Lakes Land Trust, SLWAP, NYSDEC, Syracuse University, US Fish & Wildlife Service, Onondaga County Water and Environment Protection, the Town of Skaneateles and Upstate Freshwater Institute, to monitor Shotwell Brook water quality and assess impacts of land use in the Watershed on erosion and sediment loads. The objective of the monitoring program is to establish a seasonal (April – October) baseline characterization of hydrology and water quality. The monitoring location was approximately 700' upstream from the Shotwell Brook outlet. Monitoring locations were expanded in 2017 to include several major tributaries of Shotwell Brook. Water quality data is collected on individual tributaries to facilitate the identification of pollutant loading areas, allowing the agencies indicated above to concentrate resources. In 2018 the SLWAP was awarded a $181.000 grant for stormwater attenuation on the NE branch of Shotwell Brook. The two-phase project involves the establishment of a constructed wetland and an extensive floodplain on one acre of fallow agricultural land. Immediately downstream of the construction wetland a channelized stream section will be improved, allowing for sinuosity and the re-establishment of floodplains.

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.

SHOTWELL BROOK AND GROUT BROOK TOTAL AND FECAL COLIFORM SAMPLING

In 1987 Shotwell Brook, Grout Brook and Bear Swamp Creek were sampled for 16 consecutive weeks (between July 8 and October 15) for fecal streptococcus, fecal coliform and total coliform bacteria. The results indicated that Shotwell Brook had the highest levels of bacteria in comparison to Grout Brook and Bear Swamp Creek. Sampling for total and fecal coliform was scheduled for identical dates in 2018 on Shotwell Brook and Grout Brook to assess current sub-watersheds in comparison to 1987. Daily rainfall totals throughout the sampling period were also plotted on the graphs to determine the effect of stormwater runoff on bacterial counts. Three rainfall events in 2018 exceeded .80”

Graphs No. 10 and 11 indicate a significant reduction in fecal and total coliform counts in Shotwell Brook from 1987 to 2018. Fecal coliform counts only exceeded 200 cfu/100 ml. on one sample date in 2018, in contrast to 1987 where 67% of sample events exceeded the threshold. Graphs No. 10 and 11 also illustrate surprisingly low fecal and total coliform counts during and immediately following significant storm events validating all the focused watershed protection efforts and best management practices (BMPs) implemented in the Shotwell Brook Watershed since the inception of the SLWAP in 1994.

Graphs No. 12 and 13 illustrate consistently low fecal coliform counts for both 1987 and 2018 Grout Brook sample events. In contrast to the Shotwell Brook Watershed (approximately 70% agricultural land use), the Grout Brook Watershed is predominantly forested.

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 of the conveyances bordering farm land will extend over several years.

WATERSHED PERSONNEL TRAINING/CERTIFICATIONS/PRESENTATIONS

Shotwell Brook Watershed Landowner Meeting – March 1, 2019 The Skaneateles Lake Watershed Protection Program organized a landowner workshop at the Skaneateles Library, open to all property owners within the Shotwell Brook Watershed. Representatives from the Skaneateles Lake Watershed Protection Program, the NYSDEC Division of Lands and Forests and the SLWAP discussed the significance the Shotwell Brook Watershed plays in regard to the City of Syracuse water supply. Presenters also discussed services and potential funding opportunities available to land owners in the Watershed, including forest management and reforestation, riparian buffers, constructed wetlands and channel sinuosity projects.

Harmful Algal Bloom Summit, Central NY Region – March 5-6, 2018 The Regional Summit provided a forum for national, state and local experts and stakeholders to exchange information and engage in technical discussions. The goal of the Summit was to provide a better understanding of the variety of causes of HABs and to develop action-plans specific to individual watersheds. The Public Health Sanitarian was selected for the steering committee and participated in a panel discussion on the second day of the Summit.

March to Lake Day – Solutions to Reduce HABs in Owasco Lake A Scientific Symposium in "Plain English" – March 10, 2018 The Symposium, sponsored by the Owasco Watershed Lake Assocation, Cayuga County Water Quality Management Agency, Save Owasco Now, Cayuga Community College and the Finger Lakes Institute at Hobart and William Smith Colleges was attended by the Public Health Sanitarian. Presentations included; *The Status of Owasco Lake, Nine Element Watershed Plan, Total Maximum Daily Load – TMDL* and *In Lake HAB Disruptor and Prevention Technologies.*

Central New York Water Works Conference, Inc., Spring Meeting and Workshop – March 15, 2018 The Public Health Sanitarian attended the Conference, which included a presentation from the principal of Louisiana Pond Management titled; *Control of Blue Green Algae Using Mixing and Aeration in Water Reservoirs.*

Skaneateles Lake HABs Steering Committee Meeting – April 16, 2018 The meeting held at the Cayuga County Community College was attended by the Public Health Sanitarian.

Onondaga County Council on Environmental Health Meetings – April 17 & May 15, 2018 Presenters for the April 17 meeting included the co-owner of E-Z Acres and the owner of Volles Family Dairy Farm. Discussions included the present and future economic challenges facing dairy farms in the Central New York region. The May 15 Meeting presentations included; *Farm Tile Drainage and Road Salt Impacts Associated Primarily With Aquatic Life*. The Public Health Sanitarian attended both meetings.

New York's 24^{th} Congressional District Agriculture Advisory Committee Meeting – April 23, 2018 The meeting was scheduled to allow members of the Committee to address a host of issues facing the agricultural community. The Public Health Sanitarian attended the meeting.

Emergency Stream Intervention Training – May 9, 2018 The training event was hosted by the Cayuga County Soil and Water Conservation District and open to town and county officials, contractors, agency personnel and highway staff that are involved in streambank and culvert projects. Presentations included; *Channel Instability, Impacts Of Human Activity On Stream Health, Flood Response And Documentation* and *Regional Curve Tools*. The training event was attended by the Public Health Sanitarian.

Onondaga County Emergency Preparedness Committee Meeting – May 16, 2018 The Public Health Sanitarian discussed with the Committee the Syracuse Water Departments Action Plan to address HABs, microcystin detection and additional potential source water contamination concerns. The meeting was attended by the Public Health Sanitarian.

NYSDEC HABs Processor Training – May 30, 2018 The NYSDEC HABs Program Coordinator provided training for points of contact and sample processors on the six Finger Lakes in the NYSDEC's HABs Surveillance network. The training event located at the Finger Lakes Institute in Geneva, covered HAB identification, sampling, sample handling and shipping logistics and other administrative topics. The training event was attended by the Public Health Sanitarian.

Informational Public Forum - HABs Water Quality on Skaneateles Lake – June 6, 2018 CCE of Onondaga organized and presented the forum in partnership with the Town of Skaneateles, the Skaneateles Lake Association and the City of Syracuse. The keynote presentation titled; *Learning From The past: Maintaining Healthy Lakes Takes Vigilance* was given by an associate professor at Bowling Green State University. The presentation focused on cyanobacterial HABs in aquatic ecosystems. A panel session followed with representatives from the Village of Skaneateles, Onondaga County Emergency Management, Onondaga County Health Department, a consulting engineering firm and the SLA. The Forum was attended by the Public Health Sanitarian.

Farming in the Watershed: Tile Drainage and Farm Field Practices – June 21, 2019 Partners For Healthy Watersheds sponsored the workshop located at the Cayuga Community College. The featured speaker was an agronomist at the Miner Institute. His presentation focused on projects assessing impacts of tile drainage in the Lake Champlain Region and research findings from the Miner Institute. The event was attended by the Public Health Sanitarian.

Skaneateles Lake Watershed Municipal Stakeholders Meeting – July 11, 2018 The guest speaker for the bi-annual meeting was a representative from the Cornell Local Roads Program. The presentation focused on practices and structural alternatives available to manage the increasing intensity of stormwater events in relation to roadway infrastructure.

NYC Watershed Science and Technical Conference – September 12, 2018 The event, organized by the NY Water Environment Association Inc. (NYWEA), the Watershed Protection and Partnership Council, the New York City Department of Environmental Protection (NYC DEP) and NY State Department of State was attended by the Public Health Sanitarian. Presentations included; *The Occurance of Potential Toxin-Producing Cyanobacteria in the New York City Water Supply, Ultrasonic Technology for Cyanobacteria Control: A Pilot Study on Two New York City Reservoirs, Probabilistic Estimation of Stream Turbidity and Application under Climate Change Scenarios, Foamstream: A Discussion of an Alternative Herbicide and Evaluating Suspended-Sediment Dynamics* and *Turbidity in the Upper Esopus Creek.*

Cornell Cooperative Extension of Onondaga County Annual Meeting – October 25, 2018 The featured speaker for the Annual Meeting was the Director of the Office of Environment, Onondaga County. The Public Health Sanitarian was presented with an Association Cooperator Award.

SLWAP Annual Meeting – December 11, 2018 The Annual Meeting was attended by the City's Watershed Inspectors and the Public Health Sanitarian. The morning session featured a presentation titled *Precision Feed Management* by the co-owner of E-Z Acres. The presentation focused on minimizing nutrient inputs through nutrient recycling. The afternoon sessions included a presentation by a NYSDEC Forester on *Forest Stewardship Plans, Denitrifying Bio-reactors Results,* presented by a Cornell University researcher and a brief overview of monitoring buoys deployed on Skaneateles Lake during the summer and fall season of 2018, presented by a representative of the NYSDEC Hub. The Annual Meeting including 70 participants, including 30 farmers, representing 15 farms (60% of acres farmed on the Watershed).

ACKNOWLEDGMENTS

The City of Syracuse continued in its efforts to control pollution within the Skaneateles Lake Watershed in 2018. 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.

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 re-calculation 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 2010 Census and was supplied by the Syracuse-Onondaga County Planning Agency in October 2011. It is noted that the overall figures show a declining population and increasing number of dwelling units within the watershed as compared to the 1990 census (noted in previous annual reports). This is due to the way in which the watershed population is estimated. Essentially, a watershed boundary map is drawn over a tax parcel map. There are obvious discrepancies that could occur as a result, but are unavoidable.

4. Average historical data is based upon City data for the 67 years between 1951 and 2017 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.

Exhibits

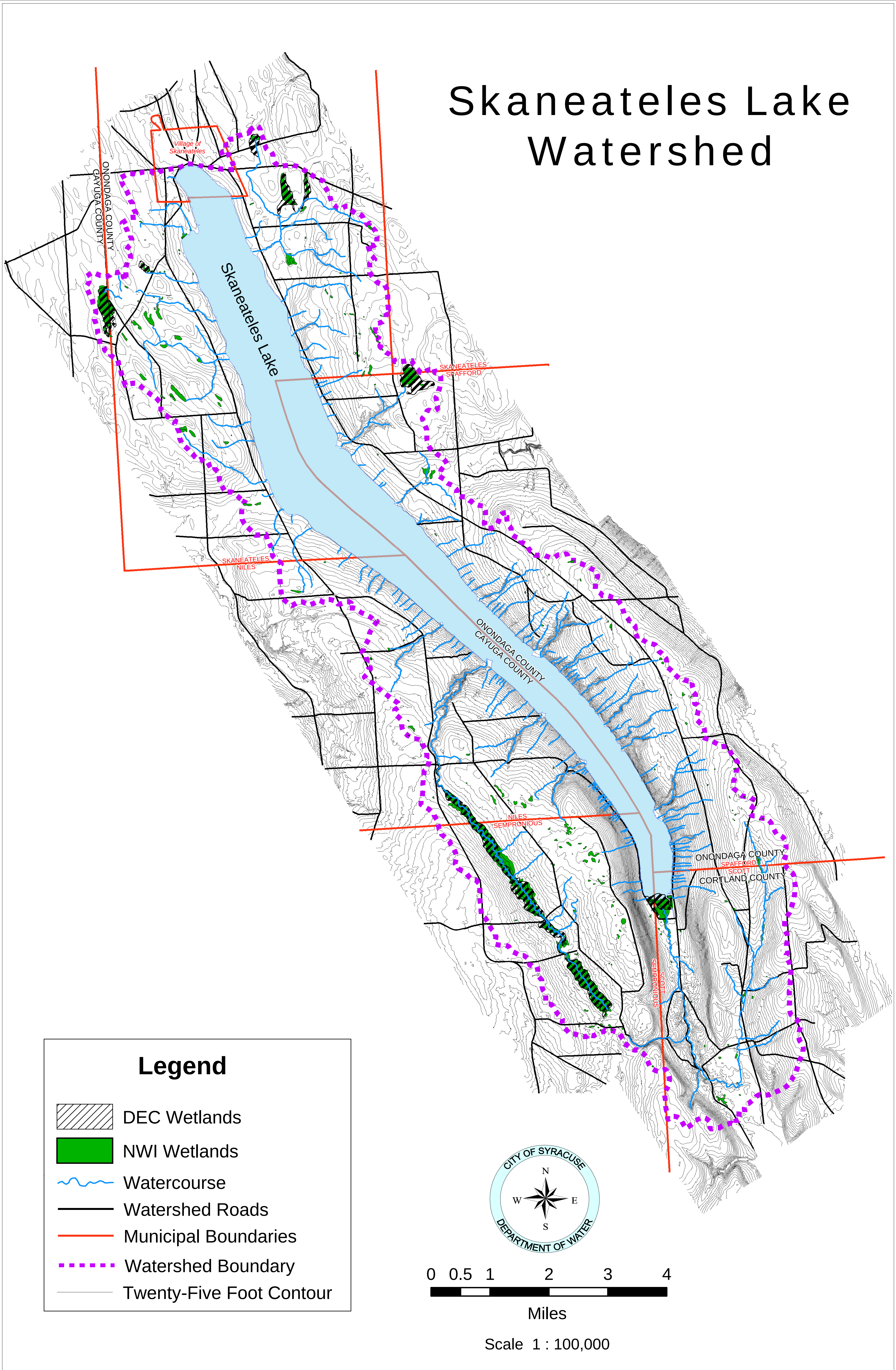


Exhibit A: General Watershed Map

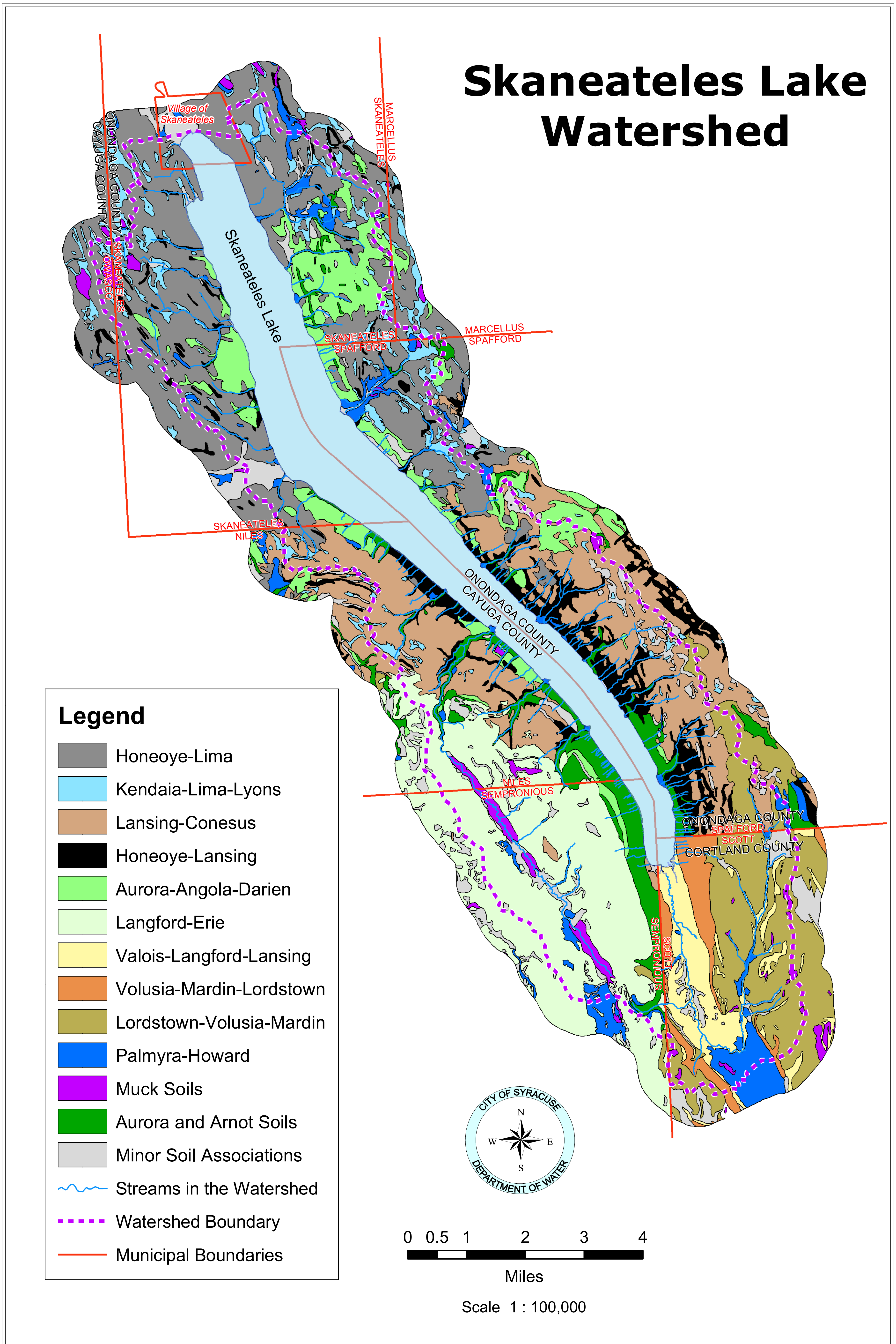
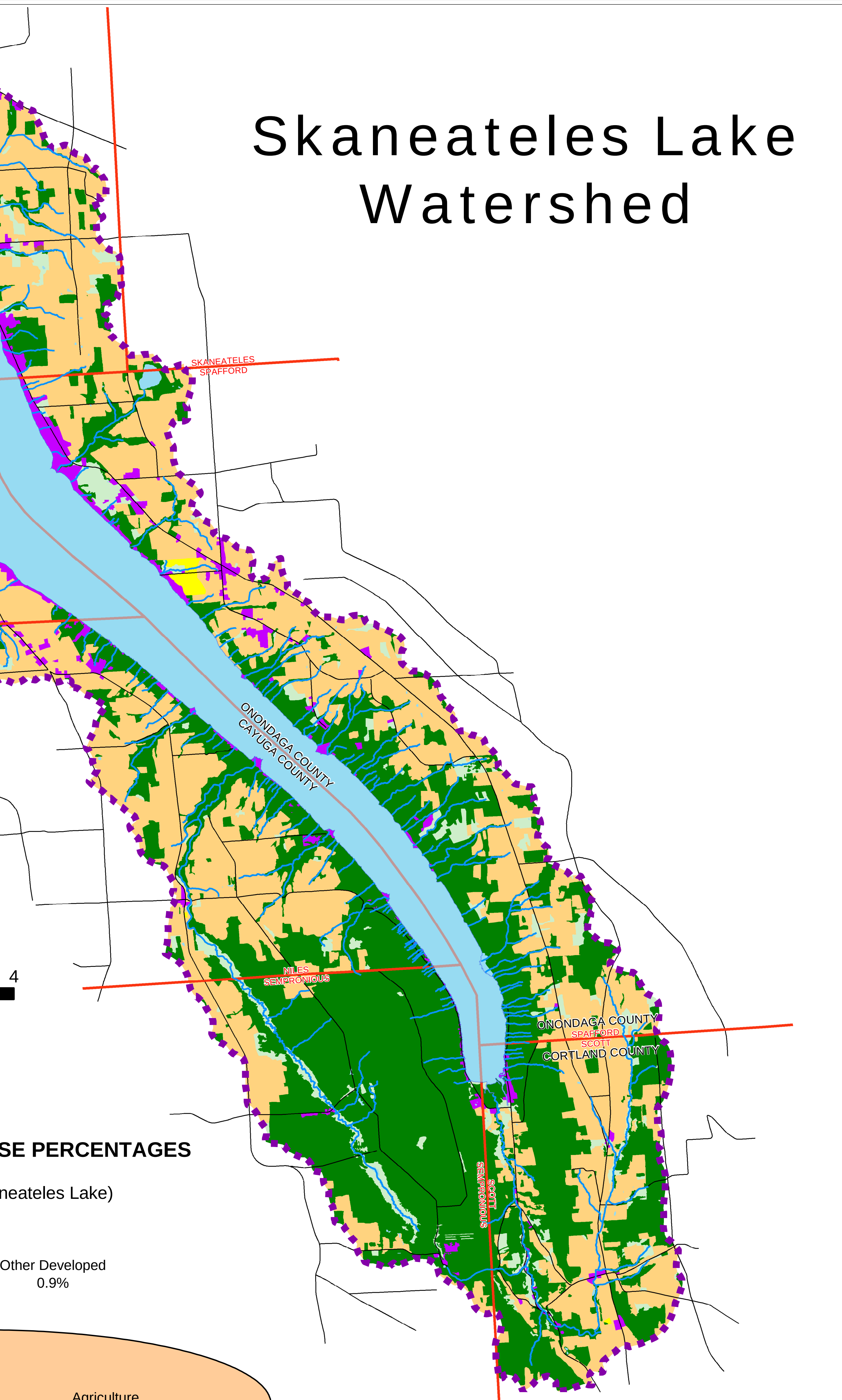


Exhibit B: Soil Associations Map

Skaneateles Lake Watershed

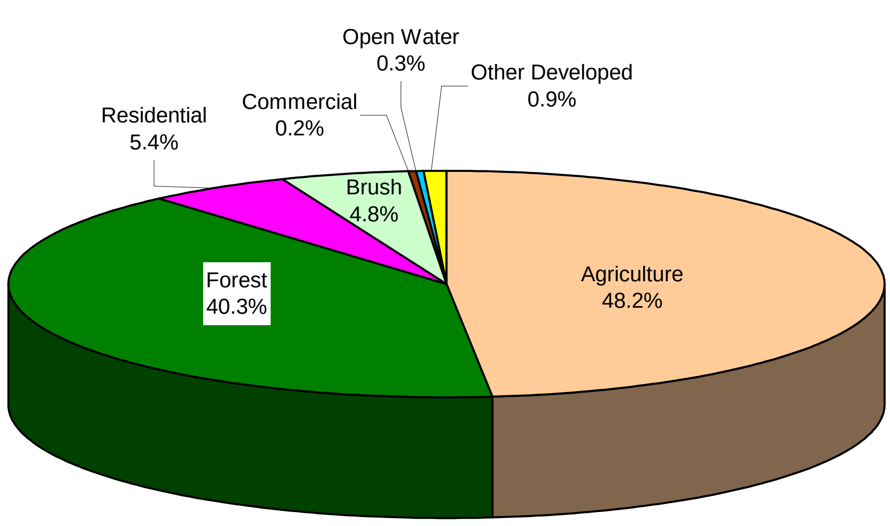


Legend

- Commercial
- Residential
- Brush
- Forest
- Agriculture
- Other Developed Areas
- Open Water
- Watercourse
- Watershed Boundary
- Municipal Boundaries
- Watershed Roads

WATERSHED LAND USE PERCENTAGES

(Not Including Skaneateles Lake)



LAND USE BY COUNTY

	Onondaga		Cayuga		Cortland		Total
	Acres	Percent	Acres	Percent	Acres	Percent	Acres
Agriculture	11,291	59.4	4,470	35.5	2,430	41.7	18,191
Forest	4,808	25.3	7,427	59.0	2,977	51.1	15,212
Residential	1,739	9.2	207	1.6	83	1.4	2,029
Brush	1,012	5.3	455	3.6	325	5.6	1,792
Commercial	58	0.3	0	0.0	0	0.0	58
Open Water	85	0.4	22	0.2	9	0.2	116
Other Developed	317	1.7	2	0.0	3	0.1	322

Exhibit C: Land Use Map

Tables

Graphs

&

Figures

Table No. 1

Skaneateles Lake and Drainage Basin Characteristics

Parameter	Value
Mean High Water Elevation *	863.27 Syracuse Datum
Mean High Water Elevation *	865.02 NGVD
Length	15 Miles
Average Width	0.90 Miles
Maximum Depth	300 Feet
Mean Depth	145 Feet
Lake Surface Area	13.6 Mi^2
Drainage Basin Area (land)	58.94 Mi^2
Drainage Basin:Lake Surface Ratio	4.33 : 1.0
Lake Volume	412 Billion Gallons
Highest Elevation *	1,980 NGVD

* Feet Above Sea Level

Table No. 2

Soils of the Skaneateles Lake Watershed

<table>
<tr><th>Association</th><th>County</th><th>Percent of County</th><th>Dominant Location in Watershed</th><th>Percent of Watershed</th><th>Slope</th><th>Soil Type and Seasonal Ground Water</th><th>Drainage/ Permeability</th></tr>
<tr><td>Honeoye-Lima</td><td>Onondaga</td><td>39%</td><td>W & NW Onondaga</td><td>20%</td><td>2-8%</td><td rowspan="4">deep, medium textured silt loams and gravelly silt loams

groundwater: 15-36"</td><td rowspan="3">moderately well, to well drained and

Very slow to moderately permeable</td></tr>
<tr><td>Lansing-Conesus</td><td>Onondaga and Cayuga</td><td>17% and 22%</td><td>Spafford Uplands, and NE Cayuga</td><td>16%</td><td>2-8%</td></tr>
<tr><td>Honeoye-Lansing</td><td>Onondaga</td><td>9%</td><td>Spafford Shoreline</td><td>6%</td><td>15-25%</td></tr>
<tr><td>Aurora-Angola-Darien</td><td>Onondaga</td><td>14%</td><td>N of Spafford Town Line</td><td>8%</td><td>2-8%</td><td>poorly to moderately well drained</td></tr>
<tr><td>Langford-Erie</td><td>Cayuga</td><td>45%</td><td>S Cayuga</td><td>15%</td><td>2-25%</td><td>deep, medium textured silt loams

groundwater: 6-20"</td><td>Poorly to well drained and slow to moderately permeable</td></tr>
<tr><td>Valois-Langford-Lansing</td><td rowspan="3">Cortland</td><td rowspan="3">87%</td><td>Lowlands</td><td rowspan="3">15%</td><td rowspan="3">2-55%</td><td rowspan="3">medium textured and gravelly silt loams

groundwater: 18-60"</td><td rowspan="3">Poorly to well drained</td></tr>
<tr><td>Volusia-Mardin-Lordstown</td><td>Uplands</td></tr>
<tr><td>Lordstown-Volusia-Mardin</td><td>Hewitt Forest</td></tr>
</table>

Table No. 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	1,414	2,406	53.6%	26.0%
Spafford	734	908	20.2%	25.0%
Niles	389	388	8.7%	17.0%
Sempronius	88	79	1.8%	17.0%
Scott	316	706	15.7%	15.0%
Grand Totals	2,941	4,487	100%	100%

Data supplied by the Syracuse-Onondaga County Planning Agency, October 2011

Table No. 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/mi^2
Onondaga	2,148	3,314	73.9%	51%	110.1
Cayuga	477	467	10.4%	34%	23.4
Cortland	316	706	15.7%	15%	79.9
Totals	2,941	4,487	100%	100%	71.1*

* Average density

Table No. 5

Land Ownership in the Skaneateles Watershed

Land Ownership	Acres	Percent of Total
Agricultural	13,734	37%
Public	3,575	9%
Commercial	671	2%
Residential/Private	19,740	52%
Total	37,720	100%

* Revised 2004

Table No. 6

Land Use in the Skaneateles Watershed

Land Use	Acres	Percent of Total
Agricultural	18,191	48.2%
Commercial	58	0.2%
Residential	2,029	5.4%
Forest/Open	15,212	40.3%
Brush	1,792	4.7%
Pond	116	0.3%
Other Development	322	0.9%
Total	37,720	100.0%

Table No. 7

Skaneateles Watershed Data

	Precipitation in Inches		Yield in MGD		Elevation Feet Above Sea Level *; **		Dam Discharges in MGD	
	67 Yr. Avg.	2018	67 Yr. Avg.	2018	67 Yr. Avg.	2018	67 Yr. Avg.	2018
January	2.71	4.36	79.23	145.89	860.72	861.38	38.42	67.78
February	2.64	2.87	98.22	144.98	860.67	861.74	32.51	115.72
March	3.22	4.45	154.39	132.81	860.86	861.60	36.57	56.46
April	3.55	3.25	166.46	118.29	861.64	861.94	50.29	35.92
May	3.69	2.80	89.03	72.51	862.38	862.35	35.04	11.98
June	3.97	2.32	62.25	18.16	862.47	862.55	21.25	6.85
July	3.96	5.12	32.44	31.68	862.40	862.24	21.46	6.10
August	3.81	3.97	10.73	9.95	862.00	862.10	13.15	5.96
September	3.99	3.75	12.54	9.81	861.45	861.71	11.38	5.61
October	3.97	5.36	26.89	47.04	860.96	861.35	12.04	5.55
November	3.71	5.45	59.16	140.43	860.63	861.38	18.60	34.56
December	3.40	3.33	85.64	197.28	860.60	862.09	30.43	121.49
Annual	42.62	47.03	73.08	89.07			26.76	39.50

* Syracuse Datum
** 1st Day of Month Lake Elevation

Table No. 8

Syracuse Water Plant Raw Water

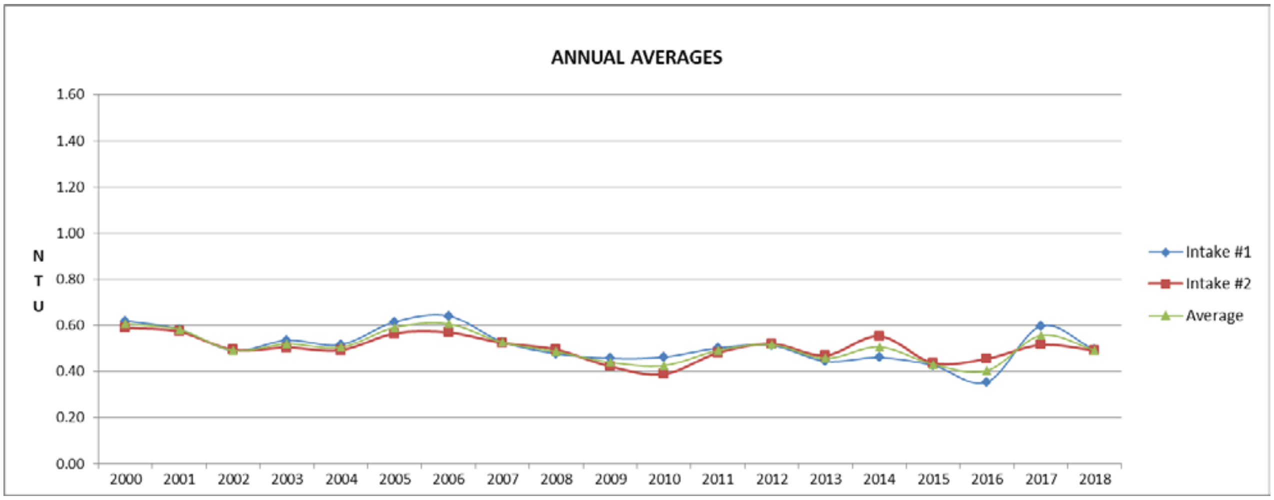
Maximum, Minimum and Average Monthly Turbidity in NTU

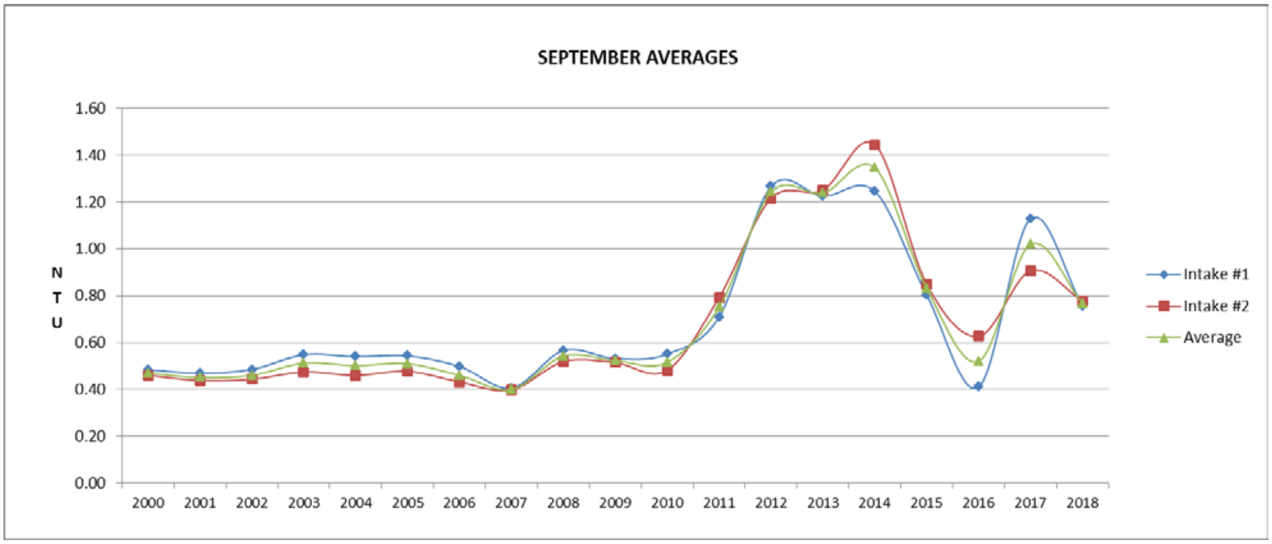
for 2018 (Intake Nos. 1 & 2)

Intake	#1 Maximum	#1 Minimum	#2 Maximum	#2 Minimum	#1 Average	#2 Average
January	2.92	0.17	2.59	0.19	0.41	0.44
February	1.61	0.18	2.00	0.15	0.36	0.35
March	0.47	0.09	1.16	0.14	0.18	0.24
April	0.59	0.16	1.18	0.18	0.28	0.29
May	1.29	0.17	2.34	0.22	0.61	0.52
June	1.20	0.26	1.23	0.15	0.67	0.50
July	2.08	0.58	1.22	0.24	0.80	0.39
August	1.43	0.24	0.95	0.23	0.53	0.50
September	1.77	0.37	2.02	0.36	0.76	0.78
October	1.36	0.43	1.45	0.51	0.81	0.89
November	0.91	0.22	1.45	0.22	0.35	0.54
December	1.89	0.21	5.94	0.27	0.40	0.49
				Average	0.51	0.49

Graphs No. 1 & 2

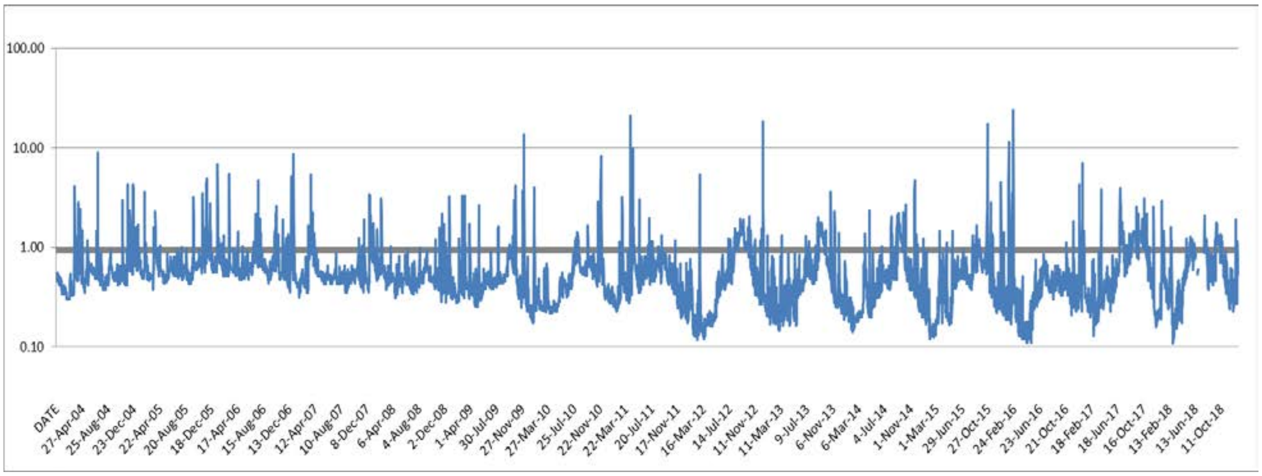
2000-2018 Turbidity Averages





<u>Graph No. 3</u>

<u>2004-2018 Daily Maximum Turbidity (NTU) Intake #1</u>



Graph No. 4

Monthly Counts Of Turbidity > 1 NTU At Intake #1, 2004-2018

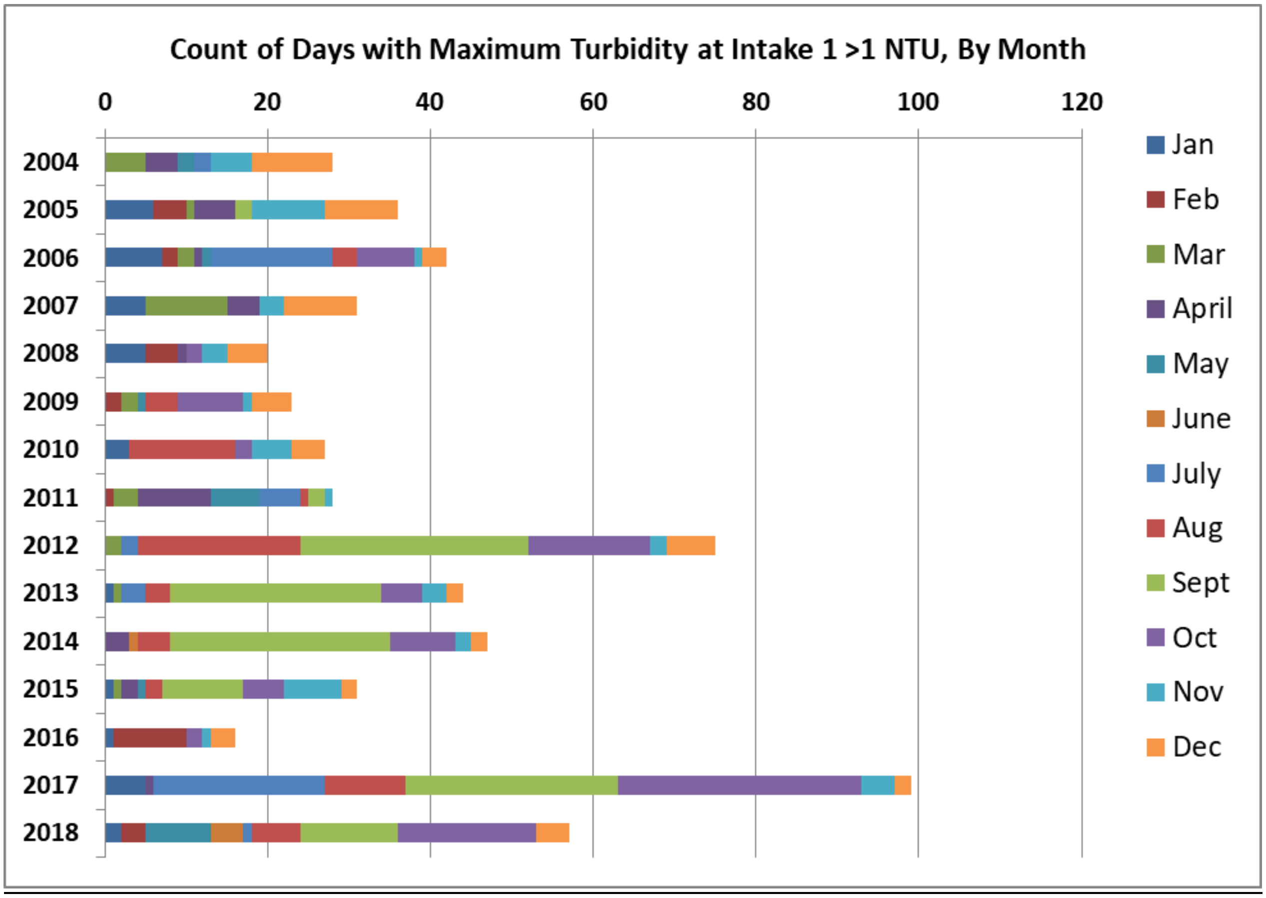


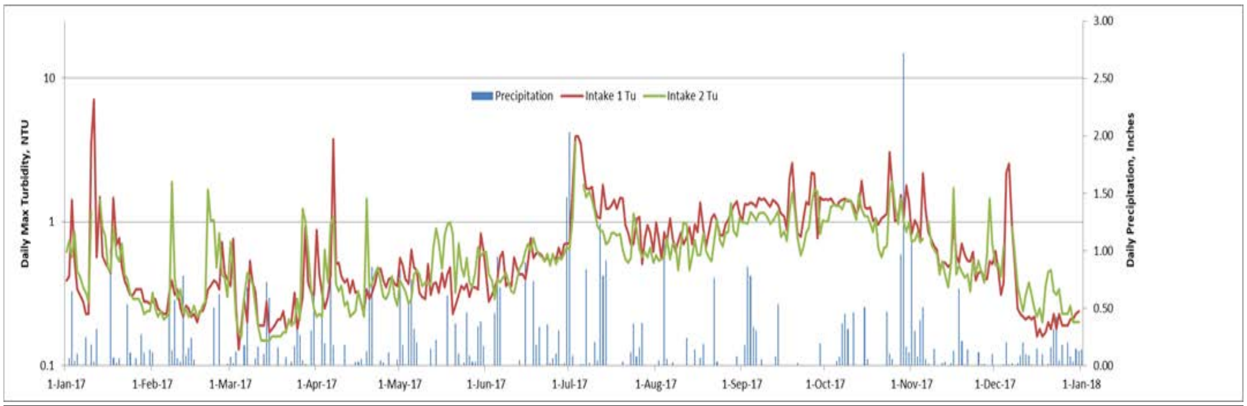
Table No. 9

Number of Days With Maximum Turbidity > Than 1 NTU, Intake #1

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Summed by Month
Jan	0	6	7	5	5	0	3	0	0	1	0	1	1	5	2	36
Feb	0	4	2	0	4	2	0	1	0	0	0	0	9	0	3	25
Mar	5	1	2	10	0	2	0	3	2	1	0	1	0	0		27
April	4	5	1	4	1	0	0	9	0	0	3	2	0	1		30
May	2	0	1	0	0	1	0	6	0	0	0	1	0	0	8	19
June	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	5
July	2	0	15	0	0	0	0	5	2	3	0	0	0	21	1	49
Aug	0	0	3	0	0	4	13	1	20	3	4	2	0	10	6	66
Sept	0	2	0	0	0	0	0	2	28	26	27	10	0	26	12	133
Oct	0	0	7	0	2	8	2	0	15	5	8	5	2	30	17	101
Nov	5	9	1	3	3	1	5	1	2	3	2	7	1	4		47
Dec	10	9	3	9	5	5	4	0	6	2	2	2	3	2	4	66
Summed by Year	28	36	42	31	20	23	27	28	75	44	47	31	16	99	57	

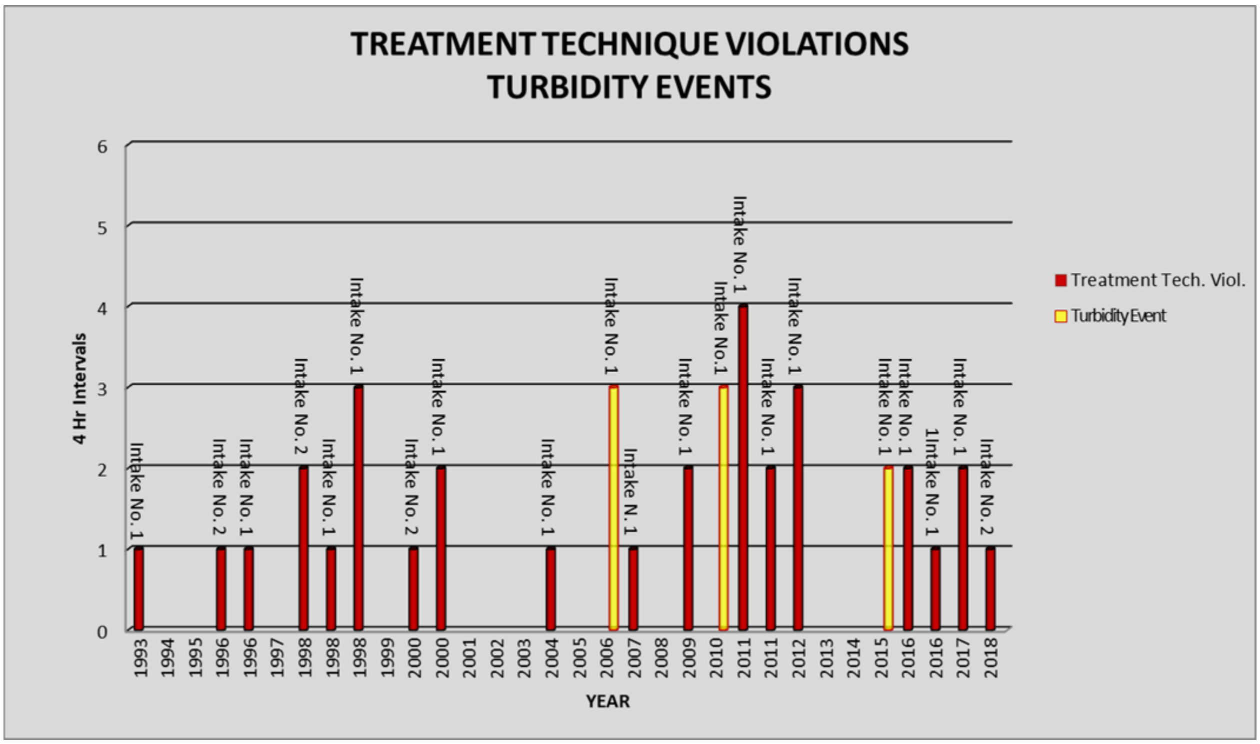
Graph No. 5

Intake # 1 & 2 Turbidity & Rainfall Measurements

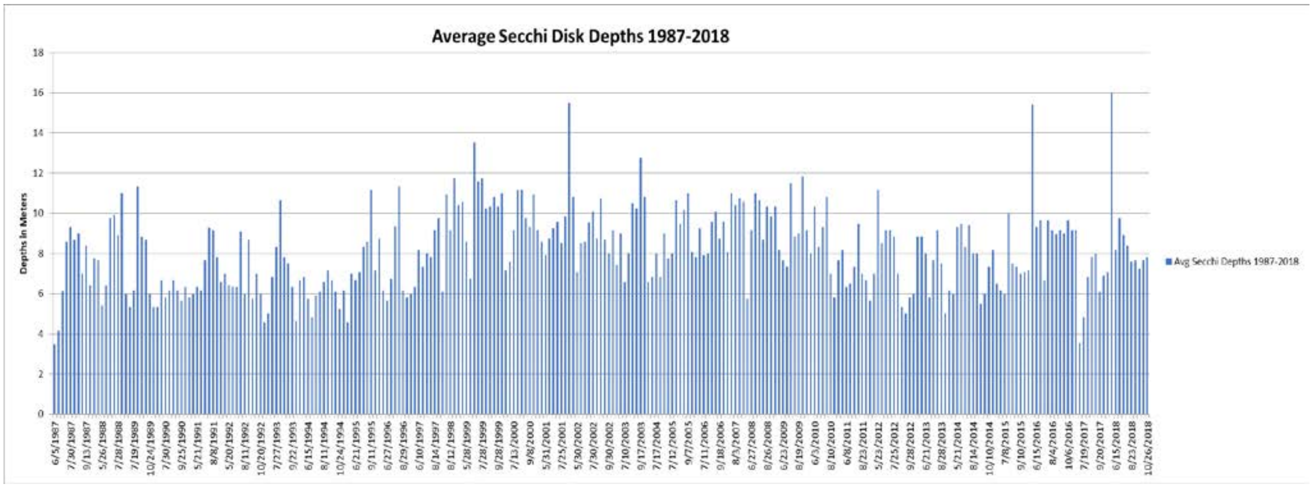


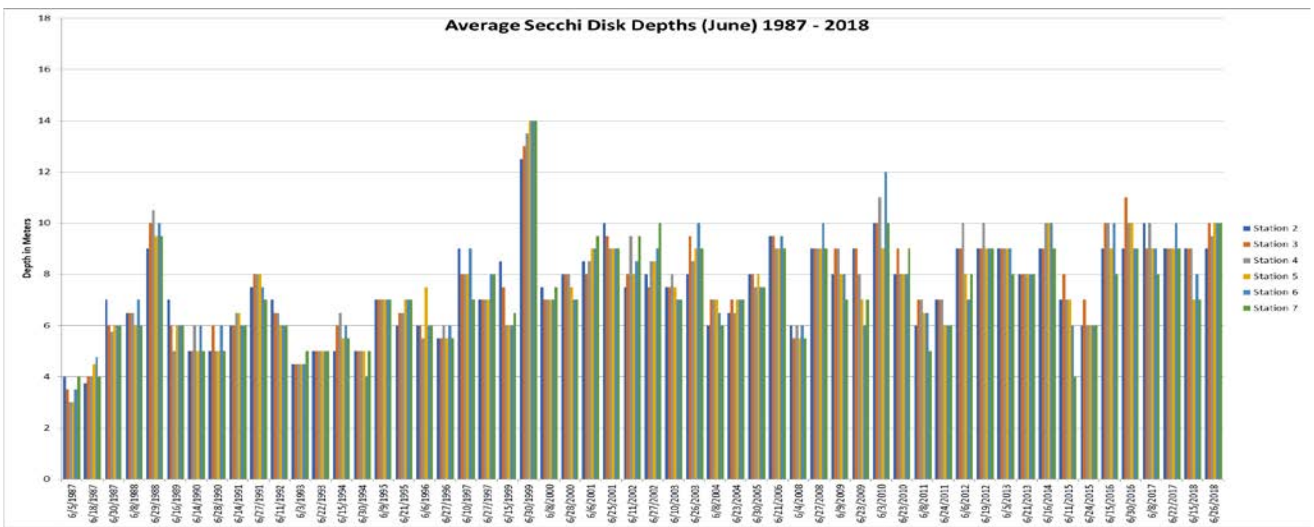
Graph No. 6

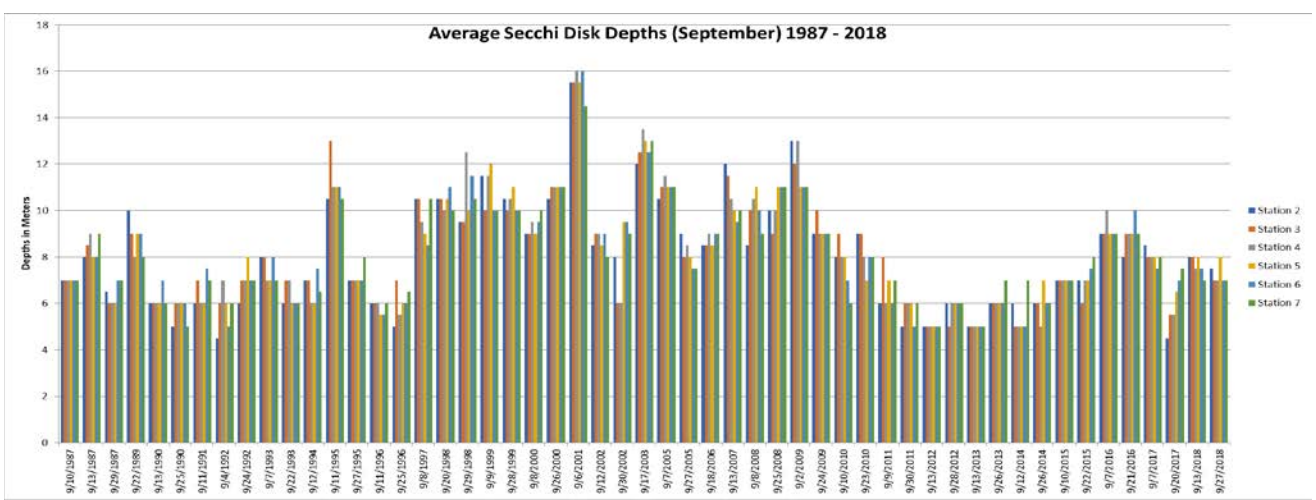
1993-2018 Treatment Technique Violations
vs Turbidity Events



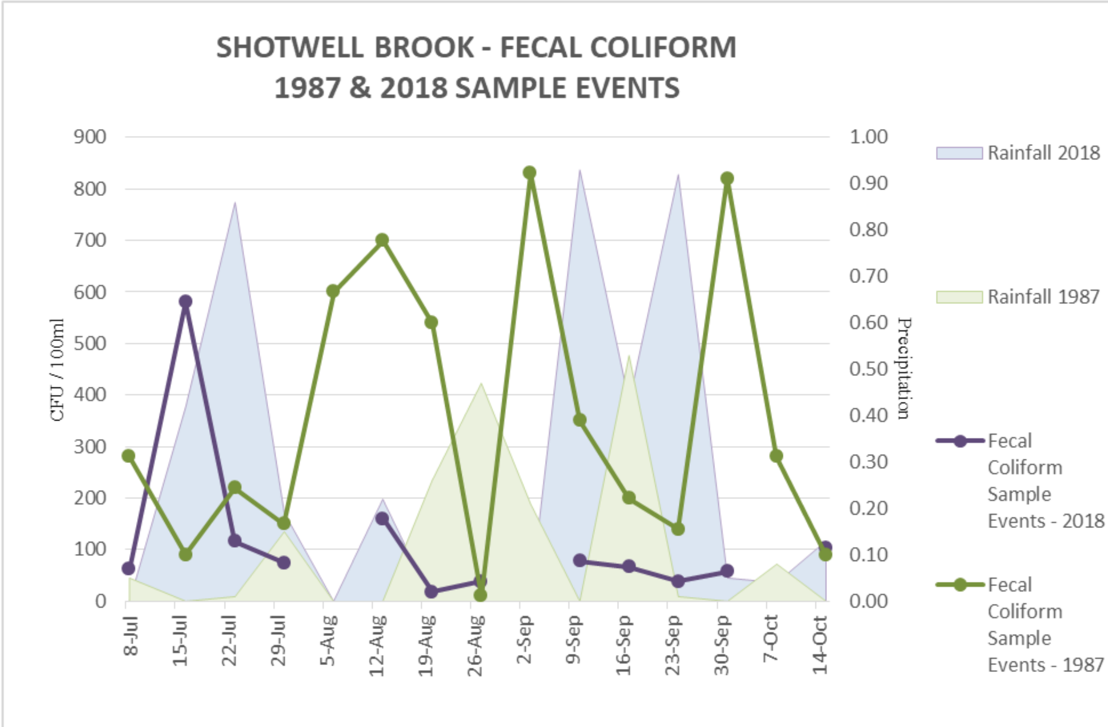
<u>Graphs No. 7, 8, & 9</u>

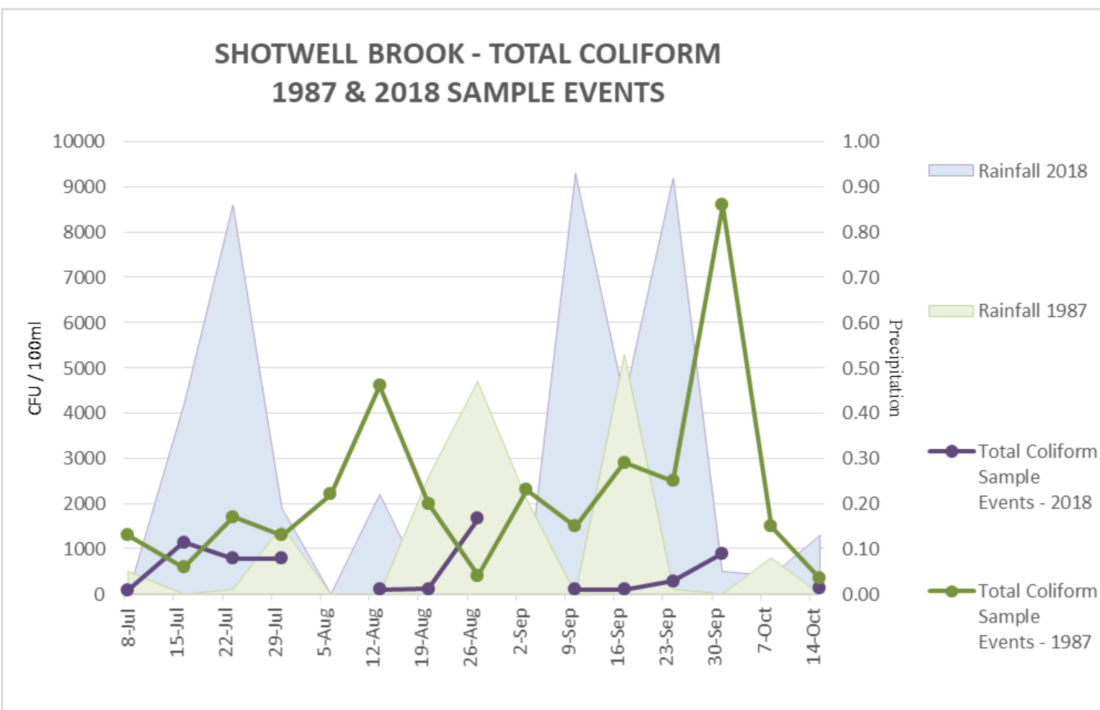




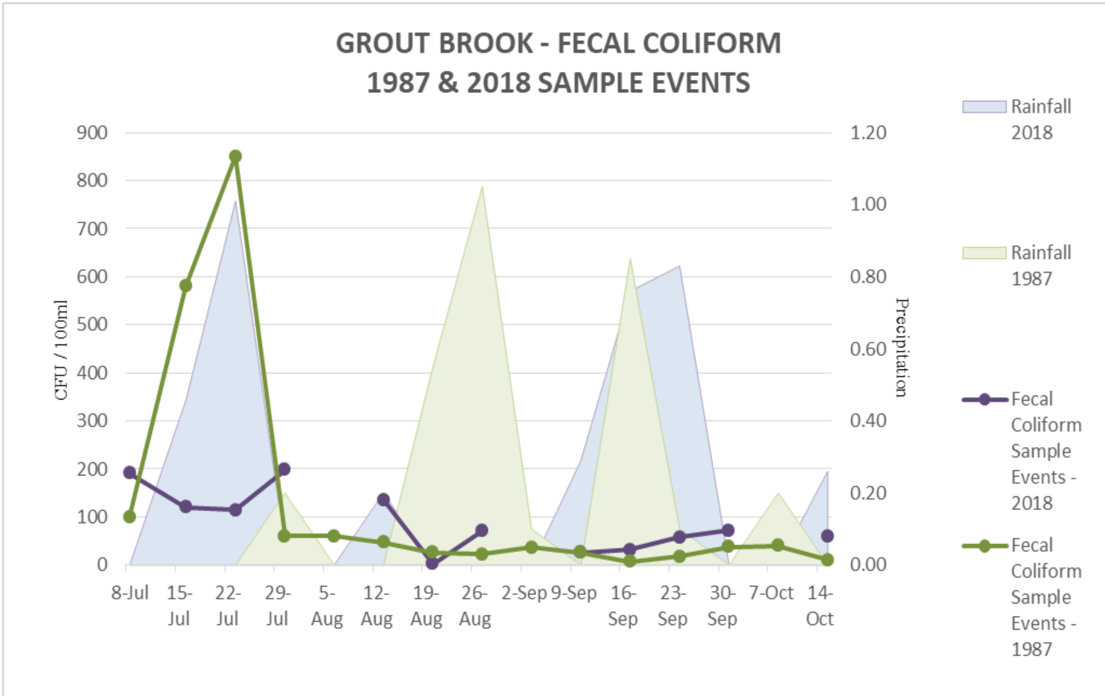


Graphs No. 10 & 11





Graphs No. 12 & 13



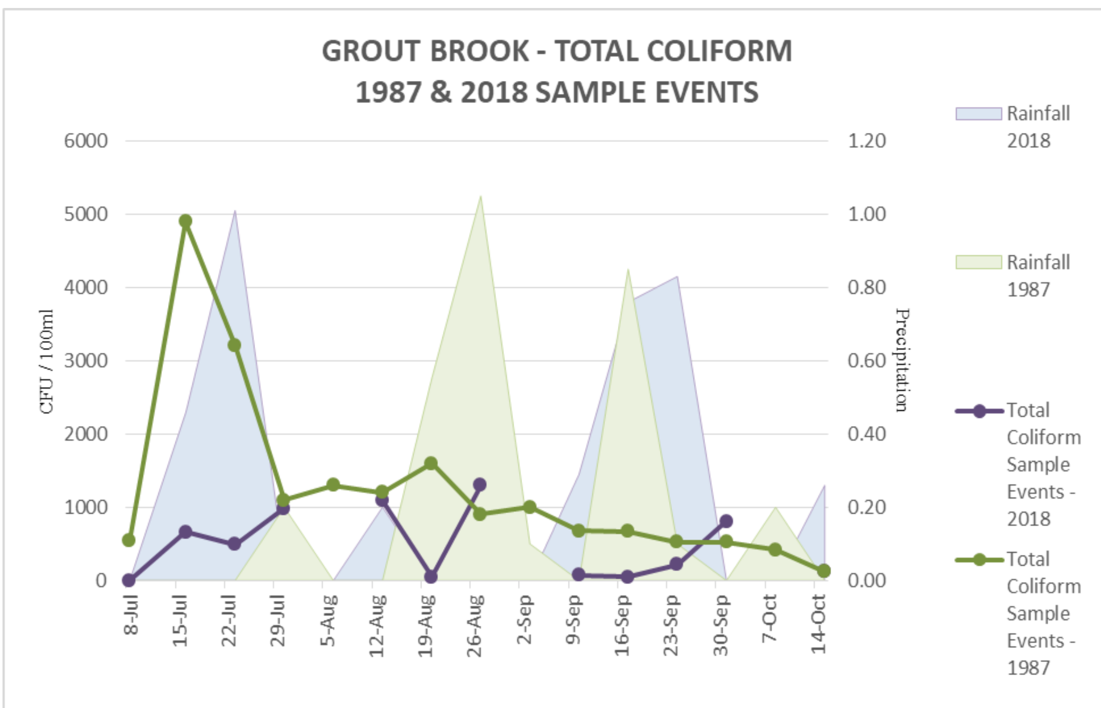


Table No. 10

Raw Water Intake Closures at Water Plant for 2018

Date Intake Closed	Date Intake Opened	Affected Intake	Violation?
1/12/2018	1/13/2018	2	No
2/18/2018	2/21/2018	2	No
2/23/2018	2/24/2018	2	No
2/25/2018	2/26/2018	2	No
3/27/2018	3/28/2018	2	No
9/25/2018	9/26/2018	2	No
11/5/2018	11/7/2018	2	No
11/24/2018	11/25/2018	2	No
12/27/2018	12/29/2018	2	No
12/31/2018	1/1/2019	2	Yes

Table No. 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 Analyzed	Number of Samples > 100 Colonies	Number of Samples > 100 Colonies	Percent > 100 Colonies	Percent > 100 Colonies
Intake:	#1	#2	#1	#2	#1	#2
January	136	136	0	0	0.00%	0.00%
February	136	136	0	0	0.00%	0.00%
March	137	137	0	0	0.00%	0.00%
April	134	134	0	0	0.00%	0.00%
May	133	129	0	0	0.00%	0.00%
June	127	117	0	0	0.00%	0.00%
July	103	116	0	0	0.00%	0.00%
August	99	116	0	0	0.00%	0.00%
September	97	115	0	0	0.00%	0.00%
October	76	117	0	0	0.00%	0.00%
November	74	119	0	0	0.00%	0.00%
December	82	133	0	0	0.00%	0.00%

Table No. 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 Analyzed	Number of Samples >20 Colonies	Number of Samples >20 Colonies	Percent >20 Colonies	Percent > >20 Colonies
Intake:	#1	#2	#1	#2	#1	#2
January	136	136	0	0	0.00%	0.00%
February	136	136	0	0	0.00%	0.00%
March	137	137	0	0	0.00%	0.00%
April	134	134	0	0	0.00%	0.00%
May	133	129	0	0	0.00%	0.00%
June	127	117	0	0	0.00%	0.00%
July	103	116	0	0	0.00%	0.00%
August	99	116	0	0	0.00%	0.00%
September	97	115	0	0	0.00%	0.00%
October	76	117	0	1	0.00%	0.85%
November	76	121	0	1	0.00%	0.83%
December	80	131	0	1	0.00%	0.76%

Table No. 13
Skaneateles Lake and Watershed
Giardia Detection: Incidents of Confirmed Cysts

	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 No. 14
Skaneateles Lake and Watershed
Cryptosporidium Detection: Incidents of Confirmed Oocysts

	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 used for analyses.
*** Previous reports list Intake #1 as the affected intake. That was incorrect. The oocysts were found in a sample collected from Intake #2.

Table No. 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: Chrysopyhta (Golden-Brown)

Centritractus	Tribonema
Dinobryon	Mallomonas

Phylum: Chlorophyta (Green)

Botyrococcus	Cosmarium	Palmella	Straurastrum
Chlorcoccum	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

Phylum: Pyrrophyta (Dinoflagellates)

Ceratium	Peridinium

Table No. 16

Station Sampling Analyses
Skaneateles Lake Algal Content: 2018

Date	Average Total Cell Count	Dominant Form	Percent Of Total	Average Secchi Disk Meters	Average Water Temperature F^0
May 24	409	*Polycystis 81.1%* *Cyanobium 6.9%* *Gomphosphaeria 3.6%*	91.6	16	57.4
June 15	444	*Polycystis 78.0%* *Achnanthes 7.8%* *Cyclotella 3.9%* *Cyanobium 3.7%*	93.4	7.9	57.8
June 26	624	*Polycystis 55.3%* *Cyanobium 22.2%* *Synedra 13.3%*	90.8	9.1	64.5
July 11	2016	*Polycystis 48.8%* *Synedra 25.3%* *Cyanobium 15.0%* *Cyclotella 3.9%*	93.0	8.9	75.8
July 26	2794	*Polycysis 45.8%* *Cyanobium 26.4.0%* *Synedra 14.4%* *Cyclotella 4.0%*	96.0	8.1	75.4
August 9	2013	*Polycystis 54.0%* *Cyanoium 27.9%* *Synedra 11.5%*	93.4		
August 23	1612	*Polycystis 62.0%* *Cyanobium 22.7%* *Synedra 5.3%*	90.0	7.4	74.9
September 13	1174	*Polycystis 40.6%* *Chroococcus Type II 23.6%* *Cyanobium 22.8%* *Chroococcus Type I 3.8%*	90.8	7.7	76.3
September 27	622	*Polycystis 58.4%* *Cyclotella 19.0%* *Chroococcus Type II 13.4%*	90.8	7.1	69.6
October 10	814	*Achnanthes 48.9%* *Polycystis 39.1%* *Cyanobium 5.3%*	93.3	7.7	66.6
October 26	336	*Polycystis76.8%* *Cyclotella 6.9%* *Stephanodiscus 5.9%*	89.6	7.8	55.1
Average	1169		91.32%	7.54	68.50

Table No. 17

Depth Profile Sampling Analyses
Skaneateles Lake Algal Content: 2018

Date	Average Total Cell Count	Dominant Form	Percent Of Total	Average Turbidity	Average Water Temperature F^0
May 17	447	*Polycystis 84.2%* *Cyclotella11.2%*	95.4	0.25	48.4
June 20	843	*Polycystis 69.3%* *Cyanobium 24.4%*	93.7	0.27	54.4
July 19	1724	*Polycystis 41.8%* *Synedra 24.8%* *Cyanobium 24.2%*	90.8	0.33	62.3
August 15	1177	*Polycystis 75.5%* *Synedra 8.6%* *Cyanobium 8.0%*	92.1	0.33	71.0
September 19	926	*Polycystis 39.6%* *Achnanthes 25.2%* *Cyanobium 18.9%* *Chroococcus Type II 5.8%*	89.5	0.75	69.3
October 16	553	*Polcystis 66.6%* *Cyanobium 16.6 %*	83.2	0.56	57.7
Average	945		90.78%	0.420	60.52

Table No. 18

SKANEATELES LAKE MICROCYSTIN LEVELS (ug/L)
July 5 – October 29, 2018

Date Sampled	7/5	7/12	7/19	7/26	8/2	8/4	8/6	8/8	8/9	8/10	8/16	8/23	8/30
Intake 1									ND		ND	ND	ND
Intake 2	ND	ND	ND	ND	ND	ND	0.33	<0.3	ND	<0.3	ND	<0.3	<0.3
Clear Well 1 & 2	-								ND		ND	ND	ND
Clear Well 3							ND	ND	<0.3	ND	ND	ND	ND
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	-	-	-	-	-	-	-	-	-	-	-	-	-

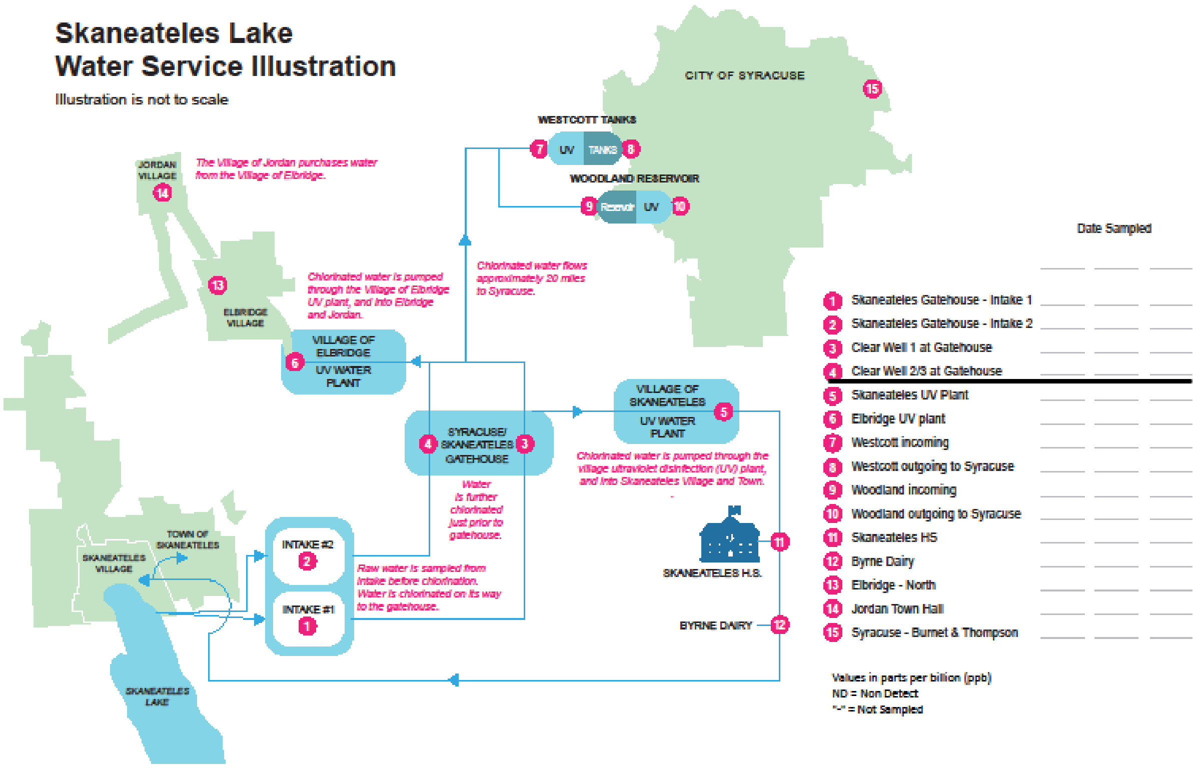
	9/4	9/6	9/8	9/13	9/14	9/20	9/27	9/28	10/1	10/2	10/3	10/4	10/9
Intake 1	ND	ND	ND	ND	ND	ND	ND	<0.3	ND			ND	
Intake 2	<0.3	0.4	ND	<0.3	<0.3	ND	0.35	<0.3	0.52	0.55	0.53	0.45	<0.3
Clear Well 1 & 2		ND	ND	ND	ND	ND	ND	<0.3	ND			ND	
Clear Well 3		ND	ND	ND	ND	ND	ND	<0.3	ND			<0.3	<0.3
Skaneateles UV plant	-	-	-	-	-	-	-	-	-	-	-	-	-
Elbridge UV plant	-	-	-	-	-	-	-	-	-	-	-	-	-
Westcott incoming	-	-	-	-	-	-	-	-	-	-	-	-	-
Westcott outgoing	-	-	-	-	-	-	-	-	-	-	-	-	-
Woodland incoming	-	-	-	-	-	-	-	-	-	-	-	-	-
Wooland outgoing						-	-	-	-	-	-	-	-
Skaneateles HS	-	-	-	-	-	-	-	-	-	-	-	-	-
Byrne Dairy	-	-	-	-	-	-	-	-	-	-	-	-	-
Elbridge North	-	-	-	-	-	-	-	-	-	-	-	-	-
Jordan Town Hall	-	-	-	-	-	-	-	-	-	-	-	-	-
Syracuse Burnet Ave	-	-	-	-	-	-	-	-	-	-	-	-	-

	10/11	10/12	10/15	10/16	10/18	10/19	10/25	10/29					
Intake 1	ND	<0.3			ND								
Intake 2	ND	0.76	<0.3	0.41	<0.3	<0.3	ND	ND					
Clear Well 1 & 2	ND	<0.3			ND		ND	ND					
Clear Well 3	0.419	<0.3	<0.3	<0.3	<0.3	ND	<0.3	ND					
Skaneateles UV plant		<0.3											
Elbridge UV plant		<0.3											
Westcott incoming	-	-	-	-	-	-	-	-	-	-	-	-	-
Westcott outgoing	-	-	-	-	-	-	-	-	-	-	-	-	-
Woodland incoming													
Wooland outgoing	-	-	-	-	-	-	-	-	-	-	-	-	-
Skaneateles HS	-	-	-	-	-	-	-	-	-	-	-	-	-
Byrne Dairy	-	-	-	-	-	-	-	-	-	-	-	-	-
Elbridge North	-	-	-	-	-	-	-	-	-	-	-	-	-
Jordan Town Hall	-	-	-	-	-	-	-	-	-	-	-	-	-
Syracuse Burnet Ave	-	-	-	-	-	-	-	-	-	-	-	-	-

(green) Highest Detection - Raw Water

(yellow) Treated Water Detection > MRL (Method Reporting Limit)

FIGURE No. 1



Department of Health

Table No. 19

Total Trihalomethane Analyses of Chlorinated Skaneateles Lake Water for 2018

Results in ug/l	4000 East Genesee St	Mama Nancy's	Functional Comm. Corp	McChesney Center	Quarterly Average (All Sites)
February 23	29.00	21.00	28.00	22.00	25.00
May 10	31.00	24.00	32.00	26.00	28.25
July 17	37.00	47.00	37.00	38.00	39.75
October 17	35.00	43.00	34.00	36.00	37.00
Locational Annual Average	33.00	33.75	32.75	30.5	

40/30 Certification Exemption per Disinfection Byproducts Rules: $\leq$ 40 ug/l

Table No. 20

Haloacetic Acids (5) Analyses of Skaneateles Lake Water for 2018

Results in ug/l	4000 East Genesee St	Mama Nancy's	Functional Comm. Corp.	McChesney Center	Quarterly Average (All Sites)
February 23	27.00	16.80	28.00	20.00	22.95
May 10	35.00	27.00	33.60	27.00	30.65
July 17	15.20	17.30	16.40	22.57	17.87
December 4 *	15.13	15.00	21.62	18.00	17.44
Locational Annual Average	23.08	19.03	24.91	21.89	

40/30 Certification Exemption per Disinfection Byproducts Rules: $\leq$ 30 ug/l
*Repeat samples due to laboratory error

Table No. 21a
Volatile Organic Compounds, Vinyl Chloride and MTBE: February 23, 2018
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 No. 21b
Volatile Organic Compounds, Vinyl Chloride and MTBE: May 10, 2018
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 No. 21c

Volatile Organic Compounds, Vinyl Chloride and MTBE: July 2, 2018

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

* The result of a quality control sample was less than the established limit.

Table No. 21d
Volatile Organic Compounds, Vinyl Chloride and MTBE: October 17, 2018
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

* The result of a quality control sample was less than the established limit.

Table No. 22 (page 1 of 2)

Synthetic Organic Compounds Analyses of Skaneateles Lake Water

May 10, 2018

Part 5 Group Number	Parameter	EPA Standard in ug/l	Results 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)pthalate	6	0.66
1	1,2-dibromo-3-chlorpropane	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	*
1	Heptachlor	0.4	Not Detected
1	Heptachlor expoxide	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

BDL: Below laboratory required minimum detection limits
* Analysis not required as per NYSDOH regulations

Table No. 22 (page 2 of 2)

Synthetic Organic Compounds Analyses of Skaneateles Lake Water

May 10, 2018

Part 5 Group Number	Parameter	EPA Standard in ug/l	Results ug/l
2	3-Hydroxy Carbofuran	5	Not Detected
2	Aldrin	5	Not Detected
2	Bis(2-ethylhexyl)adipate	50	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	Pichloram	5	Not Detected
2	Propachlor	50	Not Detected

BDL: Below laboratory required minimum detection limits

Table No. 23

Inorganic Chemicals and Physical Characteristics Analyses of Skaneateles Lake Water

May 10, 2018

Parameter	EPA Standard in mg/L	Results in mg/l
Antimony	0.006	Not Detected
Arsenic	0.010	Not Detected
Barium	2.0	0.025
Berylium	0.004	Not Detected
Cadmium	0.005	Not Detected
Chromium	0.10	Not Detected
Cyanide	0.02	Not Detected
Mercury	0.002	Not Detected
Nickel	None	.00076
Selenium	0.05	Not Detected
Thallium	0.002	Not Detected
Fluoride	2.2	0.42
Chloride	250	22
Iron	0.30	Not Detected
Manganese	0.30	Not Detected
Silver	0.10	Not Detected
Sodium	None	13
Sulfate	250	12
Zinc	5.0	Not Detected
Color	15 units	<5
Odor	3 units	<1
Nitrate	10.0	0.48
Nitrite	1.0	Not Detected

Nitrate / Nitrite sampled on 7/17/2018

Table No. 24

Radionuclide Analyses of Skaneateles Lake Water for 2017
May 10, 2017

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

FIGURE No. 2

Skaneateles Lake Watershed Inspection Zones

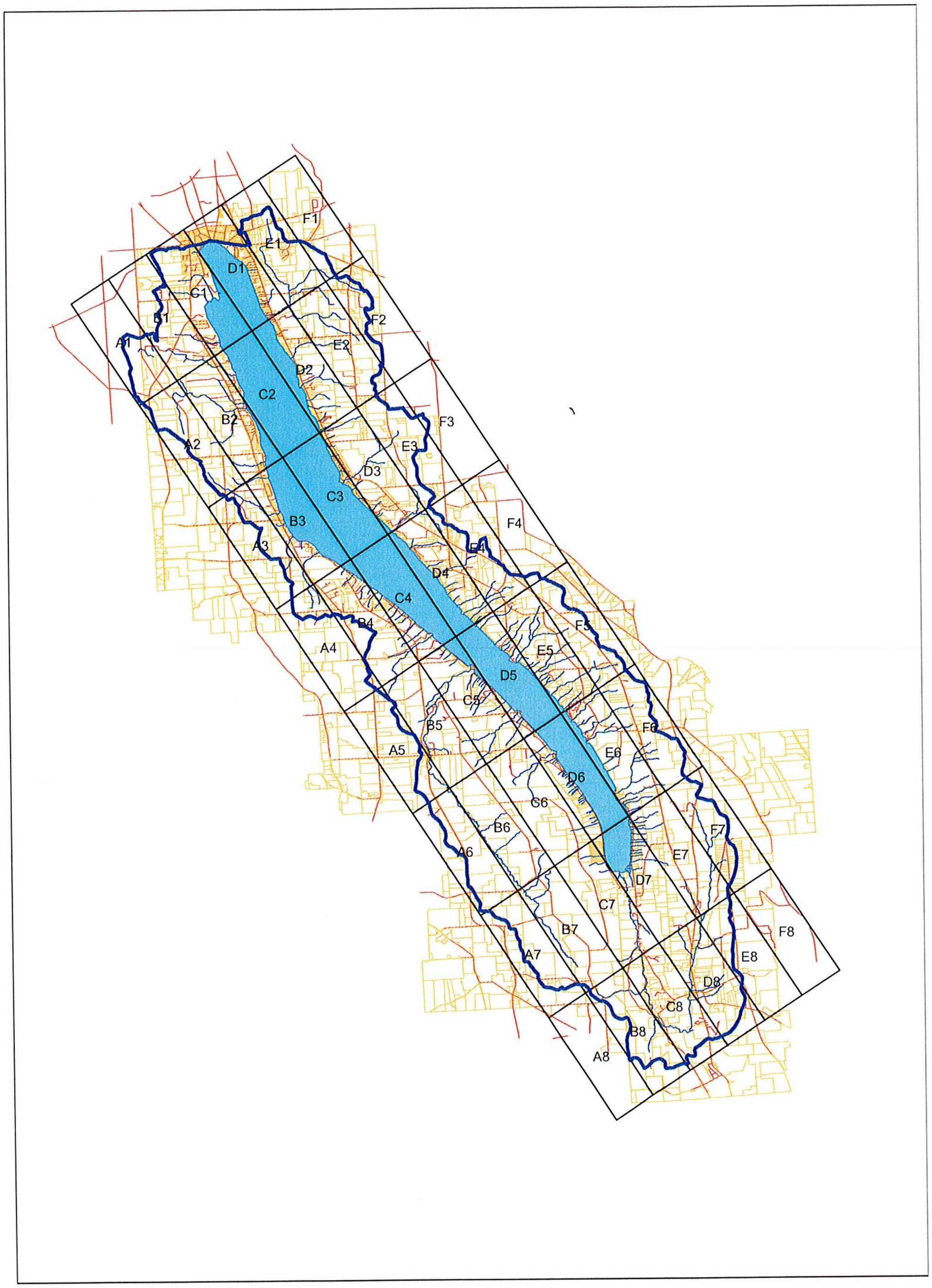


Table No. 25

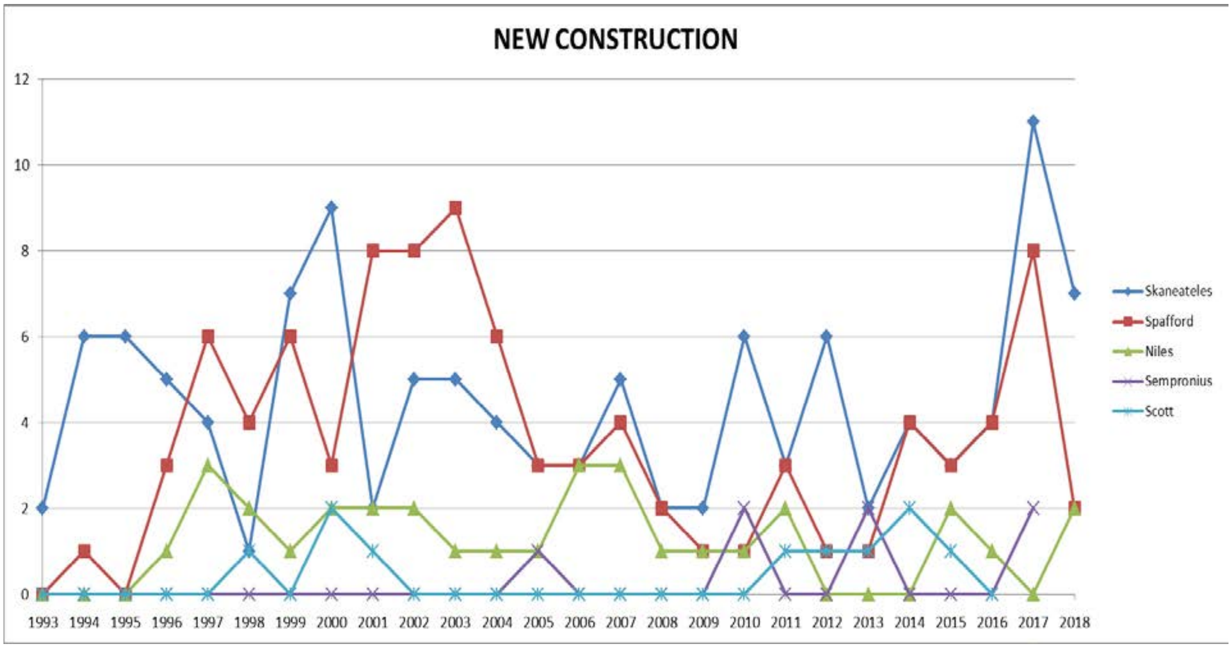
Construction Activity in the Skaneateles Watershed for 2018

Township	New Construction	Lakefront*	Additions & Renovations	Lakefront**
Village of Skaneateles				
Town of Skaneateles	7	1	8	3
Spafford	2	1	6	6
Niles	2	2		
Sempronius				
Scott			3	1
Total	11	4	17	10

* Included in New Construction figures
** Included in Additions & Renovations figures

Graphs No. 14 & 15

Construction Activity within the Skaneateles Lake Watershed 1993 - 2018



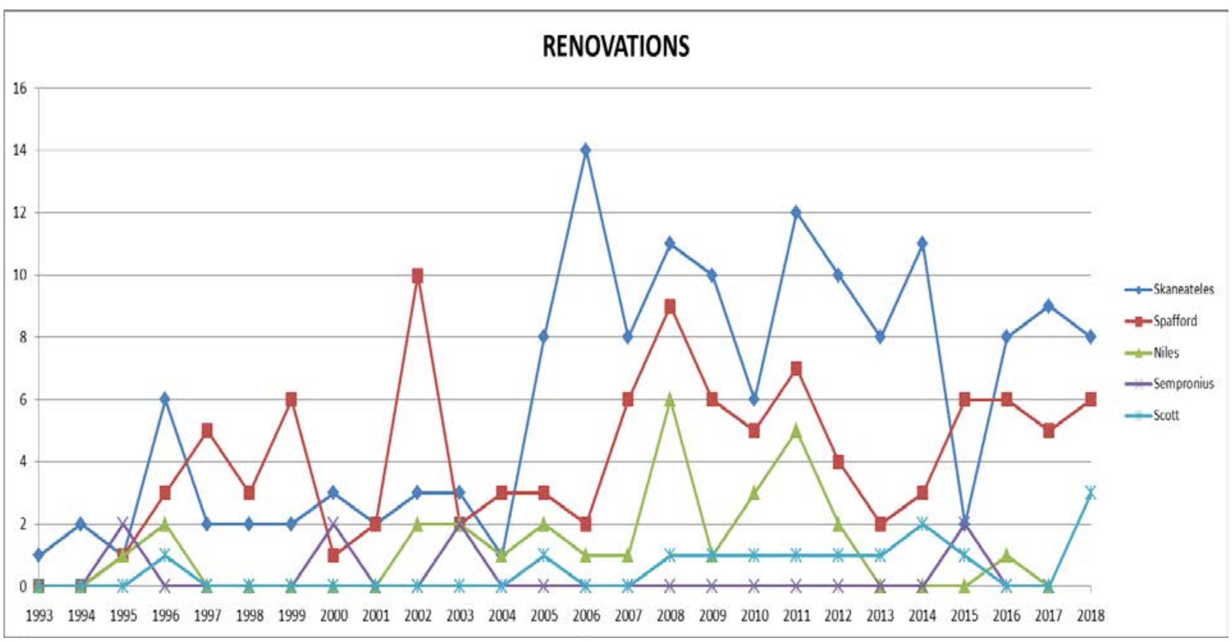


Figure No. 3

New Construction within the Skaneateles Lake Watershed 1993 - 2018

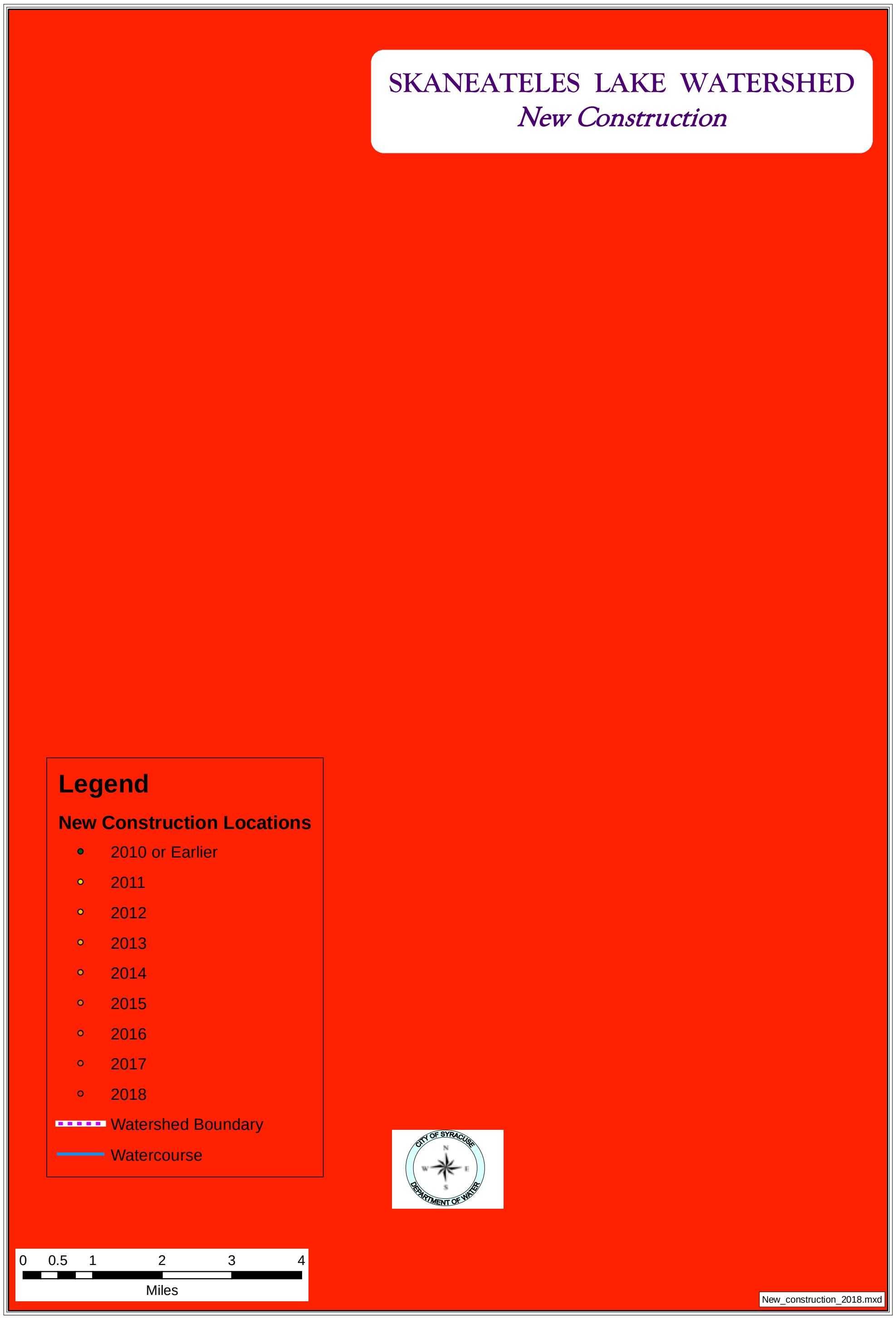


Figure No. 4

Renovation Projects within the Skaneateles Lake Watershed 1993 - 2018

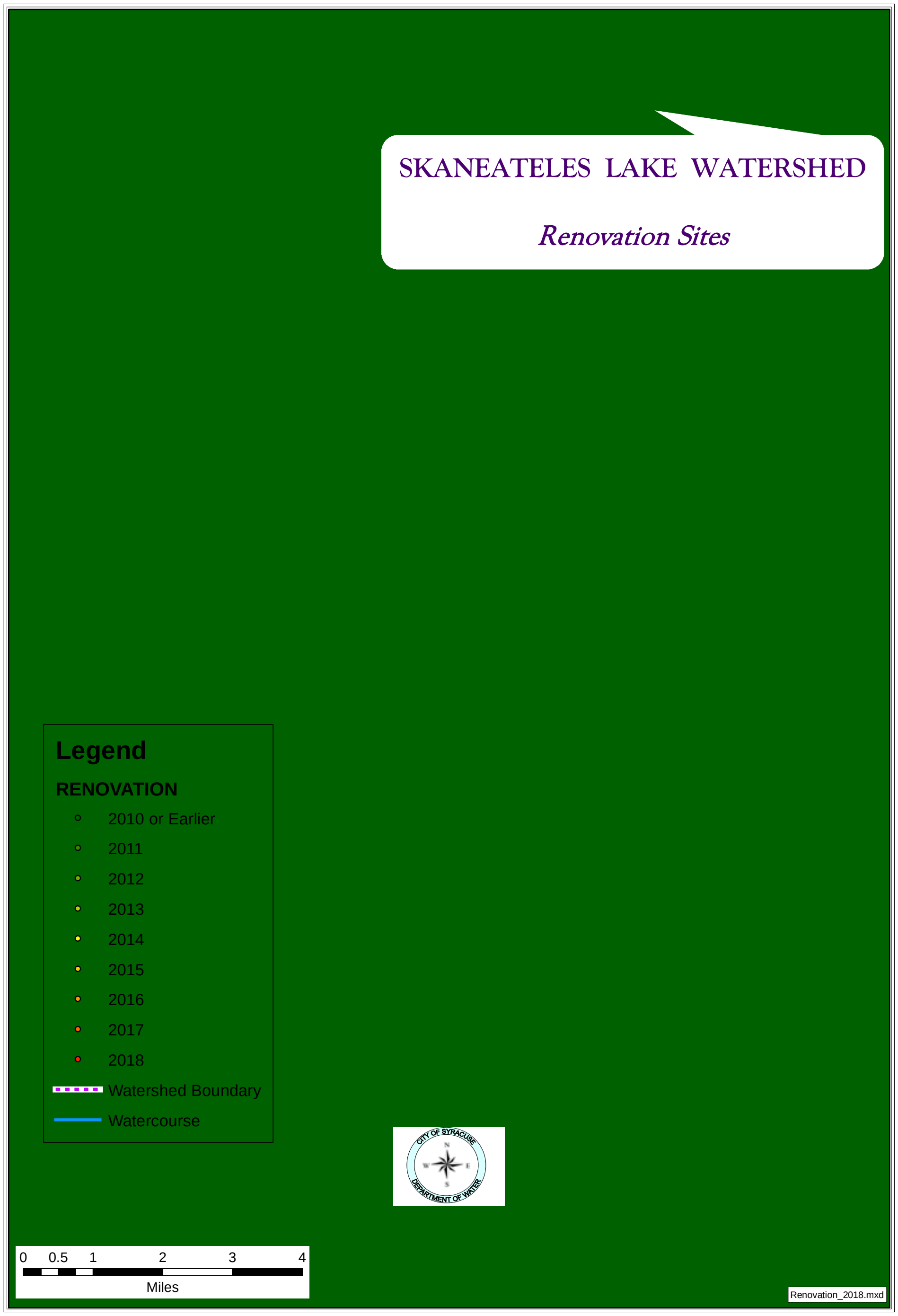


Figure No. 5

Erosion Control Plans / NYSDEC SPDES Permits

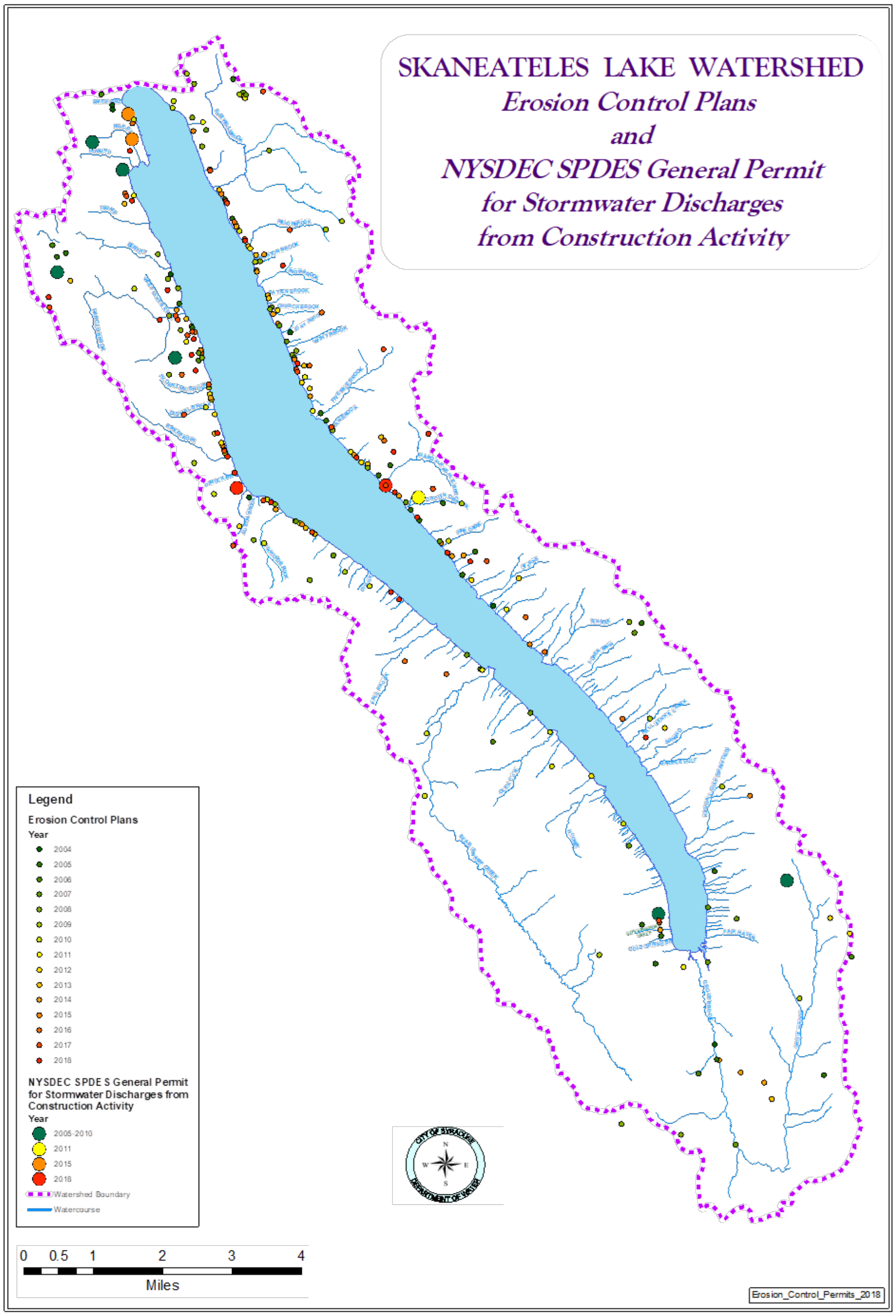


Table No. 26

Violations for the Past Five Years:
NYS Department of Health and Local DOH Sanitary Code
Sediment and Erosion Control

Year	Number Of Violations DOH/Sanitary Code	Number Of Violations Sediment and Erosion	Abated Or Pending Action By City	Reported To DOH or NYSDEC
2014	18	6	20	4
2015	59	5	62	2
2016	4	6	9	1
2017	13	17	30	0
2018	5	14	18	1

* New regulations became effective in 2004

Table No. 27

SKANEATELES LAKE WATERSHED

DOH / SANITARY CODE VIOLATIONS 1993 - 2018

Year	Violations
1993	27
1994	69
1995	27
1996	22
1997	17
1998	9
1999	5
2000	16
2001	6
2002	8
2003	16
2004	26
2005	5
2006	20
2007	22
2008	10
2009	24
2010	14
2011	4
2012	13
2013	18
2014	18
2015	59
2016	4
2017	13
2018	5
Total:	**477**