Onondaga Environmental Institute

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August 21, 2007

Alexander Pete Grannis
Commissioner
New York State Department of
Environmental Conservation
625 Broadway
Albany, New York 12233-0001

Nicholas Pirro
Onondaga County Executive
421 Montgomery Street
Syracuse, New York 13202

Samuel Sage
President
Atlantic States Legal Foundation
658 West Onondaga Street
Syracuse, New York 13204

Re: **OEI analyses of CSO capture and pathogens in Onondaga Lake, and Recommendation for OEI investigation of pathogen releases to Onondaga Lake tributaries**

Dear Commissioner Grannis:

The Onondaga Environmental Institute (OEI) has evaluated pathogen conditions in Onondaga Lake and its tributaries pursuant to U.S. Environmental Protection Agency (USEPA) funded research on behalf of the Onondaga Lake Partnership (OLP) and the Onondaga Nation. Resultant findings have profound implications towards implementation of the *Amended Consent Judgment* (ACJ) and the regulatory strategy for bacteria control in Onondaga Lake and its tributaries. The overall regulatory goal of the ACJ for Onondaga Lake is compliance with the Clean Water Act and the bacterial standard set by New York State Department of Environmental Conservation (NYSDEC) regulation 6 NYCRR § 703.4. The current compliance schedule for bacteria in Onondaga Lake was established via the ACJ, a federal court order signed between the State of New York, Onondaga County, and the Atlantic State Legal Foundation in 1998.

According to OEI's evaluations, Onondaga County has successfully achieved, and should be commended for, compliance with the New York State standard for bacteria in Onondaga Lake as required by the ACJ. Gross violations of the New York State standard for bacteria occur in several Onondaga Lake tributaries, however, and are likely to continue irrespective of completion of the Combined Sewer Overflow (CSO) Control and Upgrade Compliance Schedule under the ACJ.

The CSO Control and Upgrade Compliance Schedule was established in the ACJ based on the assumption that wet weather discharges were the predominant release of bacteria to Onondaga Lake. This is most likely the case for Onondaga Lake; however, OEI's analysis indicates potential multiple sources of bacteria are discharging to tributary waters on a year round basis, and that dry weather releases are significant. To date, these sources of bacteria have not been identified and are not well understood.

Source attribution is critical to identifying and controlling pathogen releases to tributary waters. Nevertheless, the ACJ requires specific CSO improvement projects based on the presumption that Onondaga County is required to achieve compliance with bacteria standards for Onondaga Lake. These projects were never evaluated for effectiveness in controlling bacteria in the tributaries. However, in light of the substantial commitment of resources by the OLP to projects to revitalize Onondaga Creek and the widespread public desire for "clean water"[1], it is important at this juncture to consider appropriate measures to achieve compliance with water quality standards in the tributaries. Therefore, OEI proposes that OEI and the Onondaga County Department of Water Environment Protection (WEP) work co-operatively to investigate dynamics of bacteria release to Onondaga Creek, Harbor Brook, and Ley Creek in order to: i) identify and locate potential sources, and ii) identify potential strategies and/or specific remedies to reduce tributary bacterial levels that can lead to compliance for bacteria in the tributaries as well as Onondaga Lake.

A proposal to study pathogens in Onondaga Lake tributaries will be forthcoming from OEI. The proposal could potentially provide considerable cost savings to Onondaga County, New York State, and the federal government in the long run because Onondaga County has achieved the goals of the ACJ with respect to CSO control and Onondaga Lake is currently in compliance the New York State standard for bacteria. It could be concluded that further outlays of public money towards CSO control projects are not necessary for Onondaga Lake and would not likely resolve bacteria levels in the tributaries.

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[1] OEI conducted a series of Community Forums and Stakeholder Meetings (with over 500 participants) as part of the Onondaga Creek Revitalization Planning Project. Clean water was ubiquitously among the top two public goals.

Results of OEI's analyses, which provide rationale for the recommendation listed above, are summarized in the following sections in accordance with the relevant provisions of the ACJ. Analyses were conducted by Mr. Donald J. Hughes, Ph.D. of OEI using monitoring data provided by Onondaga County WEP. The analytical protocols used are available upon request[2].

ACJ: CSO Control and Upgrade Compliance Schedule

As presented in Paragraph 14 of the ACJ, Onondaga County is required to implement a CSO control and upgrade program as stated below:

> The County shall design, construct, maintain, and modify and/or supplement, as necessary, a CSO control and upgrade program in accordance with DEC CSO guidance, as set forth in TOGS 1.6.3 (CSO Control Strategy), which implements the "presumptive approach" in EPA's control policy, as set forth in 59 FR18688 (April 18, 1994). The County's program shall achieve the following:
>
> A. elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the combined sewer system during precipitation events on a system-wide annual average basis;
>
> B. elimination or minimization of floating substances in Onondaga Lake attributed to the County's CSOs; and
>
> C. achievement of water quality standards for bacteria for all portions of Onondaga Lake that are classified as "Class B" pursuant to 6 NYCRR Part 895.

Elimination or capture of CSO discharge

OEI analyzed CSO volumes and discharges based on information reported by Onondaga County WEP in the following documents:

> Midland Avenue Regional Treatment Facility (RTF) and Conveyances: Facility Plan Amendment (June 2003),
> Clinton Street CSO Abatement Project Facility Plan (November 2005), and
> Harbor Brook CSO Abatement Project Facility Plan (August 2005).

[2] Should the reader have any questions, concerns, or require further information regarding the methods employed, please contact Dr. Hughes at 315-472-2150x23 or dhughes@oei2.org.

This analysis was performed using the USEPA Stormwater Management Model (SWMM) and 30 years of precipitation data from the Hancock International Airport in Syracuse. These models have been accepted for use by the NYSDEC[3].

Figure 1 shows progress made towards achieving the 85% elimination/capture target[4]. When the ACJ was finalized in 1998, 74% of the combined sewage was conveyed to the Metropolitan Syracuse Wastewater Treatment (Metro) facility. The sewer system's capacity to store and transport sewage was the limiting factor. Since, Onondaga County WEP has constructed several projects which capture combined sewage, including the Erie Boulevard Storage system, the Hiawatha Boulevard RTF/storage demonstration facility, and several sewer separation projects on the south side of the City of Syracuse. Collectively, these ACJ projects have increased the elimination/capture rate to 81%. The Midland Avenue RTF is currently being constructed and is near completion. This facility will account for an additional 5% capture of the total system's combined sewage, bringing the total to 86%.[5] Hence, Onondaga County will have met the first CSO control stipulation (ACJ Paragraph 14, item A) upon completion of the Midland RTF.

Elimination or Minimization of Floatable Substances Attributable to CSOs

Onondaga County has completed construction of five Floatable Control Facilities designed to minimize floatable substances attributable to CSOs in Onondaga Lake:

Franklin Street (Burnet Avenue FCF, Butternut Street FCF)
Maltbie Street FCF
Harbor Brook I-690 FCF
Teall Brook FCF

In addition, Onondaga County WEP employs a skimmer boat to collect floatables in the Inner Harbor of Onondaga Lake. Therefore, Onondaga County has met its obligations with respect to floatable control requirements under the ACJ. Until a comprehensive evaluation of the tributaries has been completed, it would be inappropriate to speculate on what, if any, additional measures would be required to control floatables.

Achievement of WQS for Bacteria for all Class B Portions of Onondaga Lake

OEI has also evaluated attainment of water quality standards for bacteria in the Class B waters of Onondaga Lake using Onondaga County WEP data from 1996 to present. Results indicate that Onondaga County has successfully achieved compliance

[3] The level of uncertainty associated with OEI's use of the SWMM model has not been identified, as OEI was unable to locate any SWMM model validation procedures in the available literature.
[4] Supporting sewage volume data are presented in **Appendix A**.
[5] An additional 9% could be captured for treatment at either Metro or local RTFs should the remaining ACJ CSO projects be completed.

with the New York State standard for bacteria in Onondaga Lake as required by the ACJ. This section summarizes the salient findings of OEI's analyses.

Figure 2 depicts Onondaga County WEP sampling locations[6] with respect to NYSDEC Best Usage Classifications. Onondaga County performs routine ambient monitoring and storm-event monitoring that are relevant to determining compliance with bacterial standards in Onondaga Lake. Routine monitoring is conducted according to a pre-determined schedule, which is altered only if conditions preclude sample collection (e.g. ice cover). Thus, these data include both dry- and wet-weather conditions. In contrast, storm-event samples are collected only when rainfall greater than 0.35 in/hr is recorded at the meteorological station at Metro (Suryadevara pers. comm. 2007); samples are collected on the day of, and for several days following, the rainfall event. These data are intended to document the impact of CSOs on bacteria in the lake.

The regulations for both total and fecal bacteria in New York State are cited at Title 6, Chapter X NYCRR, Part 703.4. Onondaga County monitors just fecal coliforms; hence, the applicable standard for both Class B and C waters specify that fecal coliforms not exceed 200 colony forming units (cfu) per 100 mL, calculated as a monthly geometric mean, and based on a minimum of five samples "when disinfection is practiced", which corresponds to April 1 to October 15[7] on a annual basis (Burke, pers. comm. 2007)[8]. This is the same sampling period that Onondaga County WEP conducts compliance monitoring at the nearshore sites. The deep water sites are sampled nearly year-round.

OEI included the storm-event sampling data in the evaluation as to represent "worst-case" conditions for bacteria in the lake, thereby reflecting a conservative bias towards higher concentrations. Geometric means were computed on a monthly basis, irrespective of the numbers of samples collected at each location, so as to obtain the most comprehensive analysis of bacterial concentrations in the lake[9]. Figures 3 and 4 show monthly geometric mean fecal coliform concentrations at the two deep-water sites. Bacterial concentrations are generally higher at South Deep, which is closer to CSO influences than North Deep. Note that over a 12 year period (1996-2007), just 12 of 144 months violated the NYSDEC standard (200 cfu/100 mL), and with one exception, all exceedances occurred between November and March, when disinfection is not practiced at Metro, and therefore, the standard does not apply. The sole exception occurred in April 2007 at North Deep. This point represents a single sample (not a monthly average).

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[6] The Class B waters comprise approximately the northern two-thirds of Onondaga Lake, exclusive of an area around the mouth of Ninemile Creek. (Since 1999, Onondaga County monitors four nearshore sites in the Class C waters, and four nearshore sites in Class B waters. Since 1996, Onondaga County WEP has monitored two deep-water sites: South Deep[6], which has a fairly robust data set, and North Deep, which is sampled infrequently (once per month).

[7] The applicable period of disinfection required is equivalent to that for the Metro sewage treatment plant.

[8] James Burke, Regional Water Engineer at NYSDEC Region 7

[9] It should be noted that much of the data did not meet the regulatory stipulation requiring a minimum of 5 samples per month. For example, three is the maximum number of samples collected per month at North Deep. Nearshore locations have been sampled typically 3-5 times per month since 2000. Excluding months with fewer than five samples would result in the loss of at least 50% of the monitored months.

Violations occurred on only two occasions (November 1996 and November 2003) simultaneously at both deep water sites.

Data for the nearshore stations are presented in Figures 5 and 6, corresponding to the Class B and Class C waters of Onondaga Lake, respectively. Over the past eight years, compliance in the Class B waters has been consistently met at the nearshore sites, with the exception of two months at the mouth of Bloody Brook. The first occurrence in September 2001 may be related to sewage from a pumping station in Liverpool which overflows into Bloody Brook (Mastriano pers. comm. 2007)[10]. The second exceedance is coincident with increases in fecal coliforms across the lake, driven by storm-event sampling over the period from October 20 to 22 in 2006[11]. Elevated bacteria levels near Bloody Brook, but not at other Class B sites, suggests non-ACJ related sewage release issues from along Bloody Brook.

As shown in Figure 6, bacterial concentrations in Class C waters are higher than in Class B waters, reflecting releases from Metro, CSOs, and possibly other urban inputs such as storm sewer overflows. As noted above, elevated concentrations in October 2006 are representative almost entirely of storm event sampling. Otherwise, a monthly violation of the NYSDEC standard has not occurred in 5 years. Prior, violations were frequent at multiple locations. Again, the evidence indicates structural improvements to the sewer system have controlled bacteria levels in Onondaga Lake.

In summary, OEI has performed scientific review and evaluation of the complex technical issues surrounding Onondaga Lake and Onondaga Creek over the past two and one-half years. While OEI purports no position on the programmatic or policy implications of these analyses, it appears that Onondaga County has achieved the benchmarks established for CSO control facilities in the ACJ. Hence, OEI would like to congratulate the parties to the ACJ on the considerable water quality improvements in Onondaga Lake with respect to pathogens. The challenge ahead, however, is to develop strategies to reduce bacteria levels and achieve compliance with regulatory standards for bacteria in Onondaga Lake's tributaries. Any subsequent remedies would be dependent on understanding bacterial sources to tributary waters. Consequently, a proposal for OEI to work co-operatively with Onondaga County WEP to study pathogens in Onondaga Lake tributaries will be forthcoming from OEI. Performance of the proposed investigation would potentially provide considerable long-term cost savings to Onondaga County, New York State, and the federal government and could possibly identify other responsible parties contributing bacteria to the tributaries.

[10] This issue has largely been addressed by Onondaga County WEP with the construction of a detention tank (Mastriano pers. comm. 2007).
[11] All but one (October 24 at south deep) sample collected during October 2006 were storm event samples.

I look forward to the prospects of working with you in the future. Should you have any questions, concerns, or require further information, please contact me at your convenience.

Sincerely,

Edward M. Michalenko, Ph.D.
President

cc:
Senator Charles Schumer
Senator Hillary Rodham Clinton
Representative James Walsh
Andrew Cuomo, Esq., Attorney General
Katherine Kennedy, Esq., Office of the Attorney General
John Davis, Office of the Attorney General
Judith Enck, Esq., Dept. of Law
Charles D. Silver, Environmental Protection Bureau
Kenneth Lynch, Esq., NYSDEC Region 7
Alison Crocker, Esq., NYSDEC
Sandra Allen, NYSDEC
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Val Washington, NYSDEC
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Seth Ausubel, USEPA
Christopher Dere, USEPA
Diane Gomes, Esq., USEPA
Janice Whitney, USEPA
Kevin Bricke, USEPA
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David Coburn, Onondaga County, Office of the Environment
Joseph Mastriano, Onondaga County WEP
Matthew Driscoll, Mayor City of Syracuse
Christine Fix, City of Syracuse, Office of the Mayor

Vincent Esposito, City of Syracuse, Dept. Public Works
William Owens, City of Syracuse, Office of Economic Development
Stephanie Miner, Councilor at Large
Onondaga Nation Council of Chiefs
Chief Irving Powless, Jr., Onondaga Nation
Chief Bradley Powless, Onondaga Nation HETF
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Audrey Shenandoah, Onondaga Nation HETF
Wendy Gonyea, Onondaga Nation HETF
Jeanne Shenandoah, Onondaga Nation HETF
Chief Oren Lyons, Onondaga Nation HETF
Joseph Heath, Esq., Onondaga Nation Counsel

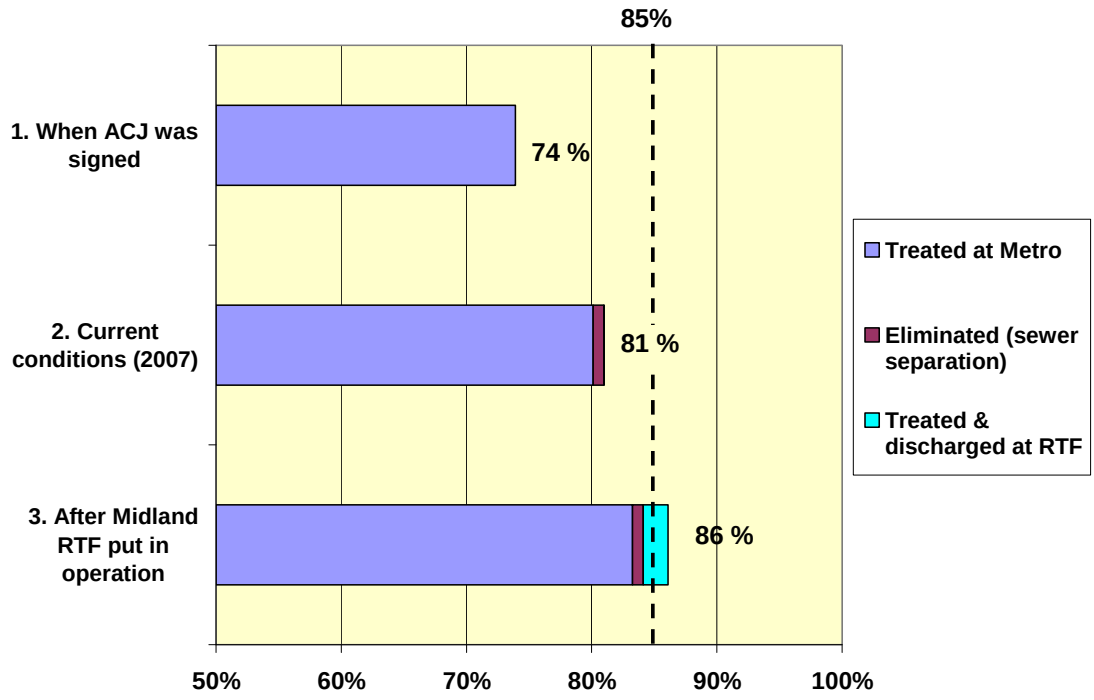

Figure 1. Percent of combined sewage eliminated and/or captured for treatment under the Onondaga County CSO abatement program. RTF = Regional Treatment Facility.

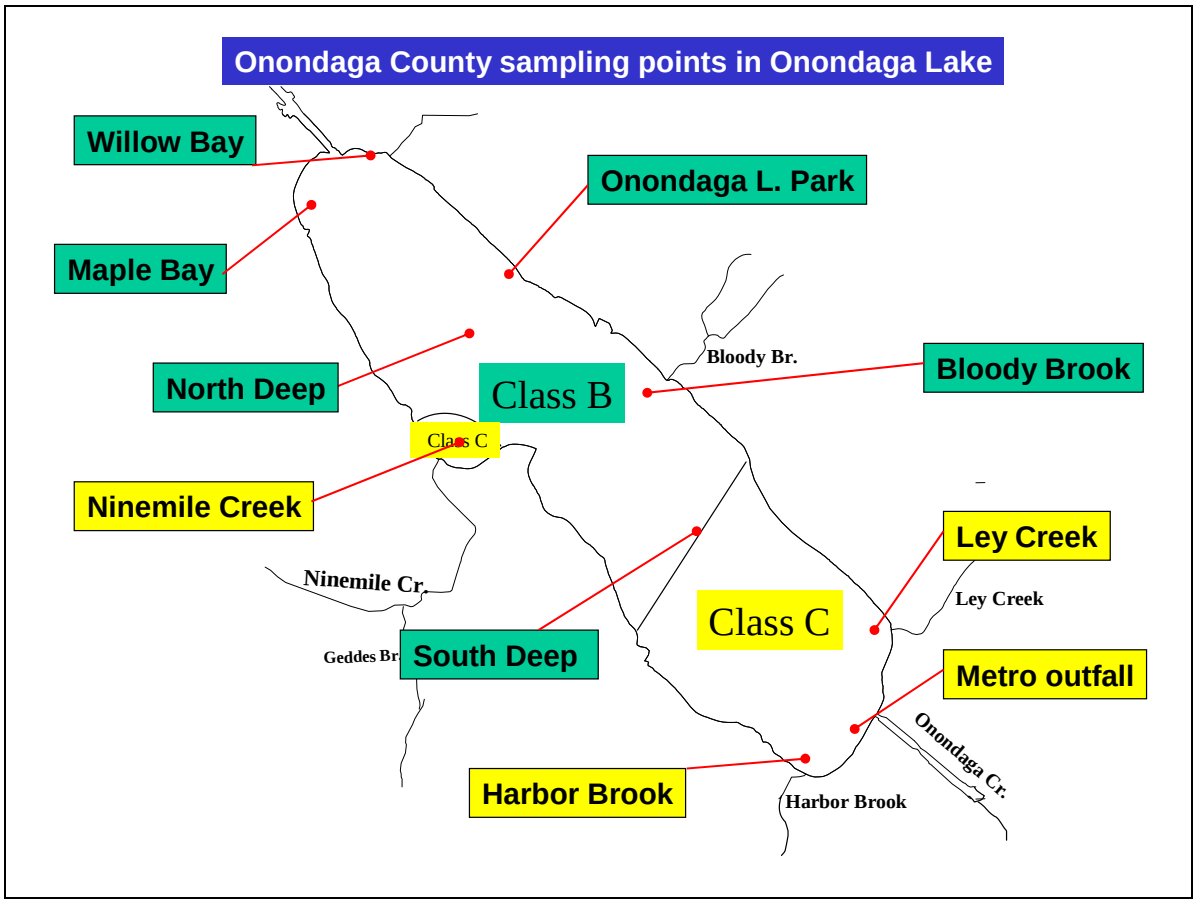

Figure 2. Regulatory classification of Onondaga Lake waters, with proximate Onondaga County sampling locations. Yellow denotes Class C; Green denotes Class B.

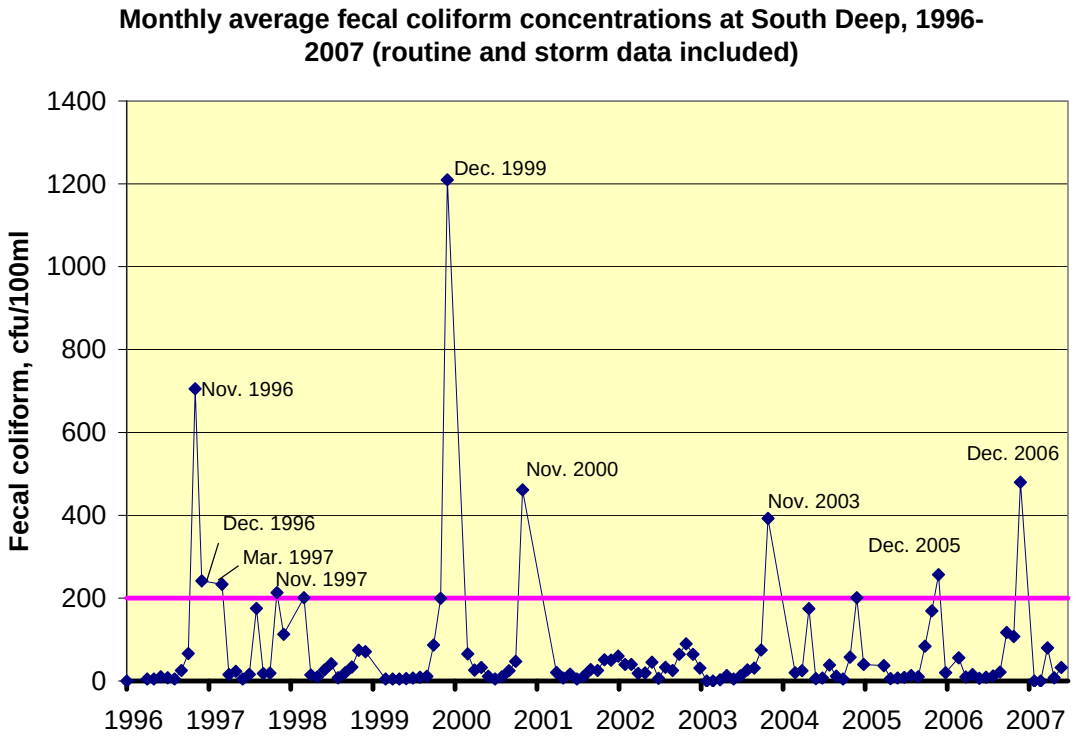

Figure 3. Monthly geometric mean fecal coliform concentrations at South Deep (January 1996 to June 1, 2007). Note: each point represents the average of all samples collected in a calendar month. Prior to 1999, 1-2 samples were collected per month. Since 1999, 2-6 samples were collected per month.

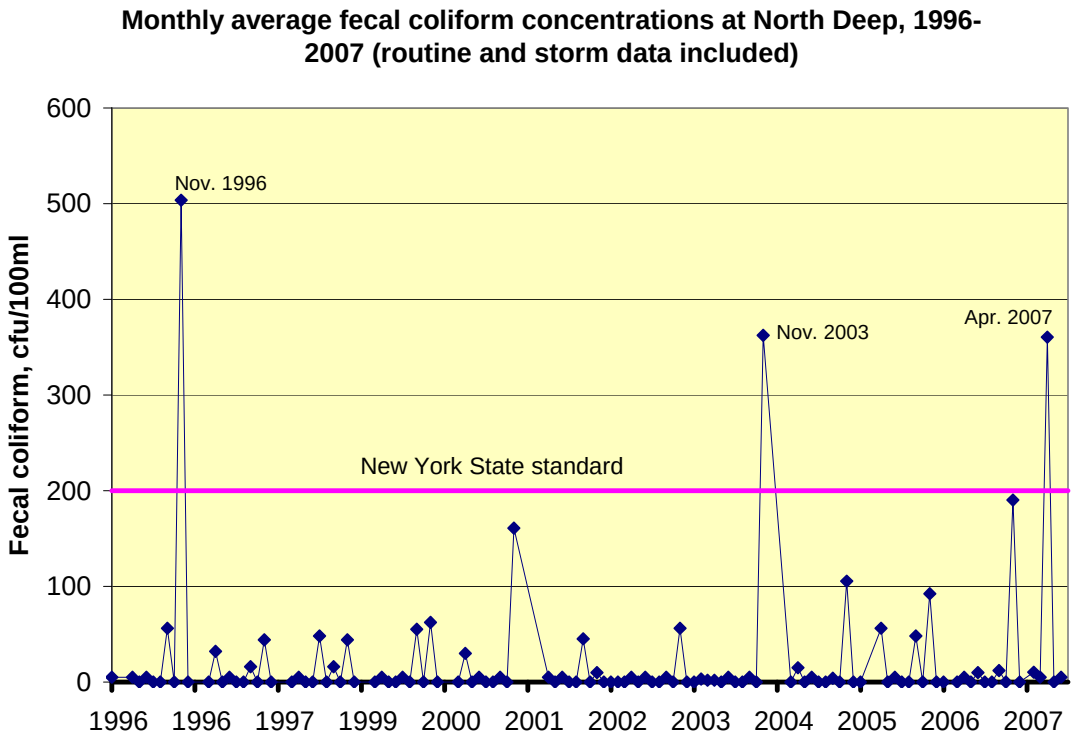

Figure 4. Monthly geometric mean fecal coliform concentrations at North Deep (January 1996 to June 1, 2007). Typically only one sample is collected per month, so data points represent single samples. Exceptions are February 2003 and March 2007 (2 samples) and February 2007 (3 samples).

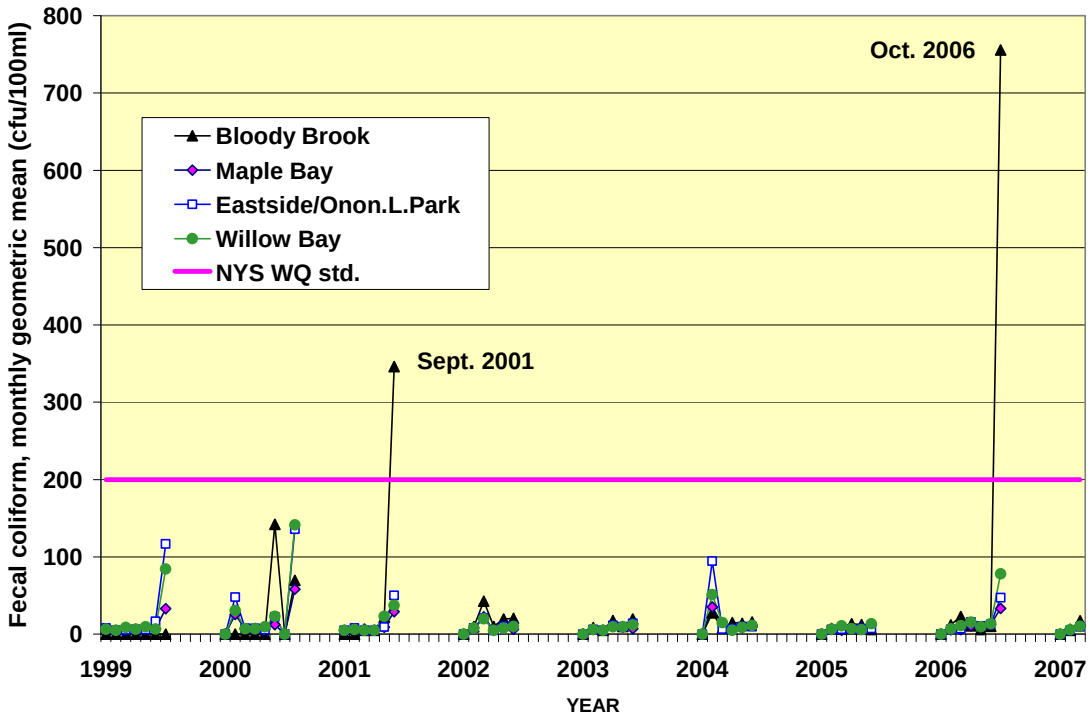

Figure 5. Monthly average fecal coliform concentrations in the Class B waters of Onondaga Lake (January 1996 and June 1, 2007)

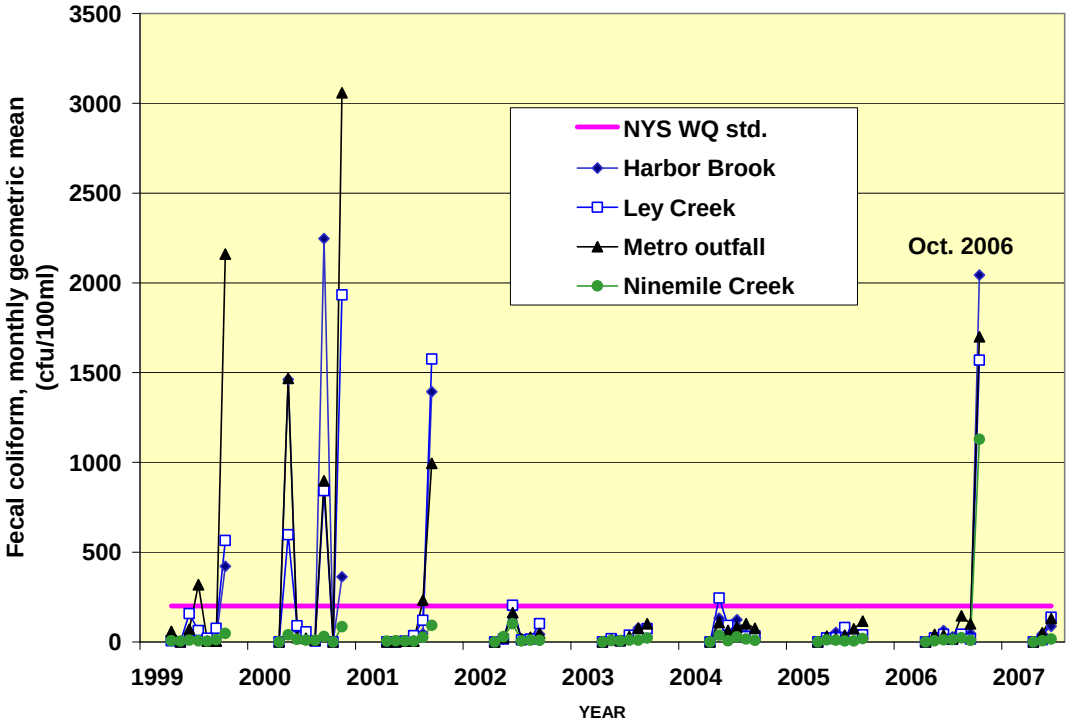

Figure 6. Monthly average fecal coliform concentrations in the Class C waters of Onondaga Lake (January 1996 to June 1, 2007)

APPENDIX A. Supporting tabular data for CSO volume elimination and capture for treatment

Table 1. Combined sewage volumes (million gallons) when ACJ was signed, January 1998.

	Diverted to Metro		RTFs	Discharged to tribs	total CSO
	Extg sewers	Add'l from new construction	Treated volume		
Hiawatha RTF	116	0	0	24	140
Harbor Brook	425	0	0	139	564
EBSS Upgrade	0	0	0	289	289
Teall FCF	77	0	0	7	84
Midland RTF	781	0	0	200	981
Clinton RTF	647	0	0	225	872
Franklin FCF	683	0	0	83	766
Maltbie FCF	69	0	0	21	90
Sewer Separation	95	0	0	33	128
Totals	2893	0	0	1021	3914

Table 2. Combined sewage volumes (million gallons), current conditions. (Yellow highlights new facilities)

	Diverted to Metro		RTFs	Discharged to tribs	total CSO
	Extg sewers	Add'l from new construction	Treated volume		
Hiawatha RTF	116	23	1	0	140
Harbor Brook	425	0	0	139	564
EBSS Upgrade	0	220	0	69	289
Teall FCF	77	0	0	7	84
Midland RTF	781	0	0	200	981
Clinton RTF	647	0	0	225	872
Franklin FCF	683	0	0	83	766
Maltbie FCF	69	0	0	21	90
Sewer Separation	95	33*	0	0	128
Totals	2893	276	1	744	3914

* eliminated from sewage system

Table 3. Combined sewage volumes (million gallons), after Midland RTF is put into operation. (Tan highlights new facilities.)

	Diverted to Metro		RTFs	Discharged to tribs	total CSO
	Extg sewers	Add'l from new construction	Treated volume		
Hiawatha RTF	116	23	1	0	140
Harbor Brook	425	0	0	139	564
EBSS Upgrade	0	220	0	69	289
Teall FCF	77	0	0	7	84
Midland RTF	781	123	77	0	981
Clinton RTF	647	0	0	225	872
Franklin FCF	683	0	0	83	766
Maltbie FCF	69	0	0	21	90
Sewer Separation	95	33*	0	0	128
Totals	2893	399	78	544	3914

* eliminated from sewage system

Table 4. Combined sewage volumes (million gallons), after all CSO facilities are completed. (Orange highlights new facilities.)

	Diverted to Metro		RTFs	Discharged to tribs	total CSO
	Extg sewers	Add'l from new construction	Treated volume		
Hiawatha RTF	116	23	1	0	140
Harbor Brook	425	60	79	0	564
EBSS Upgrade	0	220	0	69	289
Teall FCF	77	0	0	7	84
Midland RTF	781	123	77	0	981
Clinton RTF	647	107	118	0	872
Franklin FCF	683	0	0	83	766
Maltbie FCF	69	0	0	21	90
Sewer Separation	95	33*	0	0	128
Totals	2893	566	275	180	3914

* eliminated from sewage system