



Darrin Fresh Water Institute

A Research Center of Rensselaer Polytechnic Institute

**GREAT SACANDAGA LAKE
ASSESSMENT PROGRAMS
FOR 2010**

prepared for

Great Sacandaga Lake Association
&
The Great Sacandaga Lake Advisory Council

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Table Of Contents

| | | |
|--|-------|-----|
| Executive Summary | | iii |
| Background | | 1 |
| Methods | | 1 |
| Results and Discussion | | |
| Coliform bacterial monitoring and assessment program | | 5 |
| References | | 7 |

Appendix A. Coliform Assessment Program Results

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Executive Summary

In 2010, the Great Sacandaga Lake Assessment Program focused on bacterial water quality as an indicator of the suitability of the lake waters for contact recreation (i.e. swimming and wading). The Great Sacandaga Lake Coliform Monitoring Program (GSLCMP) collected water samples from suspected contamination sources and heavily used recreational venues throughout the lake basin. The purpose of these collections was to locate possible sources of bacterial contamination to Great Sacandaga Lake and provide the information, in a timely fashion, to local and state regulatory agencies for remedial action. Twelve to 15 shoreline locations were sampled during each sampling cycle. Sample collection occurred monthly in July and August. The time interval coincides with the period of maximum population density and intensity of recreational use. Two primary measurements were made for each sample: Total Coliform (TC) and Fecal Coliform (FC) Bacteria. These bacteria serve as indicators of the presence of animal or human waste. The presence of elevated levels of these bacteria indicates potentially disease-causing protozoans, bacteria and other microorganisms may be present in the water.

Interim reports on the bacterial testing programs were released approximately monthly throughout the sampling season. Results from the current study indicate that bacterial levels in Great Sacandaga Lake are more than adequate for all intended uses. Elevated bacterial levels, however, were once again observed in Kenyetto Creek at its' intersection with NYS Route 30. While only one of the 2010 bacterial samples from Kenyetto Creek exceeded the single sample standards set by the NYS Dept. of Health for swimming or wading, all samples exceeded the 5 sample average limits. Follow-up investigations along Kenyetto Creek are warranted to determine the source or sources for the bacteria. In 2008, a NYS DEC investigation concluded that no single source was responsible, but a diffuse group of non-human sources were likely. Overall, bacterial results indicated exceptionally high water quality throughout Great Sacandaga Lake.

Background

At the request of the Great Sacandaga Lake Association and the Great Sacandaga Lake Advisory Council, the Darrin Fresh Water Institute (DFWI) collected water samples in 2007 through 2010 to evaluate bacterial water quality in Great Sacandaga Lake. The initial project was a two-year program designed to largely duplicate the five-year lake water quality study of Rowell (1996) conducted in 1991 – 1995. The objective of the Rowell study was to develop a longitudinal baseline assessment of bacterial water quality, determine the concentration of selected metal contaminants in Great Sacandaga Lake gamefish and gather some basic water quality data. In 2010, the program focus shifted to assessing bacterial water quality at select locations to assure adequate water quality for swimming and wading. The DFWI program was designed to take advantage of other water quality assessments, including the ongoing water chemistry data collections by association volunteers and the Adirondack Watershed Institute (AWI 2010). The current report focuses on bacterial test results for 2010.

Methods

Bacterial Assessments

The Great Sacandaga Lake Coliform Monitoring Program (GSLCMP) collected water samples from suspected contamination sources and heavily used recreational venues throughout the lake basin. The purpose of these collections was to locate possible sources of bacterial contamination to Great Sacandaga Lake and provide the information, in a timely fashion, to local and state regulatory agencies for remedial action. Twelve to 15 shoreline locations were sampled during each sampling cycle. Sample collection occurred monthly in July and August. The time interval coincides with the period of maximum population density and intensity of recreational use. Two primary measurements were made for each sample: Total Coliform (TC) and Fecal Coliform (FC) Bacteria. These bacteria serve as indicators of the presence of animal or human waste. The presence of elevated levels of these bacteria indicates potentially disease-causing protozoans, bacteria and other microorganisms may be present in the water.

Figure 1. Bacterial sampling locations for 2010.



All samples were collected according to NYS DOH protocols for contact recreation sampling. Samples were collected in sterile containers provided by the DFWI laboratory which is certified nationally and by New York State for environmental bacterial testing

(NELAC Lab ID # 10719). Samples were collected in water depths of approximately 1 meter. Sample bottles were submerged to a depth of 0.5 meters and inverted to fill with care taken to not collect surface films. All samples were stored on ice and returned to the laboratory within 6 hours of collection. All bacterial analyses were conducted at the DFWI laboratory in Bolton Landing, NY.

Sampling sites were chosen in consultation with the Great Sacandaga Lake Association (GSLA), Great Sacandaga Lake Advisory Council (GSLAC), DEC, towns and villages, other regulatory agencies and citizens groups. DFWI personnel were also prepared to assist local regulatory authorities with location of bacterial sources, working closely with county and local authorities to locate and correct sources of contamination should they occur. Follow-up investigations by the NYS Department of Health, NYS Department of Environmental Conservation and county and local government personnel are encouraged at sites with elevated fecal coliform levels.

New York State Department of Health has determined maximum allowable bacterial levels for contact recreation (swimming, wading, etc.). A table of these bacterial concentrations is included (Table 1). When these maximum bacterial levels are exceeded, the New York State Department of Health is empowered to close the location to bathing until the problem or problems are corrected. These levels are used by the DFWI to determine appropriate responses to various bacterial concentrations found during sampling. A table of these responses is included (Table 2).

Table 1. New York State coliform bacteria standards for bathing beaches.

| Maximum Allowable Levels of Coliform Bacteria in Waters Used for Contact Recreation (NYS Dept. of Health) | | |
|--|---------------------------|---------------------------|
| Bacterial Test | Max. 5 Sample Mean | Max. Single Result |
| Total Coliform | 2400 per 100 mls | |
| Fecal Coliform | 200 per 100 mls | 1000 per 100 mls |

Interpretation of data to determine and locate sources of contamination (human or other warm-blooded animal) requires more than just current bacterial levels. Knowledge of past history of the site, weather, geology of the area, drainage patterns, and some information on human activities in the area are also useful. To differentiate between human waste and that produced by other warm-blooded animals, it is sometimes helpful to refer to the ratio of fecal coliform to enterococcus bacteria (FC/EC). An FC/EC ratio of 4 or greater is generally considered indicative of contamination of human origin. Enterococcus (EC) Bacteria abundance will be determined for any resample locations.

Table 2. Action Levels of the Proposed Coliform Monitoring Program

In order to respond effectively to contamination problems detected during the Coliform Monitoring Program, the following actions will occur:

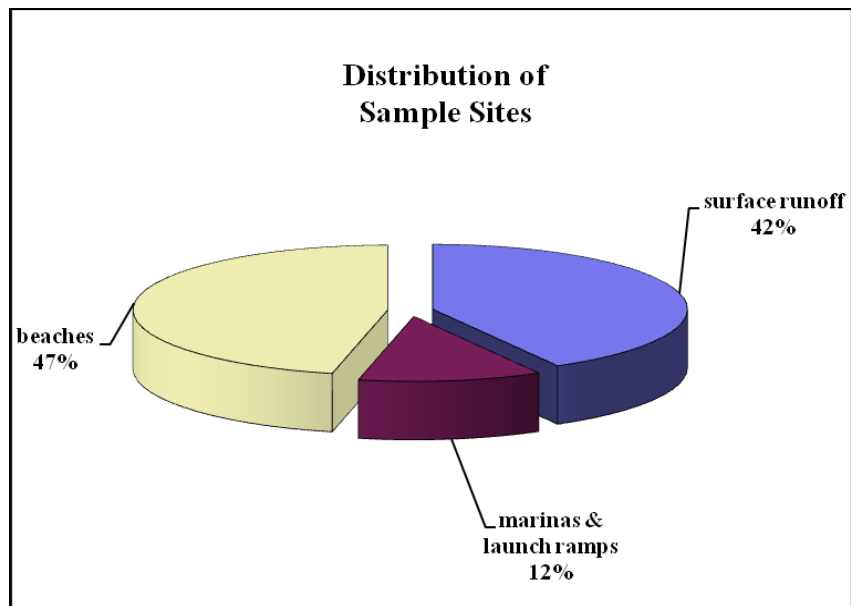
- 1. If 200 or more fecal coliform bacteria per 100 milliliters are reported, the site will be resampled during the next sampling cycle.*
- 2. If 400 or more fecal coliform bacteria per 100 milliliters are reported, the site will be resampled within 24 to 48 hours. The data for both samples will be reported to the town or village where the contamination is located.*

Reporting for the GSLCMP took the form of biweekly interim reports provided electronically to project cooperators. Cooperators included state and local regulatory agencies (NYSDEC, HRBRRD), town and village authorities and concerned local citizens. Rapid dissemination of bacterial testing results is key to effective remediation.

Results and Discussion

The Great Sacandaga Lake Coliform Monitoring Program (GSLCMP) collected 43 water samples from 29 sample points throughout the lake basin (Figure 1 and Appendix A). From 12 to 15 shoreline locations were sampled during each monthly sampling cycle. Sampling efforts focused on locations used for contact recreation (e.g. swimming or wading), marina locations or locations likely to produce bacterial contamination such as runoff sites or agricultural areas. Sample collection was dominated by runoff sites given the propensity for these areas to have elevated bacterial levels (Figure 3). The GSLCMP began in July and concluded in August 2010. The time interval coincides with the period of maximum population density and intensity of recreational use.

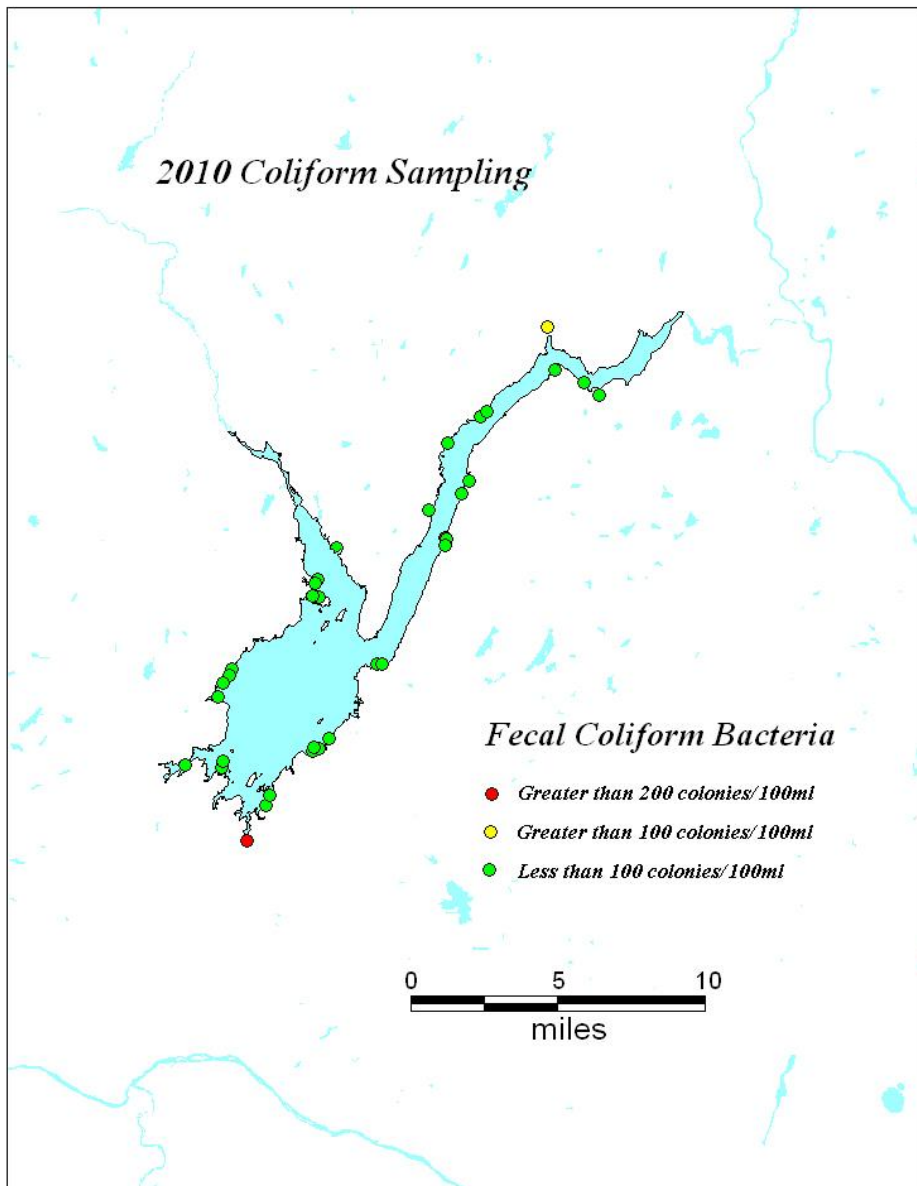
Figure 3. Distribution of bacterial sampling sites.



For all samples collected, 42% of samples had fecal coliform levels less than 10 colonies per 100 ml and 84% of samples had fecal coliform levels less than 100 colonies per 100 ml (Figure 4). For total coliform, 63% of samples had levels less than 100 colonies per 100 ml and 72% of samples were less than 200 colonies per 100 ml of sample. Only one of the sites sampled, Kenyetto Creek @ Route 30, exceeded single sample limits for contact recreation and only Kenyetto Creek @ Route 30 exceeded five sample average contact recreation

limits in 2009 and 2010. Ratios of Fecal Coliform bacteria to Fecal Streptococcus bacteria for Kenyetto Creek in both 2009 and 2010 suggest a non-human source. The Kenyetto Creek drainage includes the Village of Broadalbin as well as livestock pastures, which may account for elevated levels of coliform bacteria. All indications are that the water quality of Great Sacandaga Lake exceeds all standards for swimming or wading.

Figure 4. Relative bacterial abundance for all sampling sites.



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Appendix A.
Great Sacandaga Lake
Coliform Assessment Program Results for 2010
Results are listed alphabetically by town

Definitions

TC – Total Coliform Bacteria

FC – Fecal Coliform Bacteria

EC – Enterococcus Bacteria

TNTC – Too Numerous to Count

CONF – Confluent growth of target bacteria

MAT – Confluent growth of non-target bacteria

? – High background, referring to non-target growth of bacteria interfering with counts of target bacteria

lt – Less than

LA – Laboratory accident preventing enumeration of bacteria

2010 GREAT SACANDAGA LAKE COLIFORM MONITORING PROGRAM

| SITE | DATE | TC/100ml | FC/100ml | EC/100ml | FC/EC | NOTES |
|-------------------------------|-----------|----------|----------|----------|-------|-----------------------------|
| Town Of Broadalbin | | | | | | |
| Broadalbin Town Beach | 20-Jul-10 | 21? | 4? | | | Closed, gulls |
| Broadalbin Town Beach | 17-Aug-10 | 3? | 1 | | | closed, warm, no bathers |
| Frenchmans Creek | 20-Jul-10 | 1320? | 100? | | | Cool, moderate flow, cloudy |
| McMurray Boat Livery | 17-Aug-10 | 70 | 70 | | | calm, turbid |
| NYSDEC Broadalbin Boat Launch | 20-Jul-10 | 40? | 15? | | | suspended debris, warm |
| NYSDEC Broadalbin Boat Launch | 17-Aug-10 | 100 | 30? | | | boats being launched |
| Sacandaga Bible Conference | 20-Jul-10 | 14? | 27? | | | Slightly turbid, no bathers |
| Town of Day | | | | | | |
| Allentown Creek | 17-Aug-10 | 720 | 180 | | | clear, cold |
| Bell Brook | 17-Aug-10 | 200 | 42? | | | cold, clear, moderate flow |
| Daley Creek | 17-Aug-10 | 300 | 26? | | | moderate flow, cool, clear |
| Saratoga Co. Boat Launch | 20-Jul-10 | 29? | 5 | | | waves, clear |
| Sacandaga Avenue Brook | 20-Jul-10 | 83 | 6? | | | Cool, clear, low flow |
| Sand Creek | 20-Jul-10 | 39? | 13? | | | cool, moderate flow |
| Saratoga Biathlon Creek | 20-Jul-10 | 570 | 9? | | | Cool, clear, low flow |
| Town of Edinburgh | | | | | | |
| Batchellerville Creek | 20-Jul-10 | 550 | 55? | | | Ducks, low flow |
| Edinburgh Town Beach | 20-Jul-10 | 16 | 4? | | | Closed, ducks, no bathers |
| Edinburgh Town Beach | 17-Aug-10 | 13? | 11? | | | closed, warm, no bathers |
| Ponderosa Pines Beach | 20-Jul-10 | 22? | 1? | | | choppy, several bathers |
| Ponderosa Pines Beach | 17-Aug-10 | 26 | 4 | | | no bathers, waves to 1 ft. |
| Richters Brook | 17-Aug-10 | 130 | 82? | | | low flow, clear |

| SITE | DATE | TC/100ml | FC/100ml | EC/100ml | FC/EC | NOTES |
|----------------------------------|-----------|----------|----------|----------|-------|---------------------------------|
| Town of Mayfield | | | | | | |
| Cranberry Cove Marina | 17-Aug-10 | 60 | 50 | | | ducks, clear |
| Kennyetto Creek @ Route 30 | 20-Jul-10 | conflu | 4960? | | | Cool, low flow, slightly turbid |
| Kennyetto Creek @ Route 30 | 22-Jul-10 | 920 | 390? | 480 | 0.8 | Low flow, slightly turbid |
| Kennyetto Creek @ Route 30 | 17-Aug-10 | 4400 | 480 | | | low flow, clear |
| Kennyetto Creek @ Route 30 | 18-Aug-10 | 1040? | 600 | 700 | 0.9 | low flow, clear |
| Mayfield Lake Spillway | 17-Aug-10 | 27? | 6? | | | construction, mod flow, turbid |
| Mayfield Town Beach | 20-Jul-10 | 12? | 2 | | | no bathers, clear |
| Mayfield Town Beach | 17-Aug-10 | 10? | 5 | | | Clear, no bathers |
| Rowell Site 3 - Sunset Bay | 20-Jul-10 | 29? | 16? | | | calm, clear |
| Vandenberg Point Swim Area | 20-Jul-10 | 18? | 9? | | | no bathers, clear |
| Vandenberg Point Swim Area | 17-Aug-10 | 31? | 29 | | | calm, no bathers |
| Town of Northampton | | | | | | |
| Northville Town Beach | 20-Jul-10 | 180 | 7? | | | one bather |
| Northville Town Beach | 17-Aug-10 | 23? | 30 | | | closed, geese |
| NYSDEC Northampton Beach | 20-Jul-10 | 110 | 53? | | | many bathers |
| NYSDEC Northampton Beach | 17-Aug-10 | 26 | 20 | | | many bathers, clear |
| Sacandaga Beach/Sport Island Pub | 20-Jul-10 | 17? | 5? | | | calm, no bathers |
| Sacandaga Beach/Sport Island Pub | 17-Aug-10 | 34 | 10 | | | no bathers, calm |
| Sacandaga Park Brook | 20-Jul-10 | 900 | 70? | | | low flow |
| Small (Northville) Lake Spillway | 17-Aug-10 | 34 | 8 | | | clear, kids fishing |
| Town of Providence | | | | | | |
| Cloutler Creek | 17-Aug-10 | 9 | 7 | | | moderate flow, turbid |
| Providence Town Beach | 20-Jul-10 | 27? | 5? | | | No bathers, calm, clear |
| Providence Town Beach | 17-Aug-10 | 10? | 5 | | | closed, no bathers, warm |