

2006 INTERPRETIVE SUMMARY

NEW YORK CITIZENS STATEWIDE LAKE ASSESSMENT PROGRAM (CSLAP)

LAKE GEORGE

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BACKGROUND AND ACKNOWLEDGMENT

The Citizens Statewide Lake Assessment Program (CSLAP) is a volunteer lake monitoring program conducted by the NYS Department of Environmental Conservation (NYSDEC) and the NYS Federation of Lake Associations (FOLA). Founded in 1986 with 25 pilot lakes, the program has involved more than 200 lakes, ponds, and reservoirs and 1000 volunteers from eastern Long Island to the northern Adirondacks to the western-most lake in New York, and from 10-acre ponds to several Finger Lakes, Lake Ontario, Lake George, and lakes within state parks. In this program, lay volunteers trained by the NYSDEC and FOLA collect water samples, observations, and perception data every other week in a 15 week interval between May and October. Water samples are analyzed by certified laboratories. Analytical results are interpreted by the NYSDEC and FOLA and utilized for a variety of purposes by the State of New York, local governments, researchers, and, most importantly, participating lake associations. This report summarizes the 2006 sampling results for **Lake George**.

Lake George is a 28,200 acre, class AA_{special} lake found in multiple towns in Warren, Washington, and Essex Counties, in the southeastern portion of the Adirondack Park region of New York State. It was first sampled as part of CSLAP in 2004. The following volunteers have participated in CSLAP, and deserve most of the credit for the success of this program at Lake George: John Vice, Joanne and Mark Mueller, Susan and Roger Wilson, Nick and Vincent Scalia, Kelly Fuchs, Barry Leeds, Helene Wilkening, Marybeth, Jerry, Gerald and Matthew Hadeka, Cathy LaBombard, Anne Green, Catherine Aiken, Peter Gaddy, and Richard and Deborah Gasser.

In addition, the authors wish to acknowledge the following individuals, without whom this project and report would never have been completed:

From the Department of Environmental Conservation, N.G. Kaul, Sal Pagano, Dan Barolo, Italo Carcich, Phil DeGaetano, Dick Draper, and Jeff Myers for supporting CSLAP for the past 20 years; Jay Bloomfield and James Sutherland, for their work in developing and implementing the program, and the technical staff from the Lake Services Section, for continued technical review of program design.

From the Federation of Lake Associations, Anne Saltman, Dr. John Colgan, Don Keppel, Bob Rosati, Don Cook, Nancy Mueller and the Board of Directors, for their continued strong support of CSLAP.

The New York State Department of Health (prior to 2002), particularly Jean White and Upstate Freshwater Institute (since 2002), particularly Steve Effler and Jennifer Aicher, provided laboratory materials and all analytical services, reviewed the raw data, and implemented the quality assurance/quality control program.

Finally, but most importantly, the authors would like to thank the more than 1,000 volunteers who have made CSLAP a model for lay monitoring programs throughout the country and the recipient of a national environmental achievement award. Their time and effort have served to greatly expand the efforts of the state and the public to protect and enhance the magnificent water resources of New York State.

I. INTRODUCTION: CSLAP DATA AND YOUR LAKE

Lakes are dynamic and complex ecosystems. They contain a variety of aquatic plants and animals that interact and live with each other in their aquatic setting. As water-quality changes, so too will the plants and animals that live there, and these changes in the food web also may affect water-quality. Water-quality monitoring provides a window into the numerous and complex interactions of lakes. Even the most extensive and expensive monitoring program **cannot completely assess** the water-quality of a lake. However, by looking at some basic chemical, physical, and biological properties, it is possible to gain a greater understanding of the general condition of lakes. CSLAP monitoring is a basic step in overall water-quality monitoring.

Understanding Trophic States

All lakes and ponds undergo **eutrophication**, an aging process, that involves stages of succession in biological productivity and water-quality (see Figure 1). **Limnologists** (scientists who study freshwater systems) divide these stages into **trophic states**. Each trophic state can represent a wide range of biological, physical, and chemical characteristics and any lake may “naturally” be categorized within any of these trophic states. In general, the increase in productivity and decrease in clarity corresponds to an enrichment of nutrients, plant and animal life. Lakes with low biological productivity and high clarity are considered **oligotrophic**. Highly productive lakes with low clarity are considered **eutrophic**. Lakes that are **mesotrophic** have intermediate or moderate productivity and clarity. It is important to remember that eutrophication is a natural process and is not necessarily indicative of man-made pollution.

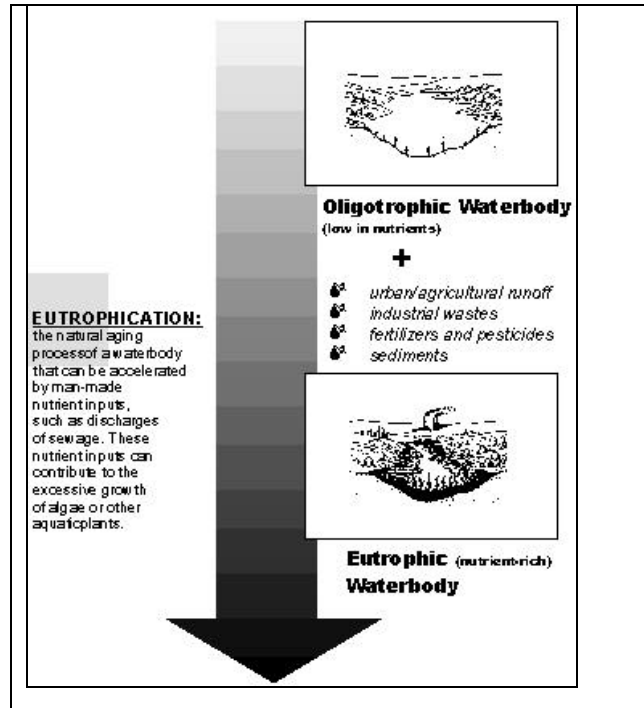


Figure 1. Trophic States

In fact, some lakes are thought to be “naturally” productive. Trophic classifications are not interchangeable with assessments of water-quality. Water-quality degradation from the perspective of one user may contrast with the perception of favorable conditions by a different lake user. For example, a eutrophic lake may support an excellent warm-water fishery because it is nutrient rich, but a swimmer may describe that same lake as polluted. A lake’s trophic state is still important because it provides lake managers with a reference point to view changes in a lake’s water-quality and they begin to understand how these changes may cause **use impairments** (threaten the use of a lake or swimming, drinking water or fishing).

When human activities accelerate lake eutrophication, it is referred to as **cultural eutrophication**. Cultural eutrophication may result from shoreline erosion, agricultural and urban runoff, wastewater discharges or septic seepage, and other non-point source pollution sources. These can greatly accelerate the natural aging process of lakes, cause successional changes in the plant and animal life within the lake, shoreline and surrounding watershed, and impair the water-quality and value of a lake. They may ultimately extend aquatic plants and emergent vegetation throughout the lake, resulting in the transformation of the lake into a marsh, prairie, and forest. The extent of cultural eutrophication and the corresponding pollution problems can be signaled by significant changes in the trophic state over a short period.

Why is this important? New York State lakes can be affected by a variety of stressors, from acid rain to zebra mussels and almost everything in between. In any given part of the state, some of these stressors are more important than others. For example, there are probably more lakes affected by acid rain than any other pollutant, but these impacts are typically associated with a particular region (the Adirondacks and Catskills) and particular type of lake (small, high-elevation lakes in basins with thin soils and little buffering capacity). But for most lakes in New York, cultural eutrophication represents the most significant source of pollutants and threat to water-quality. As a result, water-quality indicators related to eutrophication comprise the foundation of most water-quality monitoring programs.

II. CSLAP SAMPLING PARAMETERS

CSLAP monitors several parameters related to the trophic state of a lake, including the clarity of the water, the amount of nutrients in the water, and the amount of algae resulting from those nutrients. Three parameters are the most important measures of eutrophication in most New York lakes: **total phosphorus, chlorophyll *a*** (estimating the amount of algae), and **Secchi disk transparency**. Because these parameters are closely linked to the growth of weeds and algae, they provide insight into “how the lake looks” and its suitability for recreation and aesthetics. Other CSLAP parameters help characterize water-quality at the lake. Each of these sampling parameters are outlined in Figure 2. In addition, CSLAP also uses the responses on the Field Observation Forms to gauge volunteer perceptions of lake water-quality. Most water-quality “problems” arise from impairment of accepted or desired lake uses, or the perception that such uses are somehow degraded. As such, any water-quality monitoring program should attempt to understand the link between perception and measurable quality.

The parameters analyzed in CSLAP provide valuable information for characterizing lakes. By adhering to a consistent sampling protocol provided in the CSLAP Sampling Protocol sampling volunteers collect and use data to assess both seasonal and yearly fluctuations in these parameters and to evaluate the water-quality conditions in their lake. By comparing a specific year's data to historical water-quality information, lake managers can pinpoint trends and determine whether water-quality is improving, degrading or remaining stable. Such a determination answers a first critical question posed in the lake-management process.

Figure 2. CSLAP Parameters

PARAMETER	SIGNIFICANCE
Water Temperature (°C)	Water temperature affects many lake activities, including the rate of biological growth and the amount of dissolved oxygen. It also affects the length of the recreational season.
Secchi Disk Transparency (m)	Determined by measuring the depth at which a black and white disk disappears from sight, the Secchi disk transparency estimates the clarity of the water. In lakes with low color and rooted macrophyte ("weed") levels, it is related to algal productivity.
Conductivity (µmho/cm)	Specific conductance measures the electrical current that passes through water, and is used to estimate the number of ions (charged particles). It is somewhat related to both the hardness and alkalinity (acid-buffering capacity) of the water and may influence the degree to which nutrients remain in the water. Generally, lakes with conductivity of less than 100 µmho/cm are considered soft water, while conductivity readings above 300 µmho/cm are found in hardwater lakes.
pH	pH is a measure of the (free) hydrogen ion concentration in solution. Most clearwater lakes must maintain a pH between 6 and 9 to support most types of plant and animal life. Low pH waters (<7) are acidic, while high pH waters (>7) are basic.
Color (true) (platinum color units)	The color of dissolved materials in water usually consists of organic matter, such as decaying macrophytes or other vegetation. It is not necessarily indicative of water-quality but may significantly influence water transparency or algae growth. Color in excess of 30 ptu indicates sufficient quantities of dissolved organic matter to affect clarity by imparting a tannic color to the water.
Phosphorus (total, mg/l)	Phosphorus is one of the major nutrients needed for plant growth. It is often considered the "limiting" nutrient in NYS lakes, for biological productivity is often limited if phosphorus inputs are limited. Nitrogen-to-phosphorus ratios of >25 generally indicate phosphorus limitation. Many lake management plans are centered on phosphorus controls. Phosphorus is reported as total phosphorus (TP)
Nitrogen (nitrate, ammonia, and total (dissolved), mg/l)	Nitrogen is another nutrient necessary for plant growth and can act as a limiting nutrient in some lakes, particularly in the spring and early summer. Nitrogen to phosphorus ratios <10 generally indicate nitrogen limitation (for algae growth). For much of the sampling season, many CSLAP lakes have very low or undetectable levels of one or more forms of nitrogen. It is measured in CSLAP in three forms_ nitrate/nitrite (NO _x) ammonia (NH _{3/4}), and total nitrogen (TN or TDN).
Chlorophyll <i>a</i> (µg/l)	The measurement of chlorophyll <i>a</i> , the primary photosynthetic pigment found in green plants, provides an estimate of phytoplankton (algal) productivity, which may be strongly influenced by phosphorus.
Calcium (mg/l)	Calcium is a required nutrient for most aquatic fauna and is required for the shell growth for zebra mussels (at least 8-10 mg/l) and other aquatic organisms. It is naturally contributed to lakes from limestone deposits and is often strongly correlated with lake buffering capacity and conductivity.

Ranges for Parameters Assessing Trophic Status and Lake George

The relationship between phosphorus, chlorophyll *a*, and Secchi disk transparency has been explored by many researchers, to assess the trophic status (the degree of eutrophication) of lakes. Figure 3 shows the ranges for phosphorus, chlorophyll *a*, and Secchi disk transparency (summer median) that are representative for the major trophic classifications:

These classifications are valid for clear-water lakes only (with less than 30 platinum color units). Some humic or "tea color" lakes, for example, naturally have high levels

of dissolved organic material, resulting in color readings that exceed 30 color units. This will cause the water transparency to be lower than expected, given low phosphorus and chlorophyll *a* levels in the lake. Water transparency can also be unexpectedly lower in shallow lakes due to influences from the bottom (or the inability to measure the maximum water clarity due to the visibility of the Secchi disk on the lake

Figure 3. Trophic Status Indicators

Parameter	Eutrophic	Mesotrophic	Oligotrophic	Lake George
Phosphorus (mg/l)	> 0.020	0.010 - 0.020	< 0.010	0.009
Chlorophyll <i>a</i> (µg/l)	> 8	2- 8	< 2	0.8
Secchi Disk Clarity (m)	< 2	2- 5	> 5	7.5

bottom). Even shallow lakes with high water clarity, low nutrient concentrations, and little algal growth may also have significant weed growth due to shallow water conditions. While such a lake may be considered unproductive by most water-quality standards, that same lake may experience severe aesthetic problems and recreational impairment related to weeds, not trophic state. Generally, however, the trophic relationships described above can be used as an accurate "first" gauge of productivity and overall water-quality.

By each of the trophic standards described above, the lake would be considered **oligotrophic**, or highly unproductive. These assessments were consistent across the seven sampling sites, although phosphorus readings varied significantly at a few sites (see below). The trophic condition of Lake George will be discussed in greater detail later in this report.

III. CSLAP LAKES

CSLAP sampling began in 1986 on 25 lakes generally distributed throughout the state, and in the following 20 years has expanded to more than 200 lakes. The program was developed primarily to identify water-quality problems, develop long-term databases, and educate lakefront property owners on small lakes with little historical information and few other contemporary studies. However, the program has been utilized by lake residents, lake associations and managers, municipalities, state and federal government and environmental organizations to gain insights about small ponds, large high-profile lakes and multi-use reservoirs from eastern Long Island to the northern Adirondacks, to the western border of New York State. A map showing each of the lakes sampled through CSLAP since 1986 is shown in

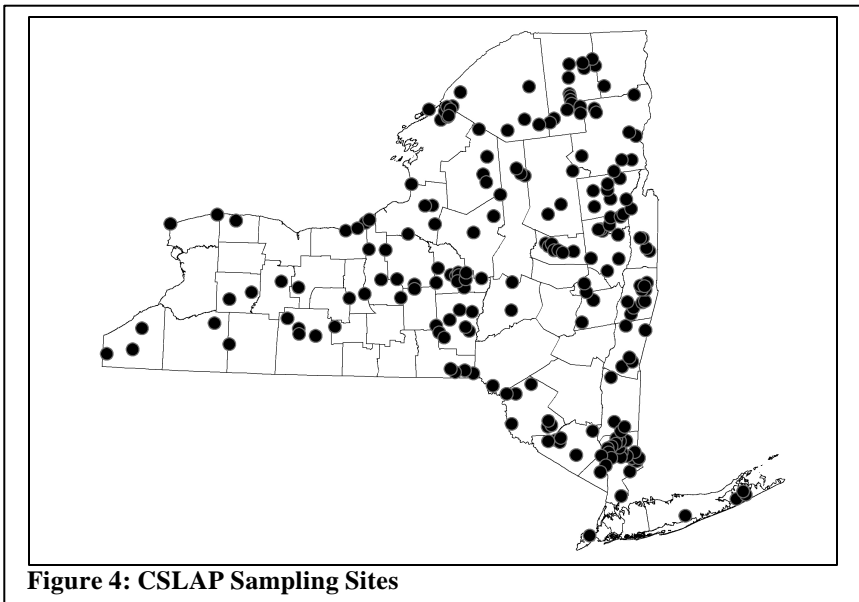


Figure 4. The distribution of lakes roughly matches the distribution of lake associations in the state (or at least those affiliated with the NY Federation of Lake Associations, the largest lake association organization in the state). The relative paucity of CSLAP lakes in the Finger Lakes region reflects the small number of lakes in a region dominated by very large lakes, while the small number of lakes sampled in the Catskills, Long Island, and western NY reflects the shortage of organized lake associations in those areas.

CSLAP lakes have ranged from the very small (five acre Cranberry Lake in the downstate region) to the great (two state park beaches on Lake Ontario). It has included perhaps the clearest lake in New York State (Skaneateles Lake, one of the Finger Lakes, with as high as 50 feet of water transparency) and several lakes with clarity as low as one foot. There are a large number of lakes used for potable water, as well as those classified only for fishing and non-contact recreation. Some lakes (those on Long Island) sit just above sea level, while others are perched high in the clouds, including Summit Lake in central NY and Twitchell Lake in the Adirondacks, more than 2,000 feet above sea level.

Figures 5a through 5d summarize the variety of lakes sampled through CSLAP. In short, these lakes constitute a representative cross-section of the lake conditions, uses, and settings encountered in New York State.

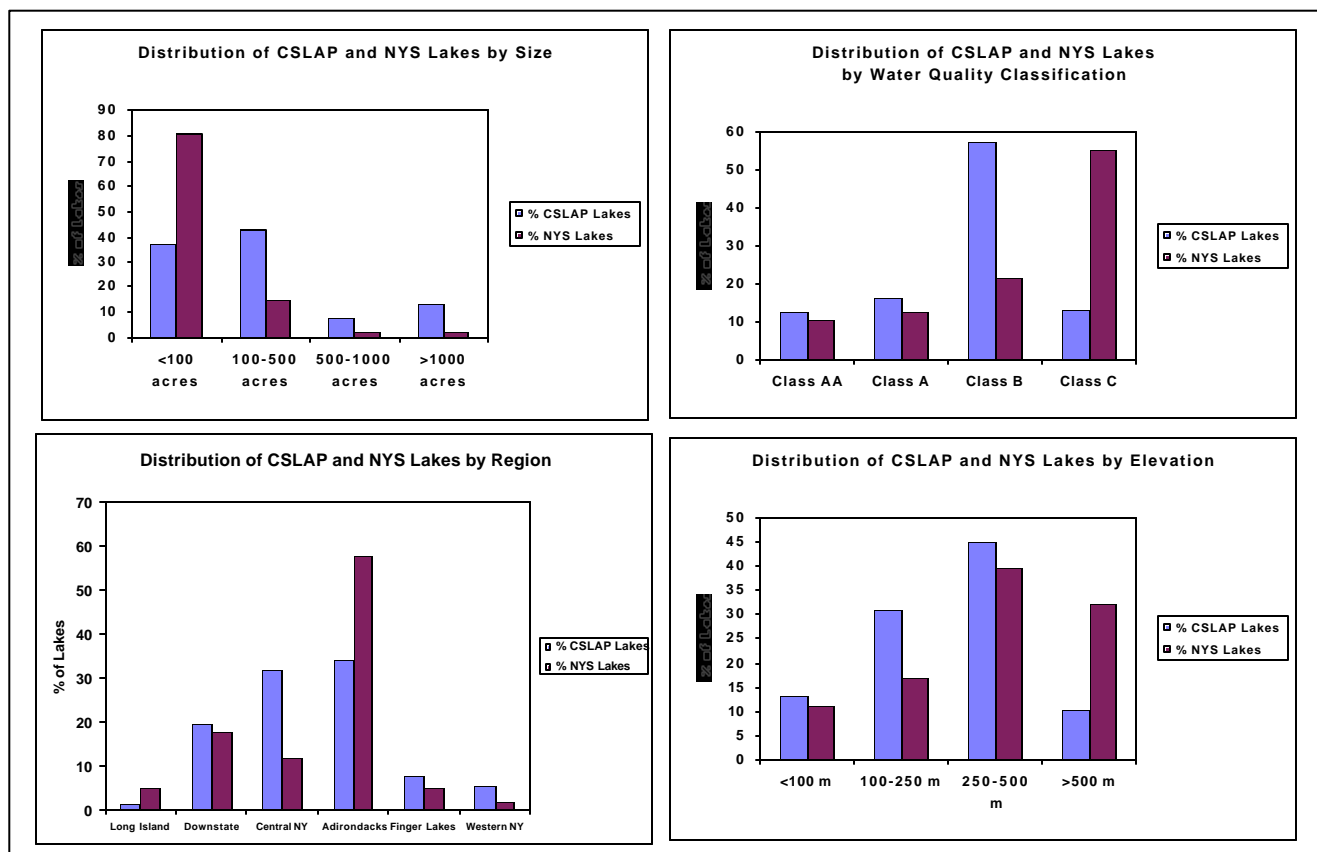


Figure 5- Comparison of CSLAP and New York State Lakes

The typical CSLAP lake is slightly larger than the typical New York State lake and is more likely to be found in central New York (between the Adirondacks, downstate and Finger Lakes regions). However, this profile, as well as the preponderance toward “mid-elevation” regions, is probably more typical of the “lake community” regions of the state. This corresponds to those regions in which large numbers of lakes are heavily populated, which in turn represents lower elevation waterbodies that support siting septic systems and have close proximity to roads and other non-lake communities (comprised of visitors and seasonal lake residents). The relatively higher percentage of Class B lakes in CSLAP and Class C lakes in the rest of the state reflects the large number of uninhabited Class C lakes in the Adirondacks. These lakes have been classified as Class C lakes, often by default, due in part to the lack of information about historical or contemporary lake uses and water-quality conditions.

The distribution of lakes in these categories does suggest that CSLAP lakes are mostly comparable to other New York State lakes, and that an evaluation of CSLAP data may serve as a reasonable surrogate for statewide water-quality evaluations, particularly since CSLAP serves as the primary long-term database maintained and supported by New York State.

LAKE GEORGE FINDINGS AND EXECUTIVE SUMMARY

Lake George was sampled as part of the New York Citizens Statewide Lake Assessment Program in 2006. For all program waters, water-quality conditions and public perception of the lake each year and historically have been evaluated within annual reports issued after each sampling season. This report attempts to summarize both the 2006 CSLAP data and an historical comparison of the data collected within the 2006 sampling season and data collected at Lake George prior to 2006.

The majority of the short- and long-term analyses of the water quality conditions in Lake George are summarized in Table 2, divided into assessments of eutrophication indicators, other water quality indicators, and lake perception indicators. The CSLAP data indicate that the lake can be classified as *oligotrophic*, or highly productive- this is typical of lakes with high water transparency, and low nutrient (primarily phosphorus) and algae levels. Lake productivity appears to increase from south to north, with the highest water clarity and lowest algae levels found at the northernmost sites. These data do not show a strong connection between changes in phosphorus, algae, or water transparency, although the nitrogen to phosphorus ratios indicate that algae levels in Lake George are probably controlled by phosphorus. Lake productivity did not change seasonally in a consistent manner at most sites, although water clarity readings at site 8 have steadily decreased during the summer. Phosphorus levels in the lake have been below the state phosphorus guidance value, and as a result, water transparency readings easily exceeded the minimum recommended water clarity for swimming beaches.

The lake is weakly colored (low levels of dissolved organic matter) and it is likely that these readings reflect the characteristics of the watershed (i.e. “natural” conditions at the lake). Color readings are usually not high enough to exert limits on the water transparency, even when algae levels are very low, although 2006 color readings were elevated at the southernmost site sampled in 2006, corresponding to lower water clarity readings. Lake George has soft water, slightly alkaline (above neutral) pH readings, and mostly undetectable nitrate and low ammonia readings. Conductivity readings were generally lower in 2006, but probably still within the normal range at the lake, while pH usually fell within the acceptable range at all sites. Nitrate and ammonia levels do not appear to warrant a threat to the lake, and the primary component of nitrogen appears to be organic. Calcium levels may be high enough to support zebra mussels at some sites, but additional monitoring should be conducted to determine if this represents a threat to the spread of zebra mussels to other parts of the lake.

The recreational suitability of Lake George was described very favorably at all but Site 1; at the other sites, the lake was most often described as “crystal clear” and “could not be nicer” for recreational uses. At Site 1, the lake was often described as “not quite crystal clear” to having “definite algal greenness”, and “excellent” to “slightly impaired” for recreational uses, despite water quality conditions similar to those at the other sites. The recreational assessments at Site 1 were occasionally impacted by “excessive weed growth”, although surface weed growth was not observed. The recreational assessments are stable during the summer at the other sites, coincident with stable water quality and lack of significant weed problems. These assessments were mostly comparable in all three sampling seasons.

The 2000 NYSDEC Priority Waterbody Listings (PWL) for the Lake Champlain drainage basin indicate *recreation* and *aquatic life habitat* are *impaired*, *public bathing* and *aesthetics* are *stressed*, and *water supply* is threatened. The CSLAP datasets have only limited utility in evaluating these PWL listings, though only at Site 1 does there appear to be any indication of use impairments. The next PWL review for the Lake Champlain drainage basin will likely occur in 2007.

IV: LAKE GEORGE- BACKGROUND INFORMATION

Lake George is a 28,200 acre, class AA_{special} lake found in multiple towns in Warren, Washington, and Essex Counties, in the southeastern portion of the Adirondack Park region of New York State. It was first sampled as part of CSLAP in 2004. Figure 6 shows the location of Lake George, as well as the sampling sites. It is one of 12 CSLAP lakes among the >120 lakes found in Warren County, and one of 15 CSLAP lakes among the >240 lakes and ponds in the Lake Champlain drainage

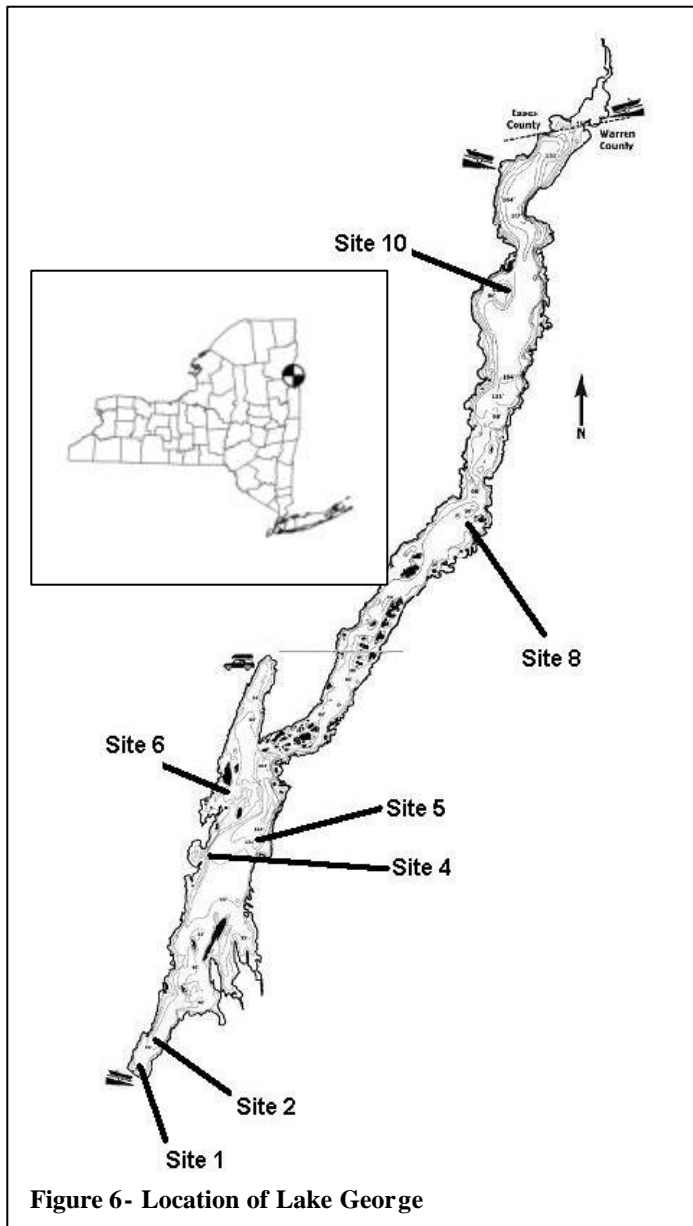


Figure 6- Location of Lake George

basin. Lake George is a Class AA_{special} lake; this means that the best intended use for the lake is for potable water intake—drinking—with minimal treatment, and contact recreation—swimming and bathing. These “categories” will be used to evaluate water-quality conditions later in the report.

CSLAP samples have been collected from the several sites in the lake, all corresponding to a to the deepest part of these locations. Most lakes with a maximum depth of > 20 feet are thermally stratified, and the sampling data indicate that Lake George is stratified. As such, surface and deepwater samples have been collected at the lake.

Historical Water-Quality Information for Lake George

Lake George has been extensively involved in multiple NYS monitoring programs. It is beyond the scope of this program to evaluate the entirety of these monitoring programs.

Historical Fisheries Information for Lake George

Lake George is stocked annually with about 1500 10.5” and 34,000 6.5” land-locked salmon. Lake trout have also been stocked—typically about 5000 7” trout. Other fish species in the lake include Atlantic salmon,

bullhead, chain pickerel, largemouth bass, pumpkinseed sunfish, smallmouth bass, smelt, sunfish, trout, and yellow perch.

General statewide fishing regulations are applicable in Lake George. In addition, open season for yellow perch, trout and sunfish lasts all year, with no minimum size but a daily limit of 50 (5 for trout). The open season for lake trout and land-locked also lasts all year, with daily limits of 2 fish and minimum lengths of 23” for lake trout and 16” for land-locked salmon.

General Comments and Questions:

- ***What is the condition of Lake George?***

Water quality conditions in Lake George appear to be more than adequate to support most recreational uses of the lake during the summer, at least at the sampled sites. Water clarity readings consistently exceed those recommended for siting a new swimming beach, due to low nutrient (phosphorus) and algae levels. Nuisance algae and aquatic plant growth was reported only by the volunteers at Site 1 (and there only infrequently), suggesting that these sites may not be representative of portions of the lake suffering from weed-induced use impairments. The lack of impact associated with nuisance weeds at some of the sampling sites may reflect the depth of the assessed sites rather than actual conditions in these parts of the lake. Recreational assessments of the lake are generally very favorable, befitting a lake with highly favorable water quality conditions.

- ***What about the dark and murky bottom waters of the lake?***

Deepwater nutrient levels were fairly close to those measured at the lake surface, although it is not known if samples were collected from the “true” bottom or if deepwater nutrient levels are elevated in other parts of the lake.

- ***How does this condition change from spring showers thru changing of the leaves?***

The productivity of Lake George varies in a somewhat inconsistent manner during the summer, although readings for most of these trophic indicators changed little from sample to sample. None of the other water quality indicators have exhibited strong seasonal patterns, with the possible exception of a drop in water clarity at site 8 during the summer.

- ***How has the condition changed since CSLAP sampling began on the lake and/or relative to historical values?***

It is premature to evaluate water quality trends with only three years of water quality data, and water quality trends in Lake George have been evaluated through other longer-term monitoring programs. The differences in water quality conditions among the three sampling seasons is probably not significant.

- ***How does Lake George compare to other similar lakes (nearby lakes,....)?***

Lake George is less productive (re: higher clarity, and lower nutrient and algae levels) than other nearby (Lake Champlain basin) lakes, other lakes classified for potable water use (Class AAspec), and other NYS lakes. Likewise, recreational assessments are also more favorable than in these other lakes, consistent with the favorable water quality and lack of invasive weed growth at these sites, although this may better reflect deepwater rather than nearshore conditions.

- ***Based on these data, what should be done to improve or maintain Lake George?***

The recreational assessments of Lake George seem to be highly favorable, consistent with the very clear water and lack of invasive weed growth in the areas assessed by the sampling volunteers. It is clear that there is no single “opinion” about water quality conditions or recreational suitability of Lake George, but these sites can continue to be evaluated to assess relative water quality or recreational use changes.

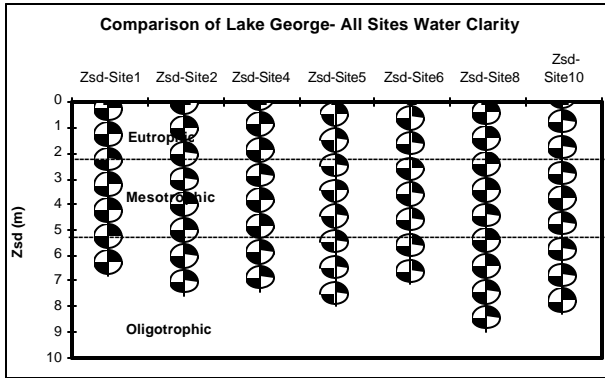


Figure 35. Comparison of 2006 Secchi Disk Transparency From Site to Site

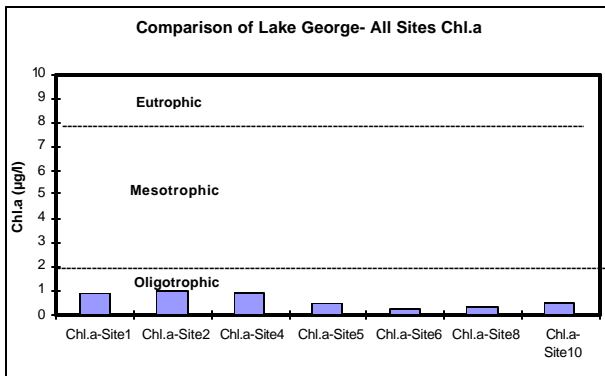


Figure 36. Comparison of 2006 Chlorophyll *a* From Site to Site

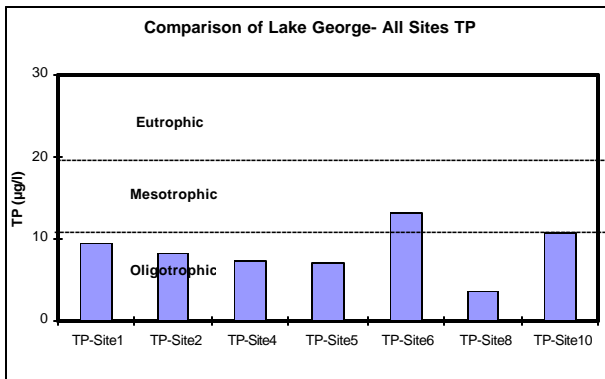


Figure 37. Comparison of 2006 Total Phosphorus From Site to Site

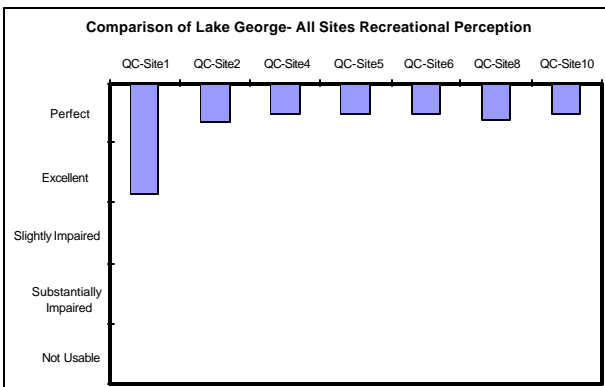


Figure 38. Comparison of 2006 Recreational Perception From Site to Site

How do the Lake George sites compare to each other?

Annual Comparison of Median Readings for Eutrophication Parameters and Recreational Assessment For Lake George From 2004 to 2006 From Site to Site

The graphs to the left illustrate comparisons of each eutrophication parameter and recreational perception at Lake George--in 2006, other lakes in the same drainage basin, lakes with the same water-quality classification (each classification is summarized in Appendix B), and all of CSLAP. Readers should note that differences in watershed types, activities, lake history and other factors may result in differing water-quality conditions at your lake relative to other nearby lakes. In addition, the limited database for some regions of the state precludes a comprehensive comparison to neighboring lakes.

Based on these graphs, the following conclusions can be made about Lake George in 2006:

- Water clarity readings have been highest at the northern sites (sites 8 and 10) and lowest at the southernmost site (site 1). This is consistent with findings in other monitoring programs. All readings have been indicative of oligotrophic lakes.
- Chlorophyll *a* readings have been very low at all sites, but were slightly higher in the southern sites (sites 1 and 2). This is consistent with findings in other monitoring programs, and consistent with the water clarity findings. All readings have been indicative of oligotrophic lakes.
- Total phosphorus readings are lowest in one of the northern-most sites (site 8), corresponding to the highest water transparency readings, but have been highest at sites 6 and 10.
- Recreational assessments (QC on the field-observations form) have been highly favorable at all sites north of site 1. This is mostly consistent with the spatial patterns associated with water quality conditions in the lake.

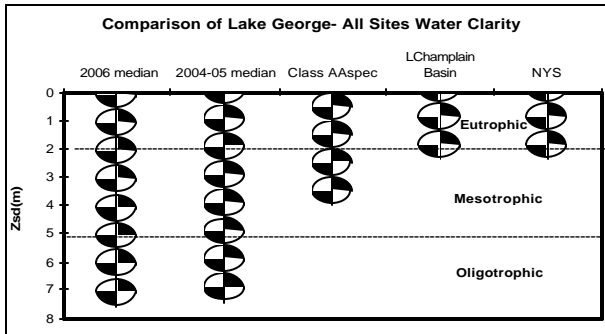


Figure 35b. Comparison of 2006 Secchi Disk Transparency to Lakes With the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes in 2006

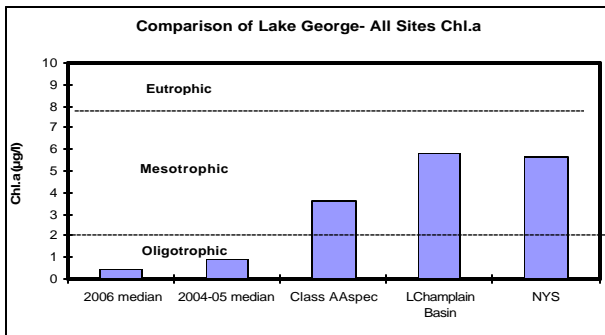


Figure 36b. Comparison of 2006 Chlorophyll a to Lakes with the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes in 2006

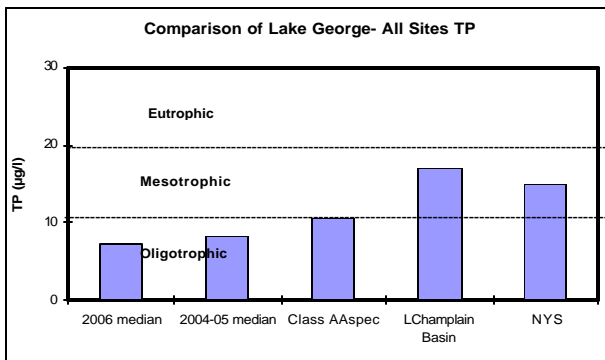


Figure 37b. Comparison of 2006 Total Phosphorus to Lakes With the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes in 2006

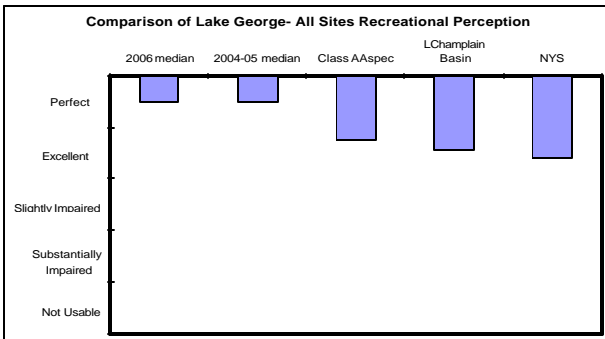


Figure 38b. Comparison of 2006 Recreational Perception to Lakes With the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes in 2006

How does Lake George compare to other lakes?

Annual Comparison of Median Readings for Eutrophication Parameters and Recreational Assessment For Lake George (Average for All Sampling Sites) in 2006 to Historical Data for Lake George, Neighboring Lakes, Lakes with the Same Lake Classification, and Other CSLAP Lakes

The graphs to the left illustrate comparisons of each eutrophication parameter and recreational perception at Lake George--in 2006, other lakes in the same drainage basin, lakes with the same water-quality classification (each classification is summarized in Appendix B), and all of CSLAP. Readers should note that differences in watershed types, activities, lake history and other factors may result in differing water-quality conditions at your lake relative to other nearby lakes. In addition, the limited database for some regions of the state precludes a comprehensive comparison to neighboring lakes.

Based on these graphs, the following conclusions can be made about Lake George in 2006:

- Using water clarity as an indicator, Lake George is less productive than other Class AA_{special}, Lake Champlain basin and NYS lakes.
- Using chlorophyll *a* concentrations as an indicator, Lake George is less productive than other Class AA_{special}, Lake Champlain basin and NYS lakes.
- Using total phosphorus concentrations as an indicator, Lake George is less productive than other Class AA_{special}, Lake Champlain basin and NYS lakes.
- Using QC on the field-observations form as an indicator, Lake George is less productive than other Class AA_{special}, Lake Champlain basin and NYS lakes.

TABLE 1: CSLAP Data Summary for Lake George

Year	Min	Avg	Max	N	Parameter
2004-06	4.00	7.58	10.72	81	Zsd
2006	6.25	7.19	7.75	7	Zsd-Site2
2006	6.10	7.64	9.05	8	Zsd-Site4
2006	7.80	8.37	9.25	3	Zsd-Site8
2006	7.50	8.10	9.00	5	Zsd-Site10
2005	6.25	6.83	7.45	4	Zsd-Site1
2005	6.25	7.38	8.50	4	Zsd-Site2
2005	5.75	7.20	8.25	8	Zsd-Site4
2005	7.00	8.17	9.50	6	Zsd-Site6
2005	8.50	9.18	9.85	2	Zsd-Site8
2005	8.30	8.60	9.00	3	Zsd-Site10
2004	5.15	6.73	9.30	8	Zsd-Site1
2004	6.80	8.08	9.35	6	Zsd-Site2
2004	6.20	7.33	8.80	8	Zsd-Site4
2004	6.50	8.00	9.50	2	Zsd-Site5
2004	4.00	5.08	6.75	3	Zsd-Site6
2004	8.00	9.28	10.72	4	Zsd-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	0.002	0.008	0.023	79	Tot.P
2006	0.006	0.008	0.013	6	Tot.P-Site2
2006	0.006	0.007	0.008	5	HypTP-Site2
2006	0.004	0.005	0.007	8	Tot.P-Site4
2006	0.004	0.006	0.008	8	HypTP-Site4
2006	0.002	0.003	0.005	3	Tot.P-Site8
2006	0.009	0.009	0.010	2	HypTP-Site8
2006	0.004	0.010	0.017	5	Tot.P-Site10
2006	0.005	0.007	0.013	5	HypTP-Site10
2005	0.004	0.008	0.015	6	Tot.P-Site1
2005	0.007	0.019	0.053	6	HypTP-Site1
2005	0.003	0.006	0.007	4	Tot.P-Site2
2005	0.006	0.008	0.013	4	HypTP-Site2
2005	0.005	0.006	0.009	8	Tot.P-Site4
2005	0.005	0.008	0.013	8	HypTP-Site4
2005	0.009	0.012	0.016	6	Tot.P-Site6
2005	0.004	0.008	0.011	3	HypTP-Site6
2005	0.003	0.004	0.004	2	Tot.P-Site8
2005	0.010	0.016	0.022	2	HypTP-Site8
2005	0.009	0.012	0.015	2	Tot.P-Site10

DATA SOURCE KEY

CSLAP	New York Citizens Statewide Lake Assessment Program
LCI	the NYSDEC Lake Classification and Inventory Survey conducted during the 1980s and again beginning in 1996 on select sets of lakes, typically 1 to 4x per year
DEC	other water-quality data collected by the NYSDEC Divisions of Water and Fish and Wildlife, typically 1 to 2x in any give year
ALSC	the NYSDEC (and other partners) Adirondack Lake Survey Corporation study of more than 1500 Adirondack and Catskill lakes during the mid 1980s, typically 1 to 2x
ELS	USEPA's Eastern Lakes Survey, conducted in the fall of 1982, 1x
NES	USEPA's National Eutrophication Survey, conducted in 1972, 2 to 10x
EMAP	USEPA and US Dept. of Interior's Environmental Monitoring and Assessment Program conducted from 1990 to present, 1 to 2x in four year cycles
Additional data source codes are provided in the individual lake reports	

CSLAP DATA KEY:

The following key defines column headings and parameter results for each sampling season:

Min	Minimum reading for the parameter
Avg	Geometric average (mean) reading for the parameter
Max	Maximum reading for the parameter
N	Number of samples collected
Zsd	Secchi disk transparency, meters
Tot.P	Total Phosphorus as P, in mg/l (Hypo = bottom sample)
NO3	Nitrate + Nitrite nitrogen as N, in mg/l
NH4	Ammonia as N, in mg/l
TDN	Total Dissolved Nitrogen as N, in mg/l
TN	Total Nitrogen as N, in mg/l
TP/TN	Phosphorus/Nitrogen ratios, unitless (calculated from TDN prior to 2006)
Ca	Calcium, in mg/l
Tcolor	True color, as platinum color units
pH	(negative logarithm of hydrogen ion concentration), standard pH
Cond25	Specific conductance corrected to 25°C, in µmho/cm
Chl.a	Chlorophyll a, in µg/l
QA	Survey question re: physical condition of lake: (1) crystal clear; (2) not quite crystal clear; (3) definite algae greenness; (4) high algae levels; and (5) severely high algae levels
QB	Survey question re: aquatic plant populations of lake: (1) none visible; (2) visible underwater; (3) visible at lake surface; (4) dense growth at lake surface; (5) dense growth completely covering the nearshore lake surface
QC	Survey question re: recreational suitability of lake: (1) couldn't be nicer; (2) very minor aesthetic problems but excellent for overall use; (3) slightly impaired; (4) substantially impaired, although lake can be used; (5) recreation impossible
QD	Survey question re: factors affecting answer QC: (1) poor water clarity; (2) excessive weeds; (3) too much algae/odor; (4) lake looks bad; (5) poor weather; (6) litter, surface debris, beached/floating material; (7) too many lake users (boats, PWCs, etc); (8) other

TABLE 1: CSLAP Data Summary for Lake George (cont)

Year	Min	Avg	Max	N	Parameter
2004-06	0.002	0.008	0.023	79	Tot.P
2004	0.005	0.010	0.020	7	Tot.P-Site1
2004	0.006	0.011	0.025	8	HypTP-Site1
2004	0.004	0.010	0.014	6	Tot.P-Site2
2004	0.006	0.012	0.030	6	HypTP-Site2
2004	0.004	0.010	0.023	8	Tot.P-Site4
2004	0.002	0.005	0.007	8	HypTP-Site4
2004	0.006	0.007	0.009	2	Tot.P-Site5
2004	0.007	0.012	0.017	2	HypTP-Site5
2004	0.006	0.015	0.022	3	Tot.P-Site6
2004	0.004	0.008	0.011	3	HypTP-Site6
2004	0.003	0.004	0.007	3	Tot.P-Site8
2004	0.003	0.008	0.015	4	HypTP-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	0.00	0.01	0.09	71	NO3
2006	0.01	0.01	0.01	4	NO3-Site2
2006	0.00	0.02	0.04	5	NO3-Site4
2006	0.01	0.01	0.02	2	NO3-Site8
2006	0.01	0.02	0.03	5	NO3-Site10
2005	0.01	0.01	0.01	4	NO3-Site1
2005	0.01	0.01	0.01	3	NO3-Site2
2005	0.01	0.01	0.04	8	NO3-Site4
2005	0.01	0.01	0.05	6	NO3-Site6
2005	0.01	0.01	0.02	2	NO3-Site8
2005	0.01	0.01	0.01	4	NO3-Site10
2004	0.01	0.03	0.09	8	NO3-Site1
2004	0.03	0.07	0.12	8	HypNO3-Site1
2004	0.01	0.01	0.01	6	NO3-Site2
2004	0.02	0.07	0.09	6	HypNO3-Site2
2004	0.01	0.02	0.02	8	NO3-Site4
2004	0.01	0.04	0.25	8	HypNO3-Site4
2004	0.01	0.01	0.01	1	NO3-Site5
2004	0.02	0.02	0.03	2	HypNO3-Site5
2004	0.01	0.01	0.01	2	NO3-Site6
2004	0.02	0.05	0.09	3	HypNO3-Site6
2004	0.01	0.01	0.01	3	NO3-Site8
2004	0.01	0.01	0.01	2	HypNO3-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	0.01	0.02	0.33	72	NH4
2006	0.01	0.01	0.02	4	NH4-Site2
2006	0.01	0.02	0.04	5	NH4-Site4
2006	0.02	0.02	0.02	2	NH4-Site8
2006	0.01	0.02	0.03	5	NH4-Site10

TABLE 1: CSLAP Data Summary for Lake George (cont)

Year	Min	Avg	Max	N	Parameter
2004-06	0.01	0.02	0.33	72	NH4
2005	0.01	0.01	0.01	4	NH4-Site1
2005	0.01	0.01	0.01	3	NH4-Site2
2005	0.01	0.02	0.13	8	NH4-Site4
2005	0.01	0.06	0.33	6	NH4-Site6
2005	0.01	0.01	0.01	2	NH4-Site8
2005	0.01	0.01	0.04	4	NH4-Site10
2004	0.01	0.01	0.02	8	NH4-Site1
2004	0.01	0.01	0.03	8	HyNH4-Site1
2004	0.01	0.01	0.02	6	NH4-Site2
2004	0.01	0.08	0.42	6	HyNH4-Site2
2004	0.01	0.01	0.03	8	NH4-Site4
2004	0.01	0.01	0.02	8	HyNH4-Site4
2004	0.01	0.01	0.01	1	NH4-Site5
2004	0.01	0.01	0.01	2	HyNH4-Site5
2004	0.01	0.01	0.02	3	NH4-Site6
2004	0.01	0.01	0.01	3	HyNH4-Site6
2004	0.01	0.01	0.02	3	NH4-Site8
2004	0.01	0.03	0.09	3	HyNH4-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	0.01	0.28	1.04	56	TDN
2006	0.00	#DIV/0!	0.00	0	TDN-Site2
2006	0.00	#DIV/0!	0.00	0	TDN-Site4
2006	0.00	#DIV/0!	0.00	0	TDN-Site8
2006	0.00	#DIV/0!	0.00	0	TDN-Site10
2005	0.06	0.11	0.16	4	TDN-Site1
2005	0.10	0.15	0.18	3	TDN-Site2
2005	0.01	0.18	0.39	8	TDN-Site4
2005	0.16	0.33	1.04	6	TDN-Site6
2005	0.26	0.29	0.32	2	TDN-Site8
2005	0.13	0.21	0.33	4	TDN-Site10
2004	0.11	0.39	0.85	8	TDN-Site1
2004	0.11	0.30	0.56	7	HypTDN-Site1
2004	0.13	0.28	0.38	6	TDN-Site2
2004	0.23	0.37	0.60	6	HypTDN-Site2
2004	0.23	0.36	0.63	7	TDN-Site4
2004	0.25	0.42	0.76	8	HypTDN-Site4
2004	0.15	0.48	0.81	2	TDN-Site5
2004	0.18	0.43	0.67	2	HypTDN-Site5
2004	0.19	0.25	0.34	3	TDN-Site6
2004	0.07	0.35	0.60	3	HypTDN-Site6
2004	0.21	0.35	0.44	3	TDN-Site8
2004	0.32	0.39	0.44	3	HypTDN-Site8

TABLE 1: CSLAP Data Summary for Lake George (cont)

Year	Min	Avg	Max	N	Parameter
2004-06	0.83	40.93	183.37	56	TN/TP
2006	0.00	#DIV/0!	0.00	0	TN/TP-Site2
2006	0.00	#DIV/0!	0.00	0	TN/TP-Site4
2006	0.00	#DIV/0!	0.00	0	TN/TP-Site8
2006	0.00	#DIV/0!	0.00	0	TN/TP-Site10
2005	7.06	13.28	26.10	4	TN/TP-Site1
2005	23.32	25.94	28.57	3	TN/TP-Site2
2005	0.83	25.94	55.03	8	TN/TP-Site4
2005	11.86	27.29	81.71	6	TN/TP-Site6
2005	61.97	78.23	94.49	2	TN/TP-Site8
2005	19.20	20.79	22.37	2	TN/TP-Site10
2004	5.30	57.22	183.37	8	TN/TP-Site1
2004	8.96	31.70	74.06	7	HypTN/TP-Site1
2004	9.32	36.07	92.43	6	TN/TP-Site2
2004	11.72	43.27	102.36	6	HypTN/TP-Site2
2004	10.59	49.96	105.34	7	TN/TP-Site4
2004	36.18	96.66	255.40	8	HypTN/TP-Site4
2004	17.57	80.45	143.32	2	TN/TP-Site5
2004	28.09	33.81	39.53	2	HypTN/TP-Site5
2004	8.76	27.06	60.41	3	TN/TP-Site6
2004	6.31	52.72	85.06	3	HypTN/TP-Site6
2004	63.34	109.69	156.05	3	TN/TP-Site8
2004	30.19	55.21	95.71	3	HypTN/TP-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	1	9	74	65	CSLAP Tcolor
2006	6	18	27	4	CSLAP Tcolor-Site2
2006	2	7	11	7	CSLAP Tcolor-Site4
2006	5	8	10	2	CSLAP Tcolor-Site8
2006	1	7	11	4	CSLAP Tcolor-Site10
2005	3	6	11	4	CSLAP Tcolor-Site1
2005	1	11	33	4	CSLAP Tcolor-Site2
2005	1	4	7	7	CSLAP Tcolor-Site4
2005	1	4	5	5	CSLAP Tcolor-Site6
2005				0	CSLAP Tcolor-Site8
2005	9	15	20	2	CSLAP Tcolor-Site10
2004	1	8	34	6	CSLAP Tcolor-Site1
2004	1	5	12	5	CSLAP Tcolor-Site2
2004	1	8	22	7	CSLAP Tcolor-Site4
2004	7	14	21	2	CSLAP Tcolor-Site5
2004	6	29	74	3	CSLAP Tcolor-Site6
2004	2	4	7	3	CSLAP Tcolor-Site8

TABLE 1: CSLAP Data Summary for Lake George (cont)

Year	Min	Avg	Max	N	Parameter
2004-06	6.54	7.67	9.16	77	CSLAP pH
2006	7.93	8.34	9.16	6	CSLAP pH-Site2
2006	6.93	7.71	8.42	8	CSLAP pH-Site4
2006	7.50	7.80	8.02	3	CSLAP pH-Site8
2006	6.83	7.50	8.05	5	CSLAP pH-Site10
2005	7.49	7.82	8.27	5	CSLAP pH-Site1
2005	7.10	8.08	8.91	4	CSLAP pH-Site2
2005	6.65	7.52	8.00	8	CSLAP pH-Site4
2005	7.34	7.59	7.81	6	CSLAP pH-Site6
2005	7.78	7.78	7.78	1	CSLAP pH-Site8
2005	7.60	7.64	7.68	2	CSLAP pH-Site10
2004	6.54	7.33	8.16	8	CSLAP pH-Site1
2004	7.38	7.60	7.83	6	CSLAP pH-Site2
2004	6.60	7.46	8.40	8	CSLAP pH-Site4
2004	7.02	7.03	7.04	2	CSLAP pH-Site5
2004	6.85	7.68	8.51	2	CSLAP pH-Site6
2004	7.96	8.23	8.65	3	CSLAP pH-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	34	107	146	75	CSLAP Cond25
2006	79	93	105	6	CSLAP Cond25-Site2
2006	59	109	135	8	CSLAP Cond25-Site4
2006	59	92	116	3	CSLAP Cond25-Site8
2006	79	98	120	5	CSLAP Cond25-Site10
2005	75	113	135	4	CSLAP Cond25-Site1
2005	78	114	134	3	CSLAP Cond25-Site2
2005	75	107	123	8	CSLAP Cond25-Site4
2005	100	112	119	5	CSLAP Cond25-Site6
2005	116	116	116	1	CSLAP Cond25-Site8
2005	102	107	112	2	CSLAP Cond25-Site10
2004	92	118	146	8	CSLAP Cond25-Site1
2004	96	115	132	6	CSLAP Cond25-Site2
2004	34	106	133	8	CSLAP Cond25-Site4
2004	85	99	112	2	CSLAP Cond25-Site5
2004	101	115	127	3	CSLAP Cond25-Site6
2004	96	99	104	3	CSLAP Cond25-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	5.1	11.6	16.5	20	CSLAP Ca
2006	9.8	11.3	12.9	2	CSLAP Ca-Site2
2006	9.4	10.5	11.6	2	CSLAP Ca-Site4
2006	7.0	7.0	7.0	1	CSLAP Ca-Site8
2006	10.8	10.8	10.8	2	CSLAP Ca-Site10

TABLE 1: CSLAP Data Summary for Lake George (cont)

Year	Min	Avg	Max	N	Parameter
2005	12.4	12.4	12.4	1	CSLAP Ca-Site1
2005	11.6	11.6	11.6	1	CSLAP Ca-Site2
2005	11.1	11.5	11.8	2	CSLAP Ca-Site4
2005				0	CSLAP Ca-Site5
2005	12.1	12.1	12.1	1	CSLAP Ca-Site6
2005	13.0	13.0	13.0	1	CSLAP Ca-Site8
2005	5.1	5.1	5.1	1	CSLAP Ca-Site10
2004	13.7	15.1	16.5	2	CSLAP Ca-Site1
2004	12.6	13.3	13.9	2	CSLAP Ca-Site2
2004	13.2	13.2	13.2	1	CSLAP Ca-Site4
2004				0	CSLAP Ca-Site5
2004	12.2	12.2	12.2	1	CSLAP Ca-Site6
2004				0	CSLAP Ca-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	0.01	0.76	2.60	72	CSLAP Chl.a
2006	0.64	1.05	1.32	6	CSLAP Chl.a-Site2
2006	0.32	0.93	1.43	8	CSLAP Chl.a-Site4
2006	0.01	0.23	0.38	3	CSLAP Chl.a-Site8
2006	0.10	0.43	0.83	5	CSLAP Chl.a-Site10
2005	0.19	0.82	1.55	6	CSLAP Chl.a-Site1
2005	0.05	0.33	0.88	4	CSLAP Chl.a-Site2
2005	0.16	0.66	1.02	7	CSLAP Chl.a-Site4
2005	0.05	0.09	0.16	5	CSLAP Chl.a-Site6
2005	0.41	0.44	0.46	2	CSLAP Chl.a-Site8
2005	0.68	0.72	0.76	2	CSLAP Chl.a-Site10
2004	0.20	0.97	1.70	6	CSLAP Chl.a-Site1
2004	0.22	1.42	2.39	5	CSLAP Chl.a-Site2
2004	0.30	1.20	2.60	7	CSLAP Chl.a-Site4
2004	0.50	0.50	0.50	1	CSLAP Chl.a-Site5
2004	0.50	0.75	1.00	2	CSLAP Chl.a-Site6
2004	0.14	0.43	0.60	3	CSLAP Chl.a-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	1	1.2	3	81	QA
2006	1	1.0	1	6	QA-Site2
2006	1	1.0	1	8	QA-Site4
2006	1	1.0	1	3	QA-Site8
2006	1	1.0	1	5	QA-Site10
2005	2	2.5	3	4	QA-Site1
2005	1	1.0	1	4	QA-Site2
2005	1	1.0	1	8	QA-Site4
2005	1	1.0	1	6	QA-Site6
2005	1	1.0	1	2	QA-Site8
2005	1	1.0	1	4	QA-Site10

TABLE 1: CSLAP Data Summary for Lake George (cont)

Year	Min	Avg	Max	N	Parameter
2004-06	1	1.2	3	81	QA
2004	1	2.1	3	8	QA-Site1
2004	1	1.2	2	6	QA-Site2
2004	1	1.0	1	8	QA-Site4
2004	1	1.5	2	2	QA-Site5
2004	1	1.0	1	3	QA-Site6
2004	1	1.3	2	4	QA-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	1	1.2	3	81	QB
2006	1	1.0	1	6	QB-Site2
2006	1	1.0	1	8	QB-Site4
2006	1	1.0	1	3	QB-Site8
2006	1	1.6	2	5	QB-Site10
2005	1	2.0	3	4	QB-Site1
2005	1	1.0	1	4	QB-Site2
2005	1	1.0	1	8	QB-Site4
2005	1	1.2	2	6	QB-Site6
2005	1	1.0	1	2	QB-Site8
2005	1	1.8	3	4	QB-Site10
2004	1	1.9	2	8	QB-Site1
2004	1	1.0	1	6	QB-Site2
2004	1	1.0	1	8	QB-Site4
2004	1	1.5	2	2	QB-Site5
2004	1	1.0	1	3	QB-Site6
2004	1	1.0	1	4	QB-Site8
Year	Min	Avg	Max	N	Parameter
2004-06	1	1.2	3	80	QC
2006	1	1.0	1	5	QC-Site2
2006	1	1.0	1	8	QC-Site4
2006	1	1.0	1	3	QC-Site8
2006	1	1.0	1	5	QC-Site10
2005	2	2.5	3	4	QC-Site1
2005	1	1.3	2	4	QC-Site2
2005	1	1.0	1	8	QC-Site4
2005	1	1.0	1	6	QC-Site6
2005	1	1.0	1	2	QC-Site8
2005	1	1.0	1	4	QC-Site10
2004	1	2.3	3	8	QC-Site1
2004	1	1.2	2	6	QC-Site2
2004	1	1.0	1	8	QC-Site4
2004	1	1.0	1	2	QC-Site5
2004	1	1.0	1	3	QC-Site6
2004	1	1.3	2	4	QC-Site8