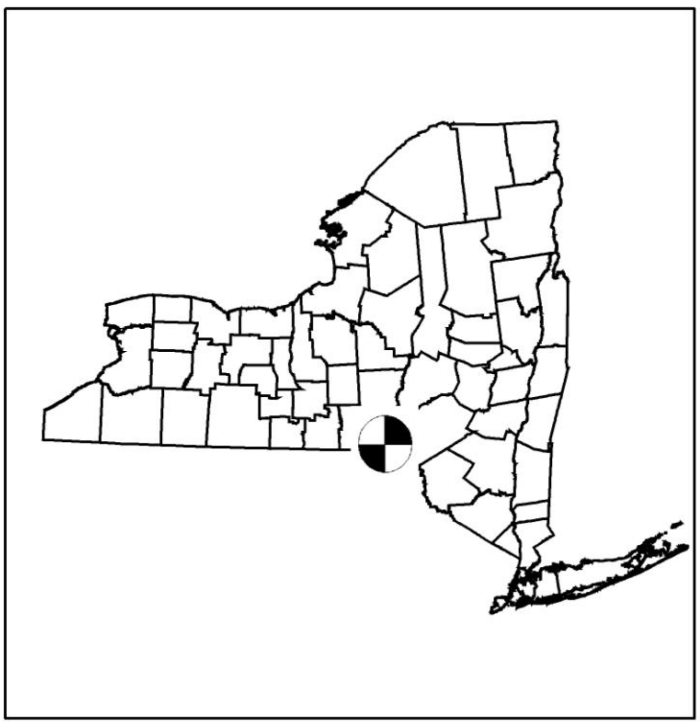
New York State Department of Environmental Conservation

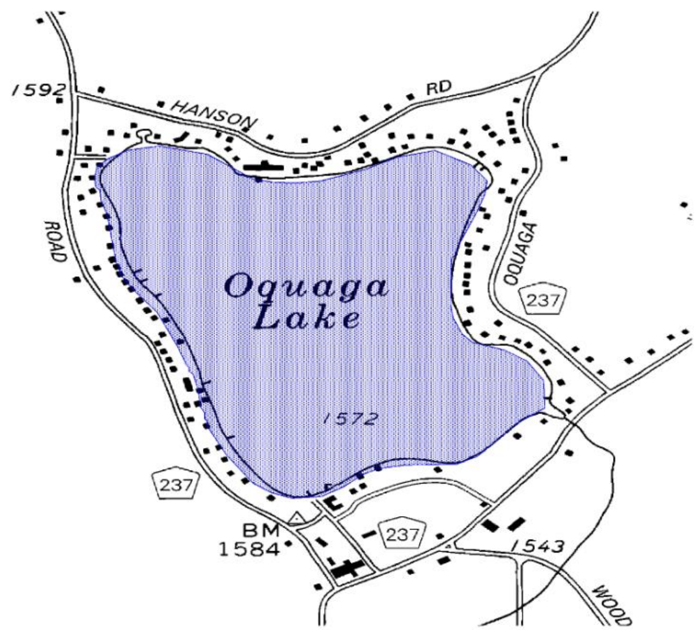
Division of Water

New York Citizens Statewide Lake Assessment Program (CSLAP)

2007 Abridged Annual Report- Oquaga Lake

April, 2008





New York State Department of Environmental Conservation

2007 INTERPRETIVE SUMMARY
ADBRIDGED REPORT

NEW YORK
CITIZENS STATEWIDE
LAKE ASSESSMENT PROGRAM
(CSLAP)

OQUAGA LAKE

Scott A. Kishbaugh, PE

NYS Department of Environmental Conservation
NY Federation of Lake Associations

April, 2008

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 2007 sampling results for **Oquaga Lake**.

Oquaga Lake is a 134 acre, class AA lake found in the Town of Deposit in Broome County in the Southern Tier region of New York State. It was first sampled as part of CSLAP in 1987. The following volunteers have participated in CSLAP, and deserve most of the credit for the success of this program at **Oquaga Lake**: **Kathy Greenman, Barbara and Fred Fenning, Joan, Ross, James and Carole Peduto, and Mark, Emma and Andrew Millspaugh.**

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, Dick Draper, and Margaret Novak for supporting CSLAP in the last several years; Jay Bloomfield and James Sutherland, for their work in developing and implementing the program, and the technical staff from the Lake Services Section and the Statewide Water Monitoring Section, for continued technical review of program design.

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

The New York State Department of Health (prior to 2002) and Upstate Freshwater Institute (since 2002), particularly Steve Effler, MaryGail Perkins, and Elizabeth Miller 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 1,500 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.

ABRIDGED SUMMARY- OQUAGA LAKE 2007

1. **Were there any significant differences in the lake eutrophication indicators (water clarity, phosphorus, chlorophyll *a*) in 2007 compared to the typical CSLAP sampling season?**

Response: Oquaga Lake was less productive in 2007 than in most previous years, particularly relative to the period from 1987 to 1992. This was manifested by higher water transparency readings than in most previous years, and algae levels that were among the lowest recorded through CSLAP. Phosphorus readings were only slightly lower than normal. These data continue to suggest very highly favorable water quality conditions.

2. **Were there any significant differences in the other lake water quality indicators (pH, conductivity, color, nitrogen, calcium) in 2007 compared to the typical CSLAP sampling season?**

Response: pH readings have increased in the last few years, although long-term changes have not been apparent. The other non-trophic indicators were within the normal range for the lake in 2007. Oquaga Lake continued to exhibit characteristics typical of weakly colored lakes with soft water, low nitrogen levels, and circumneutral (near neutral pH) conditions. The lake does not appear to be susceptible to zebra mussel infestations, based on calcium levels in the lake.

3. **Were there any significant differences in the lake perception indicators (water quality, aquatic plants, recreation) in 2007 compared to the typical CSLAP sampling season?**

Response: Recreational assessments have been consistently favorable in Oquaga Lake, befitting a lake with high water clarity, low algae levels, and aquatic plants that only rarely grow to the lake surface. Plant coverage has increased somewhat in recent years, perhaps consistent with slightly higher water clarity, but this has not triggered any recreational use impacts.

4. **Are there any long term trends in any of the water quality or lake perception indicators, and can these trends be tied to weather patterns or lake management activities?**

Response Water clarity readings have been higher and nutrient and algae levels have been lower in the last few years. This may be due to wetter weather, since this region of the state has been wet for most of the last decade. Conductivity readings have been higher in the period from 2002-2007, at least relative to conductivity readings from 1987-1992, although these readings have not increased in the last few years. Aquatic plant coverage has increased slightly in the last few years, perhaps due to higher water transparency readings.

ABRIDGED SUMMARY- OQUAGA LAKE 2007 (cont)

5. Did any of the data or information collected through CSLAP in 2007 indicate any differences from the PWL (Priority Waterbody List) evaluation for the lake provided in the 2006 CSLAP report (available at www.nysfola.org)?

Response: The 1996 NYSDEC Priority Waterbody Listings (PWL) for the Delaware River basin do not include Oquaga Lake. The CSLAP datasets suggest that no listings appear to be warranted. The 2007 data are consistent with this water quality and recreational assessment.

6. Were any aquatic plant collections conducted in 2007, and if so, what plants were identified?

Response: Aquatic plants have been not collected and submitted for identification through CSLAP.

7. Is there any other information the Oquaga Lake community should be made aware of, based on the 2007 CSLAP data?

Response: The 2007 CSLAP water quality data indicate that lake productivity has been even lower than normal, although aquatic plant coverage has increased slightly. The lake association should continue to be vigilant in preventing the introduction and spread of invasive exotic plants.

NEW YORK STATE, CSLAP AND OQUAGA LAKE WATER-QUALITY DATA: 1986-2006

Overall Summary:

Although water-quality conditions at each CSLAP lake have varied each year since 1986, and although detailed statistical analyses of the entire CSLAP dataset has not yet been conducted, general water-quality trends can be evaluated after 5-21 years' worth of CSLAP data from these lakes. Overall (regional and statewide) water-quality conditions and trends can be evaluated by a variety of different means. Each of the tested parameters ("analytes") can be evaluated by looking at how the analyte varies from year to year from the long-term average ("normal") condition for each lake, and by comparing these parameters across a variety of categories, such as across regions of the state, across seasons (or months within a few seasons), and across designated best uses for these lakes. Such evaluations are provided in the second part of this summary, via figures 7 through 17. The annual variability is expressed as the difference in the annual average (mean) from both the long-term average and the normal variability expected from this long-term average. The latter can be presented as the "standard error" (SE, calculated here within the 95% confidence interval)—one standard error away from the long-term average can be considered a "moderate" change from "normal," with a deviation of two or more standard errors considered to be a "significant" change. For each of these parameters, the percentage of lakes with annual data falling within one standard error from the long-term average are considered to exhibit "no change," with the percentage of lakes demonstrating moderate to significant changes also displayed on these graphs (figures 7a through 17a). Annual changes in these lakes can also be evaluated by standard linear regressions- annual means over time, with moderate correlation defined as $R^2 > 0.33$, and significant correlation defined as $R^2 > 0.5$. These methods are described in greater detail in Appendix D. Assessments of weather patterns—whether a given year was wetter or drier than usual—accounts for broad statewide patterns, not weather conditions at any particular CSLAP lake. As such, weather may have very different impacts at some (but not most) CSLAP lakes in some of these years.

Long-term trends can also be evaluated by looking at the summary findings of individual lakes and attempting to extrapolate consistent findings to the rest of the lakes. Given the (non-Gaussian) distribution of many of the water-quality parameters evaluated in this report, non-parametric tools may be the most effective means for assessing the presence of a water-quality trend. However, these tools do not indicate the magnitude of the trend. As such, a combination of parametric and non-parametric tools is employed here to evaluate trends. The Kendall tau ranking coefficient has been utilized by several researchers and state water-quality agencies to evaluate water-quality trends via non-parametric analyses and is utilized here. For parametric analyses, best-fit analysis of summer (June 15 through September 15) averages for each of the eutrophication indicators can be evaluated, with trends attributable to instances in which deviations in annual means exceed the deviations found in the calculation of any single annual mean. "Moderate" change is defined as $\tau > 0.33$, and "significant" change is defined as $\tau > 0.5$. It has been demonstrated in many of these programs that long-term trend analyses cannot be utilized to evaluate lake datasets until at least five years' worth of data have been collected.

As of 2007, there were 157 CSLAP lakes that have been sampled for at least five years; of these, 113 were sampled within the last five years. The change in these lakes is demonstrated in figures 7 and 8; figures 7a through 7l indicate "moderate" long-term change, while figures 8a through 8l indicate "significant" long-term change**.** When these lakes are analyzed by this combination of parametric and non-parametric analyses, these data suggest that while most NYS lakes have not demonstrated a significant change (either τ or $R^2 > 0.5$) or even a moderate changes (τ or $R^2 > 0.33$).

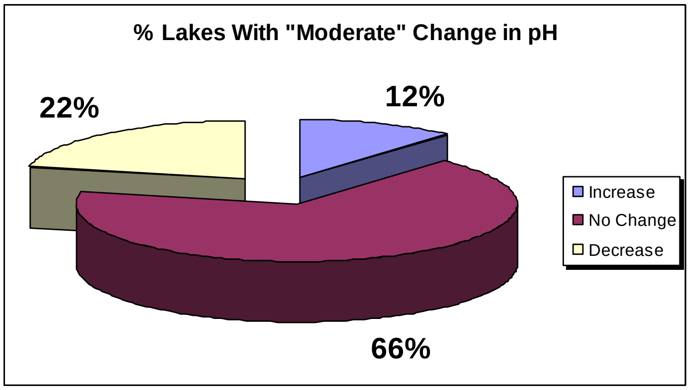


Figure 7a. %CSLAP Lakes Exhibiting Moderate Long-Term Change in pH

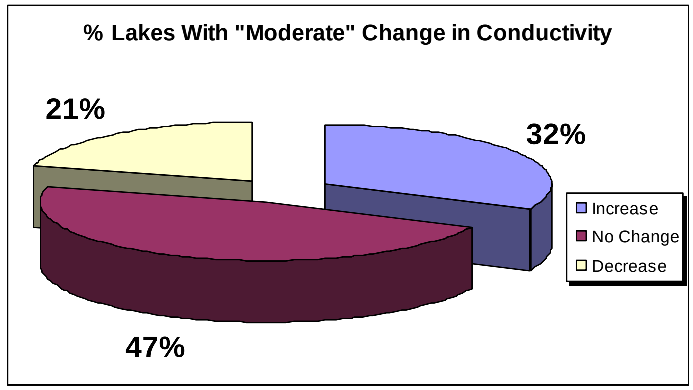


Figure 7b. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Conductivity

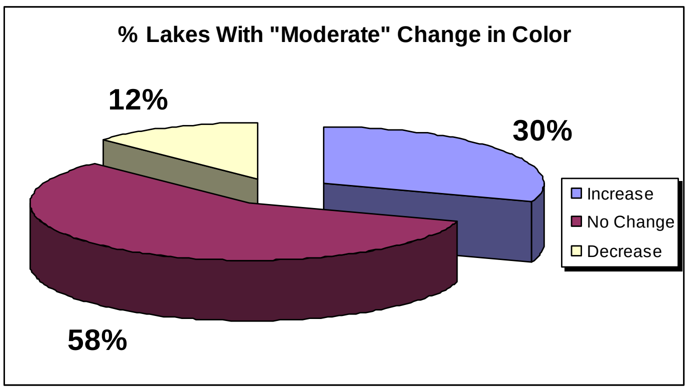


Figure 7c. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Color

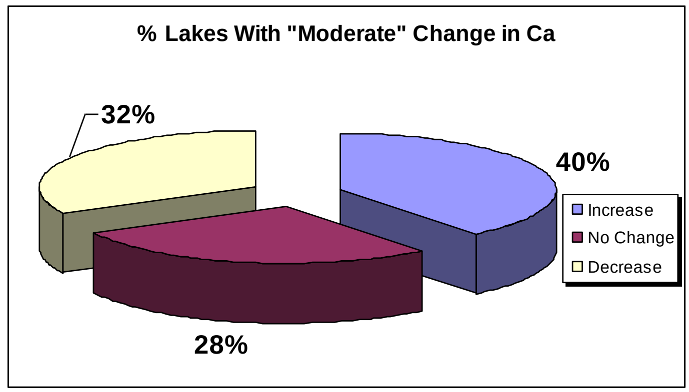


Figure 7d. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Calcium

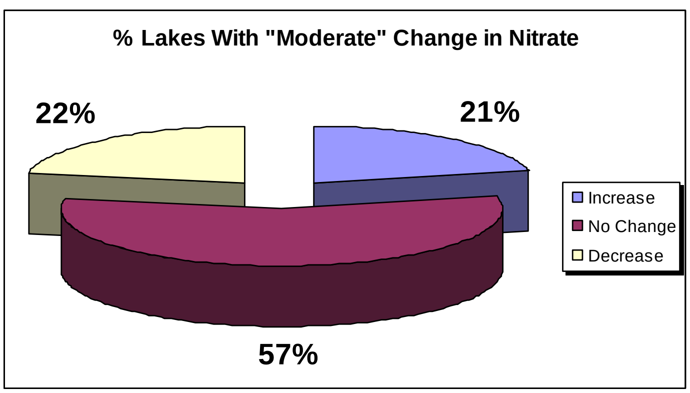


Figure 7e. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Nitrate

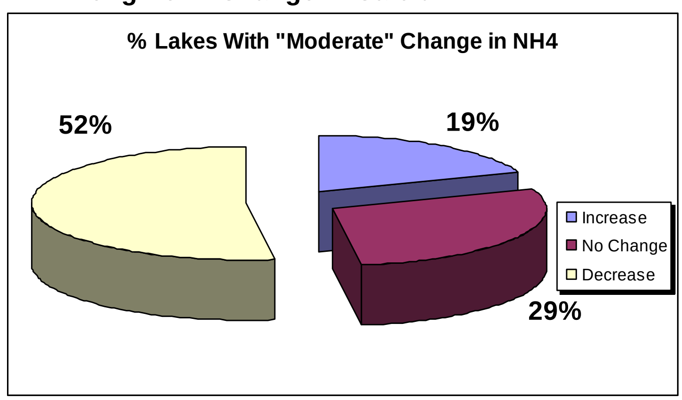


Figure 7f. %CSLAP Lakes Exhibiting Moderate Long-Term Changes in Ammonia

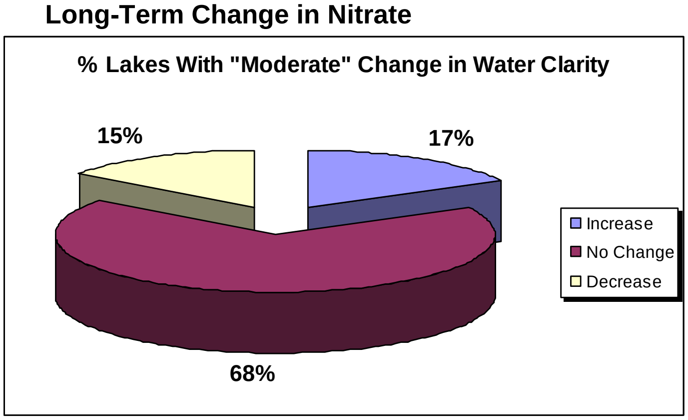


Figure 7g. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Water Clarity

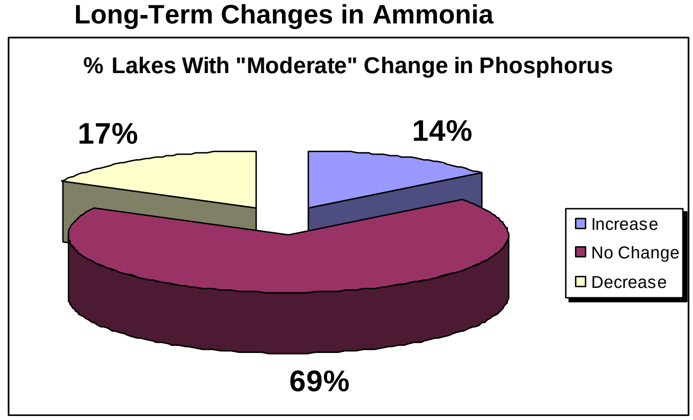


Figure 7h. %CSLAP Lakes Exhibiting Moderate Long-Term Changes in Phosphorus

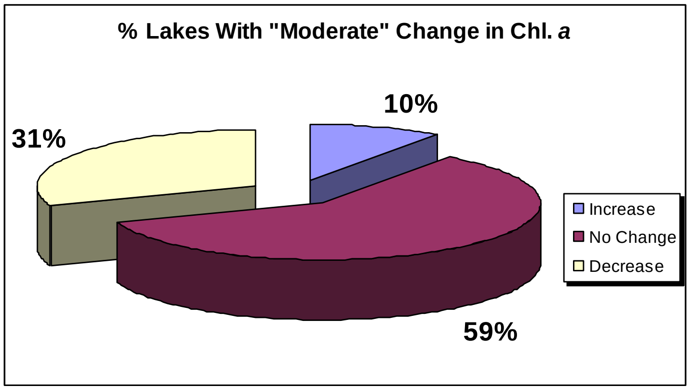


Figure 7i. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Chlorophyll *a*

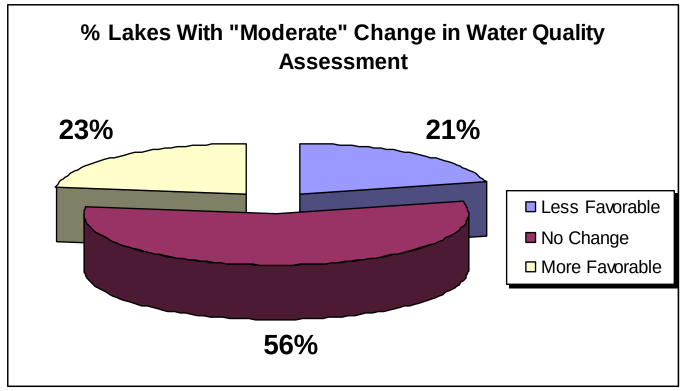


Figure 7j. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Water-quality Assessment

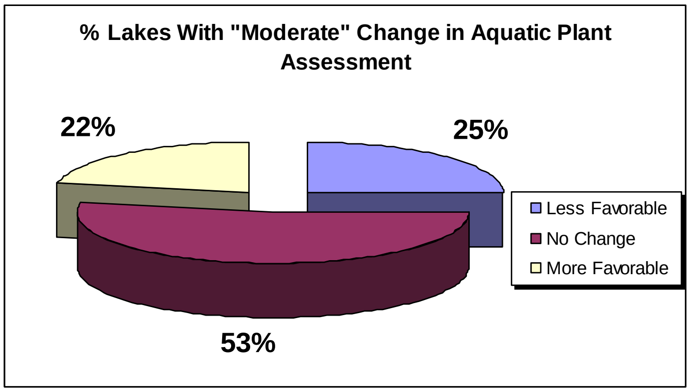


Figure 7k. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Aquatic Plant Assessment

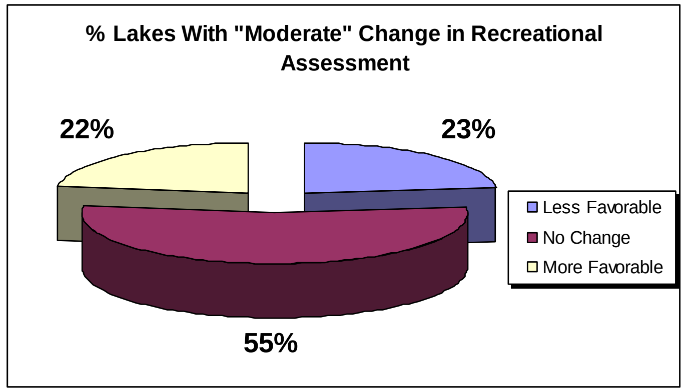


Figure 7l. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Recreational Assessment

Some of the lakes sampling through CSLAP have demonstrated a moderate change since CSLAP sampling began in 1986, at least for some of the sampling parameters measured through CSLAP. In general, between 50% and 65% of the CSLAP lakes have not exhibited even moderate changes. Some of the parameters that have exhibited moderate changes may not reflect actual water-quality change. For example, it appears that the increase in color (Figure 7c) and decrease in nitrate (Figure 7e) and chlorophyll *a* (Figure 7i) is probably due to the shift in laboratories, even though the analytical methods are comparable. The increase in conductivity (Figure 7b) and decrease in pH (Figure 7a) are probably real phenomena—both changes were evident to some degree prior to the shift in laboratories, and both are largely predictable. The difference between the increase and decrease in the other sampling parameter (or between more favorable and less favorable conditions) does not appear to be important and probably indicates random variability.

Figures 8a through 8l indicate that, not surprisingly, “substantial” change is less common. Substantial change follows the same patterns as discussed above with the evaluation of “moderate” change in CSLAP lakes, except that the percentage of CSLAP lakes not exhibiting significant change is much higher, rising to about 65-80% of these lakes. For those CSLAP lakes exhibiting substantial change, it is most apparent in the same parameters described above. About 25% of the CSLAP lakes have exhibited a substantial increase in conductivity, consistent with a broad (and expected) successional pattern, in which lakes generally concentrate materials washed in from the surrounding watershed (and as the runoff itself concentrates materials as these watersheds move from forested to more urbanized, whether via residential development or other uses. The comparison between figures 8b and 8e through 8h indicate that this has not (yet) translated into higher nutrient loading into lakes.

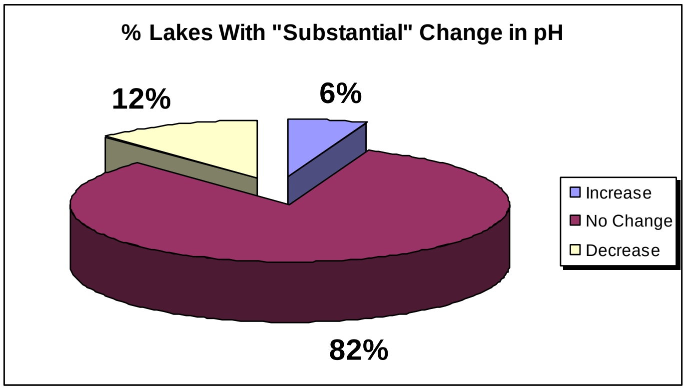


Figure 8a. %CSLAP Lakes Exhibiting Substantial Long-Term Change in pH

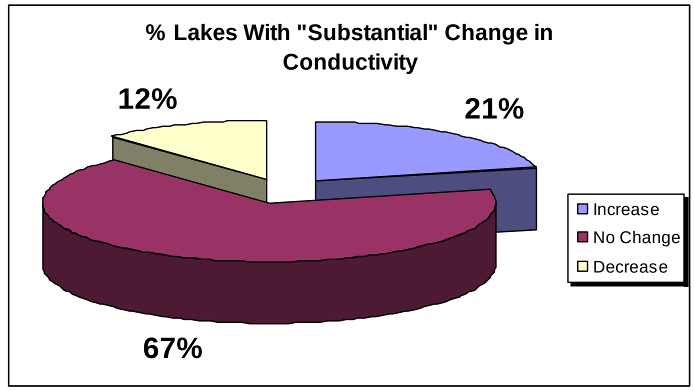


Figure 8b. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Conductivity

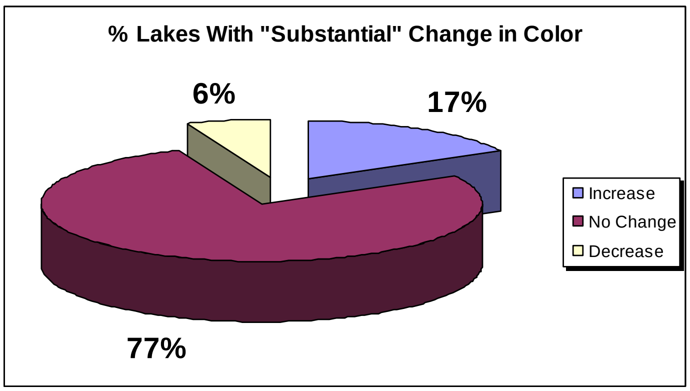


Figure 8c. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Color

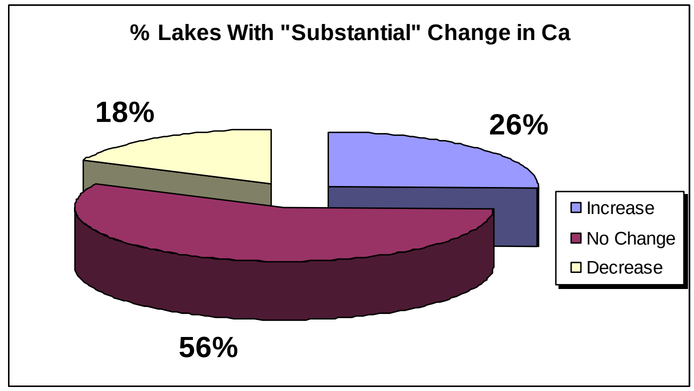


Figure 8d. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Calcium

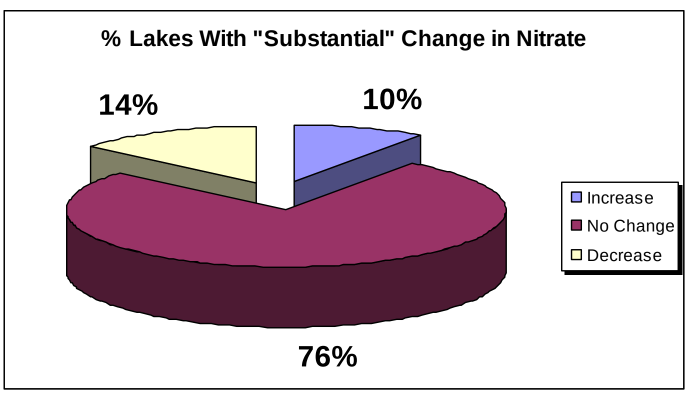


Figure 8e. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Nitrate

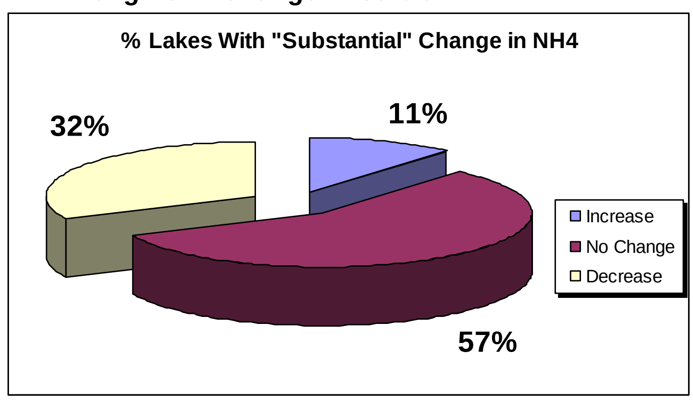


Figure 8f. %CSLAP Lakes Exhibiting Substantial Long-Term Changes in Ammonia

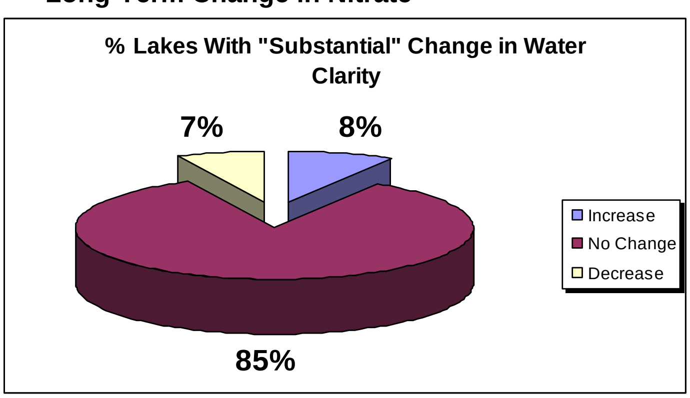


Figure 8g. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Water Clarity

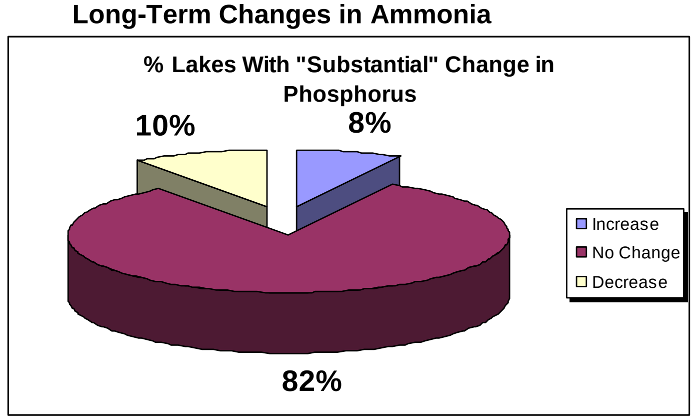


Figure 8h. %CSLAP Lakes Exhibiting Substantial Long-Term Changes in Phosphorus

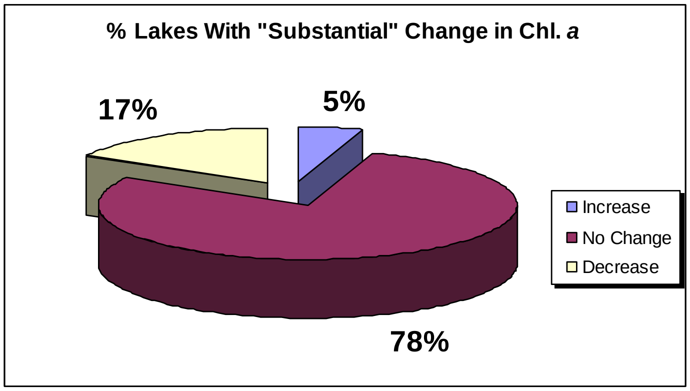


Figure 8i. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Chlorophyll *a*

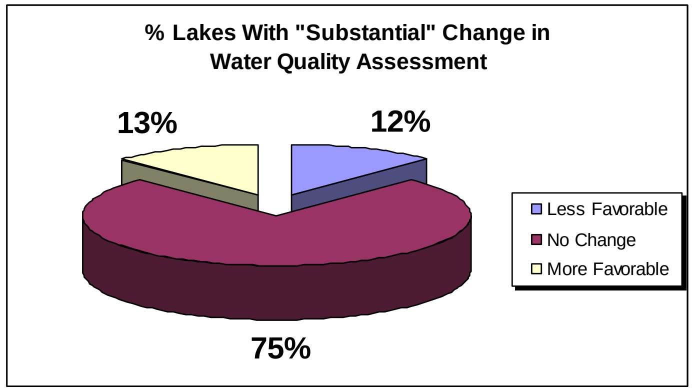


Figure 8j. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Water-quality Assessment

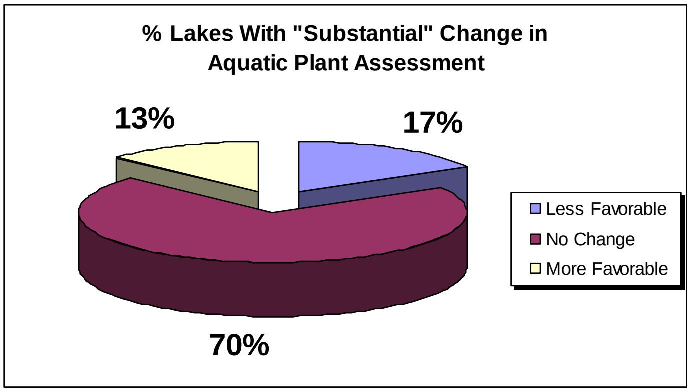


Figure 8k. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Aquatic Plant Assessment

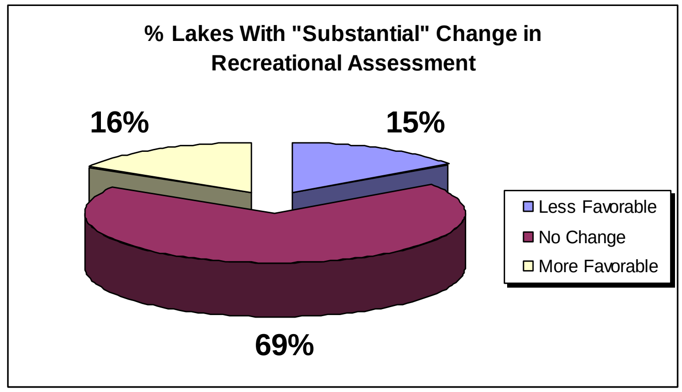


Figure 8l. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Recreational Assessment

As noted above, there does not appear to be any clear pattern between weather and water-quality changes, although some connection between changes in precipitation and changes in some water-quality indicators is at least alluded to in some cases. However, all of these lakes may be the long-term beneficiaries of the ban on phosphorus in detergents in the early 1970s, which, with other local circumstances (perhaps locally more "favorable" weather, local stormwater or septic management, etc.), has resulted in less productive conditions. Without these circumstances, water-quality conditions in many of these lakes might otherwise be more productive in the creeping march toward aging, eutrophication, and succession (as suggested from the steady rise in conductivity). In other words, the higher materials loading into these lakes may be largely balanced by a reduction in nutrients within the corresponding runoff.

The drop in pH in NYS lakes has been studied at length within the Adirondacks and may continue to be attributable on a statewide basis to acid rain, which continues to fall throughout the state. The CSLAP dataset is not adequate to evaluate any ecological changes associated with higher lake acidity, and it is certainly worth noting that the slight drop in pH in most CSLAP lakes does not bring these lakes into an acidic status (these lakes have, at worse, become slightly less basic). In addition, for lakes most susceptible to acidification, laboratory pH is only an approximation of actual pH. Fully accurate pH readings require field measurements using very specialized equipment, although for most lakes with even modest buffering capacity, laboratory pH is a good estimate of *in situ* pH readings. So while the decrease in pH in some CSLAP lakes should continue to be watched, it does not appear to be a cause for concern, at least relative to the low pH in small, undeveloped, high-elevation lakes within the Adirondack Park.

Lake perception has changed more significantly than water-quality (except conductivity). None of the lake perception indicators—water-quality, weeds, or recreation—have varied in a consistent manner, although variability is more common in each of these indicators. The largest change is in recreational assessments, with about one third of all lakes exhibiting substantial change and nearly half demonstrating moderate change. A more detailed analysis of these assessments (not presented here) indicates that the Adirondacks have demonstrated more "positive" change than other regions of the state, due to the perception that aquatic weed densities have not increased as significantly (and water-quality conditions have improved in some cases). However, the rapid spread of *Myriophyllum spicatum* into the interior Adirondacks will likely reverse this "trend" in coming years, and it is not clear if these "findings" can be extrapolated to other lakes within the Adirondack Park.

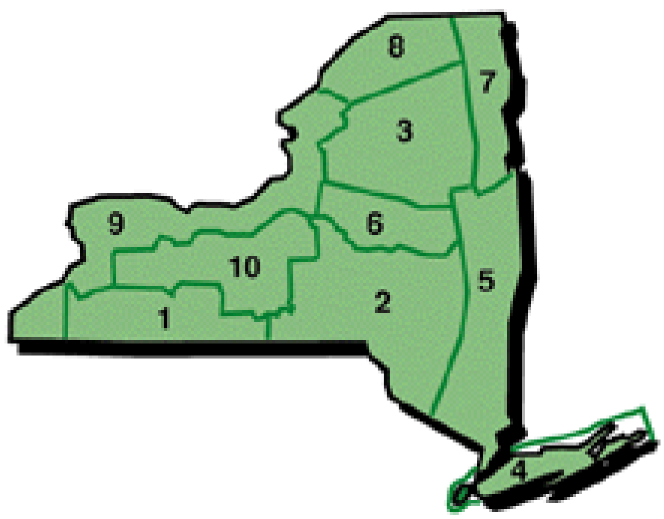


Figure 9- NOAA Weather Zones in New York State

Larger trends and observations about each of the CSLAP sampling parameters are presented below in figures 10 through 21. Information about general precipitation and runoff patterns—whether a particular year was wet or dry—is reported to provide a basis for understanding the connection between weather and water quality for lakes in New York state. It is clear that weather patterns are highly variable within the state. While this is also apparent down at the individual lake scale—storms can fall at a lake but not a neighboring lake—the National Oceanographic and Atmospheric Administration (NOAA) has established ten weather zones in New York state corresponding to regions exhibiting similar weather patterns. Weather data for the state can be summarized by each of these zones, in an attempt to fine-tune individual lake analyses to local weather data.

The individual parameter summaries provided in figures 10-20 correspond to the predominant weather patterns found from 1986 to 2006 in the state. A code can be located above the columns for each year; a "↑" corresponds to wetter (>50%) than normal weather, while "↓ " corresponds to drier (<50%) than normal weather, and "0" corresponds to normal weather. In this code, the first symbol corresponds to the winter and spring precipitation, and the second symbol corresponds to summer precipitation. So, for example, a code of "↑↓" corresponds to a wet spring and dry summer, while "00" corresponds to normal spring and summer precipitation. While ideally the individual parameter summaries and weather summaries could be delineated by weather zone, the CSLAP lake dataset is not sufficient large for most of these weather zones to generate statistically meaningful data summaries. However, these weather zone data are used in the individual lake data summaries in **Section IV: Detailed Oquaga Lake Water Quality Summary.**

Oquaga Lake is in NOAA weather zone 2, the Eastern Plateau region. The precipitation patterns for this zone are summarized below.

Statewide and Oquaga Lake Regional Weather Patterns

Weather patterns in New York state have varied significantly from year to year since at least 1986. This may be a response to global climatic change, since greater weather variance has been observed by both climatologists and casual observers.

Using the criteria above (wetter = >50% more precipitation than the long-term average, drier = >50% less precipitation than normal) and equally weighing each of the 10 NOAA weather zones in New York state, Table 1 shows the winter (January through March) and spring (April through June) precipitation and "summer" (June through September) precipitation patterns for New York state and the NOAA zone corresponding to Oquaga Lake. Summer was defined here to overlap with spring to include the entirety of the sampling season for most CSLAP lakes.

Year	Statewide Avg: Winter-Spring / Summer	NOAA Zone 2 Avg: Winter-Spring / Summer
1986	Normal / Wet	Very Wet / Normal
1987	Dry / Normal	Normal / Normal
1988	Very Dry / Normal	Dry / Normal
1989	Wet / Normal	Wet / Normal
1990	Very Wet / Normal	Very Wet / Normal
1991	Normal / Normal	Normal / Normal
1992	Normal / Wet	Normal / Normal
1993	Wet / Normal	Very Wet / Normal
1994	Wet / Normal	Very Wet / Wet
1995	Very Dry / Normal	Dry / Dry
1996	Very Wet / Normal	Very Wet / Wet
1997	Normal / Normal	Normal / Normal
1998	Very Wet / Normal	Very Wet / Normal
1999	Normal / Normal	Wet / Normal
2000	Very Wet / Normal	Very Wet / Normal
2001	Normal / Normal	Normal / Normal
2002	Very Wet / Dry	Very Wet / Normal
2003	Normal / Wet	Very Wet / Very Wet
2004	Dry / Very Wet	Normal / Very Wet
2005	Normal / Normal	Very Wet / Normal
2006	Wet / Wet	Very Wet / Very Wet

Table 1: Statewide and NOAA Zone 2 Weather Patterns

The weather data in Table 1 shows that wetter than normal summers have occurred in three of the last four years, although more variable weather patterns have occurred in the winter and spring. The wettest years have been 1990, 1996, 1998, 2004 and 2006, while the driest years were 1988 and 1995. The only dry seasons since 1995 were the winter of 2004 and the summer of 2002.

Data from the Eastern Plateau Region—which includes Oquaga Lake— have indicated wet conditions over nearly all of the last eleven years. The wettest years have been 2006, 2003, and 1996, while the driest years were 1995 and 1988. It should be noted that no dry summers or winters have occurred in this region in the last ten years. Within the CSLAP sampling timetable for Oquaga Lake, 2006 and 2003 were wet, and 1988 was drier than normal.

DETAILED OQUAGA LAKE WATER-QUALITY SUMMARY

CSLAP is intended to provide a database to help lake associations understand lake conditions and foster sound lake protection and pollution prevention decisions. This individual lake summary for 2007 contains two forms of information. The raw data and graphs present a snapshot or glimpse of water-quality conditions at each lake. They are based on (at most) eight or nine sampling events during the summer. As lakes are sampled through CSLAP for a number of years, the database for each lake will expand, and assessments of lake conditions and water-quality data become more accurate. For this reason, lakes new to CSLAP for only one year will not have information about annual trends.

Raw Data

Two **"**data sets**"** are provided below. The data presented in Table 2 include an annual summary of the minimum, maximum, and average for each of the CSLAP sampling parameters, including data from other sources for which sufficient quality-assurance/quality-control documentation is available for assessing the validity of the results. This data may be useful for comparing a particular data point for the current sampling year with historical data or information. Tables 3 through 5 includes more detailed summaries of the 2007 and historical data sets, including some evaluation of water-quality trends, comparison against existing water-quality standards, and whether 2007 represented a typical year.

Graphs

The second form of data analysis for your lake is presented in the form of graphs. These graphs are based on the raw data sets to represent a snapshot of water-quality conditions at your lake. The more sampling that has been done on a particular lake, the more information that can be presented on the graph, and the more information you have to identify annual trends for your lake. For example, a lake that has been doing CSLAP monitoring consistently for five years will have a graph depicting five years' worth of data, whereas a lake that has been doing CSLAP sampling for only one year will only have one. Therefore, it is important to consider the number of sampling years of information in addition to where the data points fall on a graph when trying to draw conclusions about annual trends. There are certain factors not accounted for in this report that lake managers should consider:

- **Local weather conditions** (high or low temperatures, rainfall, droughts or hurricanes). Due to delays in receiving meteorological data from NOAA stations within NYS, weather data from individual weather stations or the present sampling season are not included in these reports. Some of the variability reported below can be attributed more to weather patterns than to a "real" water trend or change. However, it is presumed that much of the sampling "noise" associated with weather is dampened over multiple years of data collection and thus should not significantly influence the limited trend analyses provided for CSLAP lakes with longer and larger databases.

- **Sampling season and parameter limitations**. Because sampling is generally confined to June-September, this report does not look at CSLAP parameters during the winter and other seasons. Winter conditions can impact the usability and water-quality of a lake. In addition, there are other sampling parameters (fecal coliform, dissolved oxygen, etc.) that may be responsible for chemical and biological processes and changes in physical measurements (such as water clarity) and the perceived conditions in the lake. *The 2007 CSLAP report attempts to standardize some comparisons by limiting the evaluation to the summer recreational season and the most common sampling periods (mid-June through mid-September), in the event that samples are collected at other times of the year (such as May or October) during only some sampling seasons.*

TABLE 2: CSLAP Data Summary for Oquaga Lake

Year	Min	Avg	Max	N	Parameter
1987-07	**1.75**	**6.56**	**12.30**	**94**	**CSLAP Zsd**
2007	7.95	9.06	10.80	7	CSLAP Zsd
2006	5.60	8.46	11.65	7	CSLAP Zsd
2005	4.73	6.12	6.80	7	CSLAP Zsd
2004	6.10	8.85	11.30	8	CSLAP Zsd
2003	5.05	7.67	9.70	8	CSLAP Zsd
2002	5.45	8.49	12.30	9	CSLAP Zsd
1992	3.50	4.57	5.75	3	CSLAP Zsd
1991	1.75	4.58	6.50	6	CSLAP Zsd
1990	4.25	5.64	6.50	7	CSLAP Zsd
1989	4.25	4.88	5.63	7	CSLAP Zsd
1988	4.75	5.65	6.50	10	CSLAP Zsd
1987	2.75	4.73	6.00	15	CSLAP Zsd
Year	Min	Avg	Max	N	Parameter
1987-07	**0.002**	**0.007**	**0.014**	**94**	**CSLAP Tot.P**
2007	0.004	0.006	0.009	7	CSLAP Tot.P
2007	0.006	0.009	0.018	8	CSLAP HypoTP
2006	0.004	0.006	0.007	8	CSLAP Tot.P
2006	0.006	0.009	0.014	8	CSLAP HypoTP
2005	0.004	0.006	0.009	8	CSLAP Tot.P
2005	0.005	0.008	0.012	8	CSLAP HypoTP
2004	0.002	0.004	0.007	8	CSLAP Tot.P
2004	0.003	0.007	0.013	8	CSLAP HypoTP
2003	0.003	0.006	0.011	8	CSLAP Tot.P
2003	0.005	0.008	0.016	8	CSLAP HypoTP
2002	0.003	0.005	0.007	8	CSLAP Tot.P
2002	0.006	0.009	0.017	6	CSLAP HypoTP
1992	0.008	0.011	0.014	3	CSLAP Tot.P
1991	0.007	0.009	0.012	6	CSLAP Tot.P
1990	0.004	0.008	0.012	7	CSLAP Tot.P
1989	0.005	0.008	0.013	7	CSLAP Tot.P
1988	0.005	0.007	0.011	10	CSLAP Tot.P
1987	0.003	0.007	0.012	14	CSLAP Tot.P
Year	Min	Avg	Max	N	Parameter
1987-07	**0.00**	**0.02**	**0.18**	**78**	**CSLAP NO3**
2007	0.00	0.02	0.06	7	CSLAP NO3
2006	0.01	0.02	0.03	7	CSLAP NO3
2005	0.01	0.03	0.09	8	CSLAP NO3
2004	0.01	0.02	0.02	8	CSLAP NO3
2004	0.01	0.02	0.05	8	CSLAP HyNO3
2003	0.00	0.01	0.03	8	CSLAP NO3
2003	0.00	0.00	0.01	8	CSLAP HyNO3
2002	0.00	0.01	0.01	9	CSLAP NO3
2002	0.00	0.01	0.02	9	CSLAP HyNO3
1992	0.01	0.01	0.01	1	CSLAP NO3
1991	0.01	0.01	0.01	3	CSLAP NO3

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
NH_4	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)
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 2: CSLAP Data Summary for Oquaga Lake (cont)

Year	Min	Avg	Max	N	Parameter
1987-07	**0.00**	**0.02**	**0.18**	**78**	**CSLAP NO3**
1990	0.01	0.01	0.01	4	CSLAP NO3
1989	0.01	0.01	0.01	3	CSLAP NO3
1988	0.01	0.01	0.01	6	CSLAP NO3
1987	0.01	0.02	0.18	14	CSLAP NO3
Year	Min	Avg	Max	N	Parameter
2002-07	**0.00**	**0.02**	**0.11**	**47**	**CSLAP NH4**
2007	0.01	0.03	0.11	7	CSLAP NH4
2006	0.01	0.02	0.05	7	CSLAP NH4
2005	0.01	0.01	0.01	8	CSLAP NH4
2004	0.01	0.01	0.02	8	CSLAP NH4
2004	0.01	0.02	0.03	8	CSLAP HyNH4
2003	0.00	0.01	0.01	8	CSLAP NH4
2003	0.00	0.01	0.04	8	CSLAP HyNH4
2002	0.01	0.04	0.06	9	CSLAP NH4
2002	0.01	0.04	0.08	9	CSLAP HyNH4
Year	Min	Avg	Max	N	Parameter
2002-07	**0.01**	**0.31**	**0.71**	**47**	**CSLAP TDN**
2007	0.23	0.45	0.71	7	CSLAP TDN
2006	0.26	0.44	0.64	8	CSLAP TDN
2005	0.01	0.10	0.19	8	CSLAP TDN
2004	0.27	0.35	0.48	7	CSLAP TDN
2004	0.01	0.16	0.27	6	CSLAP HyTDN
2003	0.03	0.18	0.23	8	CSLAP TDN
2003	0.03	0.13	0.19	8	CSLAP HyTDN
2002	0.26	0.37	0.53	9	CSLAP TDN
2002	0.29	0.38	0.48	9	CSLAP HyTDN
Year	Min	Avg	Max	N	Parameter
2002-07	**2.53**	**133.72**	**352.26**	**45**	**CSLAP TN/TP**
2007	81.73	163.65	218.19	7	CSLAP TN/TP
2006	100.28	185.22	352.26	8	CSLAP TN/TP
2005	2.53	39.57	65.71	8	CSLAP TN/TP
2004	122.79	193.02	299.97	6	CSLAP TN/TP
2004	1.34	74.71	214.93	6	CSLAP HyTN/TP
2003	5.15	77.54	151.53	8	CSLAP TN/TP
2003	3.37	46.65	73.57	8	CSLAP HyTN/TP
2002	93.72	161.89	238.35	8	CSLAP TN/TP
2002	62.76	103.63	143.01	6	CSLAP HyTN/TP
Year	Min	Avg	Max	N	Parameter
1987-07	**1**	**6**	**45**	**90**	**CSLAP TColor**
2007	1	3	6	7	CSLAP TColor
2006	5	14	27	7	CSLAP TColor
2005	1	4	9	8	CSLAP TColor
2004	1	6	16	7	CSLAP TColor

TABLE 2: CSLAP Data Summary for Oquaga Lake (cont)

Year	Min	Avg	Max	N	Parameter
1987-07	**1**	**6**	**45**	**90**	**CSLAP TColor**
2003	6	8	11	6	CSLAP TColor
2002	2	5	9	8	CSLAP TColor
1992	2	4	5	3	CSLAP TColor
1991	2	10	45	6	CSLAP TColor
1990	1	2	5	7	CSLAP TColor
1989	2	2	4	7	CSLAP TColor
1987	3	5	8	10	CSLAP TColor
1987	2	5	9	14	CSLAP TColor
Year	Min	Avg	Max	N	Parameter
1987-07	**5.78**	**7.34**	**8.28**	**91**	**CSLAP pH**
2007	7.17	7.79	8.26	7	CSLAP pH
2006	6.68	7.49	8.28	8	CSLAP pH
2005	6.80	7.48	7.86	8	CSLAP pH
2004	5.78	6.87	7.95	8	CSLAP pH
2003	6.41	7.00	7.20	8	CSLAP pH
2002	6.90	7.31	7.52	7	CSLAP pH
1992	7.68	7.71	7.75	3	CSLAP pH
1991	6.95	7.43	7.63	6	CSLAP pH
1990	6.60	7.29	7.89	7	CSLAP pH
1989	7.36	7.62	7.89	7	CSLAP pH
1987	6.33	7.48	8.06	8	CSLAP pH
1987	6.85	7.11	7.49	14	CSLAP pH
Year	Min	Avg	Max	N	Parameter
1987-07	**22**	**63**	**127**	**90**	**CSLAP Cond25**
2007	37	59	75	7	CSLAP Cond25
2006	54	72	127	8	CSLAP Cond25
2005	22	55	78	8	CSLAP Cond25
2004	50	72	84	8	CSLAP Cond25
2003	69	72	78	8	CSLAP Cond25
2002	72	73	74	7	CSLAP Cond25
1992	59	60	60	3	CSLAP Cond25
1991	57	58	59	6	CSLAP Cond25
1990	56	61	79	7	CSLAP Cond25
1989	55	57	58	6	CSLAP Cond25
1987	56	59	66	8	CSLAP Cond25
1987	53	55	63	14	CSLAP Cond25
Year	Min	Avg	Max	N	Parameter
2002-07	**5.0**	**5.9**	**7.0**	**9**	**CSLAP Ca**
2007	5.1	5.8	6.5	2	CSLAP Ca
2006	5.8	5.8	5.8	2	CSLAP Ca
2005	5.7	6.3	7.0	2	CSLAP Ca
2004	5.0	5.0	5.0	1	CSLAP Ca
2003	6.1	6.2	6.2	2	CSLAP Ca
2002				0	CSLAP Ca

TABLE 2: CSLAP Data Summary for Oquaga Lake (cont)

Year	**Min**	**Avg**	**Max**	**N**	**Parameter**
1987-07	**0.05**	**2.61**	**23.80**	**89**	**CSLAP Chl.a**
2007	0.44	0.83	1.23	7	CSLAP Chl.a
2006	0.24	0.72	1.62	8	CSLAP Chl.a
2005	0.05	0.62	1.39	8	CSLAP Chl.a
2004	0.10	1.13	3.22	8	CSLAP Chl.a
2003	0.13	0.92	1.72	7	CSLAP Chl.a
2002	0.41	0.80	1.25	8	CSLAP Chl.a
1992	1.98	4.48	6.97	3	CSLAP Chl.a
1991	1.26	8.44	23.80	6	CSLAP Chl.a
1990	0.63	2.06	3.01	7	CSLAP Chl.a
1989	0.43	2.22	4.11	6	CSLAP Chl.a
1988	1.06	2.41	4.66	10	CSLAP Chl.a
1987	1.20	7.06	19.20	11	CSLAP Chl.a
Year	Min	Avg	Max	N	Parameter
1992-07	**1**	**1.2**	**2**	**47**	**QA**
2007	1	1.1	2	7	QA
2006	1	1.6	2	7	QA
2005	1	1.1	2	7	QA
2004	1	1.1	2	8	QA
2003	1	1.1	2	8	QA
2002	1	1.1	2	8	QA
1992	1	1.0	1	2	QA
Year	Min	Avg	Max	N	Parameter
1992-07	**1**	**1.7**	**3**	**47**	**QB**
2007	2	2.1	3	7	QB
2006	2	2.0	2	7	QB
2005	1	1.7	2	7	QB
2004	2	2.1	3	8	QB
2003	1	1.1	2	8	QB
2002	1	1.5	2	8	QB
1992	1	1.0	1	2	QB
Year	Min	Avg	Max	N	Parameter
1992-07	**1**	**1.2**	**3**	**47**	**QC**
2007	1	1.0	1	7	QC
2006	1	1.1	2	7	QC
2005	1	1.3	2	7	QC
2004	1	1.0	1	8	QC
2003	1	1.5	3	8	QC
2002	1	1.1	2	8	QC
1992	1	1.0	1	2	QC

- **Statistical analyses**. True assessments of water-quality trends and comparison to other lakes involve rigid statistical analyses. Such analyses are generally beyond the scope of this program, in part due to limitations on the time available to summarize data from nearly 100 lakes in the five months from data receipt to the next sampling season. This may be due in part to the inevitable inter-lake inconsistencies in sampling dates from year to year and in part to the limited scope of monitoring. Where appropriate, some statistical summaries, utilizing both parametric and non-parametric statistics, have been provided within the report (primarily in Table 2).

- **Mean versus Median.** Much of the water-quality summary data presented in this report is reported as the mean, or the average of all of the readings in the period in question (summer, annual, year to year). However, while mean remains one of the most useful, and often most powerful, ways to estimate the most typical reading for many of the measured water-quality indicators, it is a less useful and perhaps misleading estimate when the data are not "normally" distributed (most common readings in the middle of the range of all readings, with readings less common toward the end of the range).

  In particular, comparisons of one lake to another, such as comparisons within a particular basin, can be greatly affected by the spread of the data across the range of all readings. For example, the average phosphorus level of nine lakes with very low readings (say 10 µg/l) and one lake with very high readings (say 110 µg/l) could be much higher (in this case, 20 µg/l) than in the "typical lake" in this set of lakes (much closer to 10 µg/l). In this case, median, or the middle reading in the range, is probably the most accurate representation of "typical". This report will include the use of both mean and median to evaluate "central tendency," or the most typical reading, for the indicator in question. In most cases, "mean" is used most often to estimate central tendency. However, where noted, "median" may also be used.

TABLE 3- Current and Historical Data Summaries for Oquaga Lake
Eutrophication Indicators

Parameter	Year	Minimum	Average	Maximum
Zsd	2007	7.45	8.86	10.80
(meters)	All Years	1.75	6.57	12.30
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
Phosphorus	2007	0.004	0.006	0.009
(mg/l)	All Years	0.002	0.007	0.014
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
Chl.a	2007	0.44	0.88	1.27
(µg/l)	All Years	0.05	2.59	23.80

Parameter	Year	Was 2007 Clarity the Highest or Lowest on Record?	Was 2007 a Typical Year?	Trophic Category	Zsd Changing?	% Samples Violating DOH Beach Std?+
Zsd	2007	Within Normal Range	Higher than Normal	Oligotrophic	Increasing?	0
(meters)	All Years			Oligotrophic		0
Parameter	**Year**	**Was 2007 TP the Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**Trophic Category**	**TP Changing?**	**% Samples Exceeding TP Guidance Value**
Phosphorus	2007	Within Normal Range	Yes	Oligotrophic	Decreasing?	0
(mg/l)	All Years			Oligotrophic		0
Parameter	**Year**	**Was 2007 Algae the Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**Trophic Category**	**Chl.a Changing?**	
Chl.a	2007	Within Normal Range	Yes	Oligotrophic	Decreasing?	
(µg/l)	All Years			Mesotrophic		

Minimum allowable water clarity for siting a new NYS swimming beach = 1.2 meters
NYS Total Phosphorus Guidance Value for Class B and Higher Lakes = 0.020 mg/l

The CSLAP dataset usually indicates that Oquaga Lake is an *oligotrophic*, or highly unproductive lake. The lake was probably less productive in 2007 than in the typical CSLAP sampling season. Water clarity readings were among the highest recorded in CSLAP, due to algae and nutrient levels that were lower than normal. Each of the trophic indicators indicate lower lake productivity in the last six years compared to the period from 1987-1992. This has corresponded to a wetter period (this region has generally been wetter than normal over the last decade). There continues to be only a weak correlation between changes in algae and nutrients, although a moderately strong correlation exists between changes in algae and water clarity. However, it is likely that any management activities driven by the desire to maintain water transparency readings will require controlling algae levels, which in turn will require addressing nutrient loading to the lake. Lake productivity is fairly stable during the summer, consistent with hypolimnetic (deepwater) phosphorus readings nearly identical to those measured at the lake surface. This suggests that deepwater oxygen levels are probably high throughout the summer. Surface phosphorus readings consistently fall below the state guidance value for lakes used for contact recreation (swimming), and Secchi disk transparency readings consistently exceed the minimum recommended water clarity for swimming beaches (= 1.2 meters). In short, it is likely that the productivity of Oquaga Lake was slightly lower in 2007 than that measured in previous years, and lake productivity was lower in the last six years than in the period from 1987-1992 (as indicated by higher water clarity and nutrient and algae levels).

TABLE 4- Current and Historical Data Summaries for Oquaga Lake (cont.)
Other Water-Quality Indicators

Parameter	**Year**	**Minimum**	**Average**	**Maximum**
Nitrate	2007	0.00	0.03	0.09
(mg/l)	All Years	0.00	0.02	0.18
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
NH4	2007	0.01	0.03	0.11
(mg/l)	All Years	0.00	0.02	0.11
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
TDN	2007	0.23	0.46	0.71
(mg/l)	All Years	0.01	0.32	0.71
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
True Color	2007	1	4	6
(ptu)	All Years	1	6	45
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
pH	2007	7.17	7.79	8.26
(std units)	All Years	5.78	7.34	8.28
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
Conductivity	2007	37	59	75
(µmho/cm)	All Years	22	63	127
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
Calcium	2007	5.1	5.8	6.5
(mg/l)	All Years	5.0	5.9	7.0

These data indicate Oquaga Lake is a weakly colored, circumneutral (near neutral pH) lake with low nitrate and ammonia levels, and soft water. Water transparency readings are more influenced by algae than dissolved organic matter (brownness, as measured by water color), although the very high water transparency stems from very low algae and color levels. Color readings in the lake have varied slightly from year to year, perhaps inconsistent with the rise in color observed in many CSLAP lakes. Ammonia and nitrate readings are low and do not appear to represent a threat to surface water-quality. pH readings are indicative of circumneutral (near neutral) lakes, and most readings have been within the state water-quality standards (=6.5 to 8.5). These readings should be adequate to support most aquatic organisms, although they have increased in the last few years. While conductivity readings have been higher over the last six years than in the first six years of CSLAP sampling, the slight rise in pH in the last four years has not been mirrored by a rise in conductivity. These readings have consistently been indicative of softwater lakes. Calcium levels are below the threshold found to support zebra mussels, and these exotic animals have not been found in Oquaga Lake.

TABLE 4- Current and Historical Data Summaries for Oquaga Lake (cont.)
Other Water-Quality Indicators (cont)

Parameter	Year	Was 2007 Nitrate the Highest or Lowest on Record?	Was 2007 a Typical Year?	Nitrate High?	Nitrate Changing?	% Samples Exceeding NO3 Standard	
Nitrate	2007	Within Normal Range	Yes	No	No	0	
(mg/l)	All Years			No		0	
Parameter	**Year**	**Was 2007 NH4 the Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**NH4 High?**	**NH4 Changing?**	**% Samples Exceeding NH4 Standard**	
NH4	2007	Highest at Times	Yes	No	No	0	
(mg/l)	All Years			No		0	
Parameter	**Year**	**Was 2007 TDN the Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**TDN High?**	**TDN Changing?**	**Ratios of TN/TP Indicate P or N Limitation?**	
TDN	2007	Highest at Times	Higher than Normal	No	No	P Limitation	
(mg/l)	All Years			No		P Limitation	
Parameter	**Year**	**Was 2007 Color the Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**Colored Lake?**	**Color Changing?**		
True Color	2007	Within Normal Range	Yes	No	No		
(ptu)	All Years			No			
Parameter	**Year**	**Was 2007 pH the Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**Acceptable Range?**	**pH Changing?**	**% Samples > Upper pH Standard**	**% Samples < Lower pH Standard**
pH	2007	Within Normal Range	Higher than Normal	Yes	No	0	0
(std units)	All Years			Yes		0	3
Parameter	**Year**	**Was 2007 Conductivity Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**Relative Hardness**	**Conductivity Changing?**		
Conductivity	2007	Within Normal Range	Yes	Softwater	No		
(µmho/cm)	All Years			Softwater			
Parameter	**Year**	**Was 2007 Calcium Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**Support Zebra Mussels?**	**Calcium Changing?**		
Calcium	2007	Within Normal Range	Yes	No	No		
(mg/l)	All Years			No			

NYS Nitrate standard = 10 mg/l
NYS Ammonia standard = 2 mg/l (as NH_3-NH_4)
NYS pH standard- 6.5 < acceptable pH < 8.5

TABLE 5- Current and Historical Data Summaries for Oquaga Lake

Lake Perception Indicators (1= most favorable, 5= least favorable)

Parameter	Year	Minimum	Average	Maximum
QA	2007	1	1.1	2
(Clarity)	All Years	1	1.2	2
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
QB	2007	1	2.0	3
(Plants)	All Years	1	1.7	3
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
QC	2007	1	1.0	1
(Recreation)	All Years	1	1.2	3

Parameter	Year	Was 2007 Clarity the Highest or Lowest on Record?	Was 2007 a Typical Year?	Clarity Changed?	%Frequency 'Definite Algae Greenness'	%Frequency 'Severe Algae Levels'	%Frequency 'Slightly Impaired' Due to Algae	%Frequency 'Substantially Impaired' Due to Algae
QA	2007	Highest and Lowest	Yes	No	0	0	0	0
(Clarity)	All Years				0	0	0	0
Parameter	**Year**	**Was 2007 Weed Growth the Heaviest on Record?**	**Was 2007 a Typical Year?**	**Weeds Changed?**	**%Frequency Surface Weeds**	**%Frequency Dense Weeds**	**%Frequency 'Slightly Impaired' Due to Weeds**	**%Frequency 'Substantially Impaired' Due to Weeds**
QB	2007	Heaviest and Lightest	Yes	No	13	0	0	0
(Plants)	All Years				4	0	0	0
Parameter	**Year**	**Was 2007 Recreation the Best or Worst on Record?**	**Was 2007 a Typical Year?**	**Recreation Changed?**	**%Frequency Slightly Impaired**	**%Frequency Substantially Impaired**		
QC	2007	Best at Times	Yes	No	0	0		
(Recreation)	All Years				2	0		

Oquaga Lake was described as "crystal clear," assessments comparable to other lakes with similar water clarity and color readings. Aquatic plant coverage has increased slightly in the last few years, with subsurface growth more frequently visible, although "excessive weed growth" is still not implicated in recreational use impacts. Oquaga Lake was described as "could not be nicer" for recreational uses in 2007, about as favorable as in other lakes with similar water quality conditions and historical lack of "excessive weed" problems. Recreational assessments are usually stable during the summer, consistent with seasonally stable algal productivity and aquatic plant coverage. These assessments have been consistently favorable since 1992.

Oquaga Lake has been described by the CSLAP sampling volunteers as "slightly" impaired during 2% of the CSLAP sampling sessions, but never "substantially" impaired. Slightly impaired conditions have never been associated with excessive weeds or poor water clarity.

How Do the 2007 Data Compare to Historical Data from Oquaga Lake?

Seasonal Comparison of Eutrophication, Other Water-quality, and Lake-Perception Indicators–2007 Sampling Season and in the Typical or Previous Sampling Seasons at Oquaga Lake

Figures 23 and 24 compare data for the measured eutrophication parameters for Oquaga Lake in 2007 and since CSLAP sampling began at Oquaga Lake. Figures 25 and 26 compare nitrogen to phosphorus ratios, figures 27 through 34 compare other sampling indicators, and figures 35 and 36 compare volunteer perception responses during the same periods.

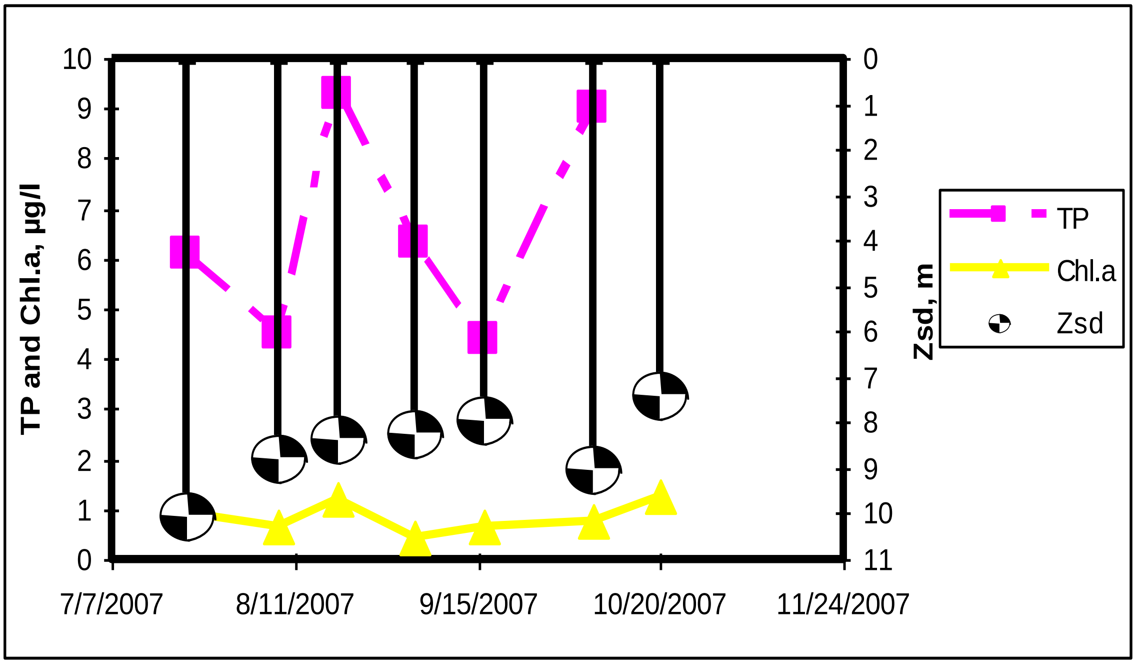


Figure 23. 2007 Eutrophication Data for Oquaga Lake

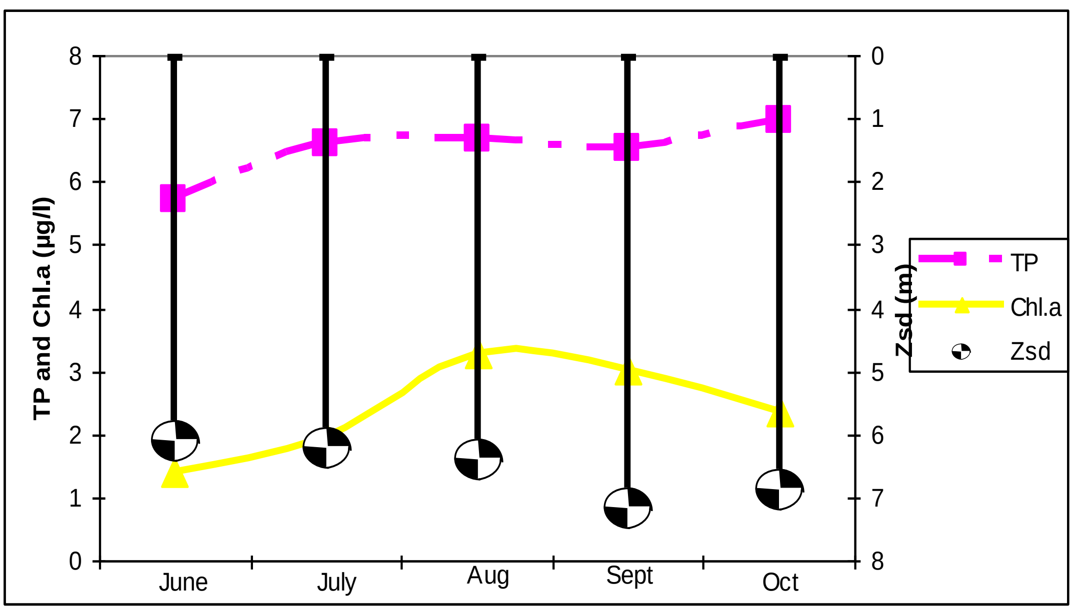


Figure 24- Eutrophication Data in a Typical (Monthly Mean) Year for Oquaga Lake

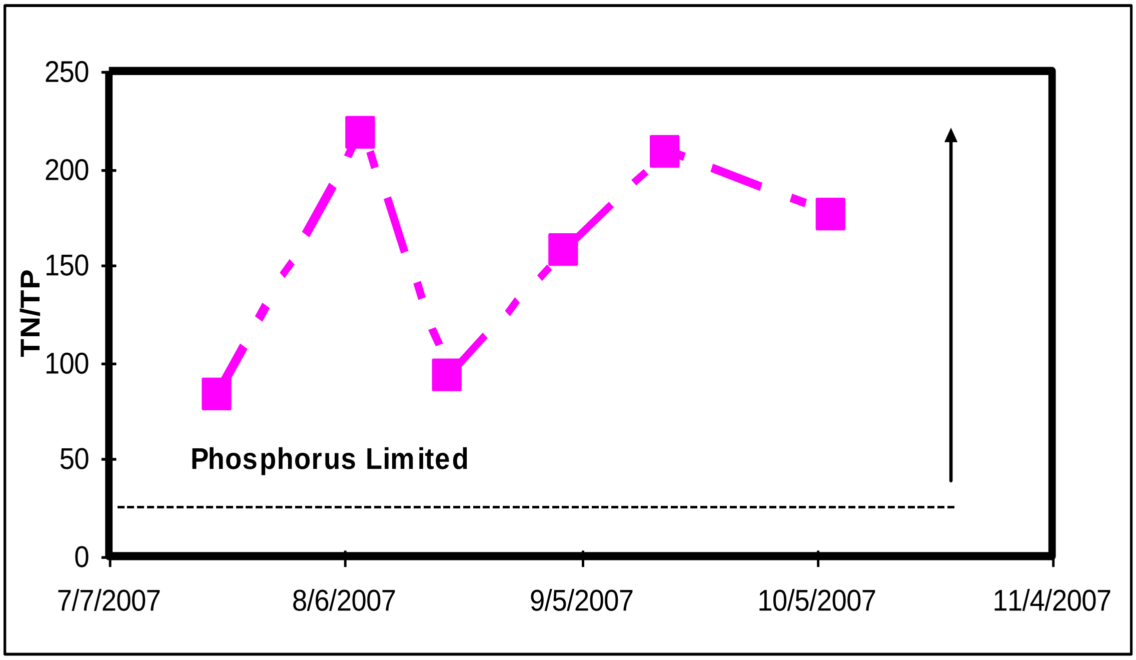


Figure 25. 2007 Nitrogen-to-Phosphorus Ratios for Oquaga Lake

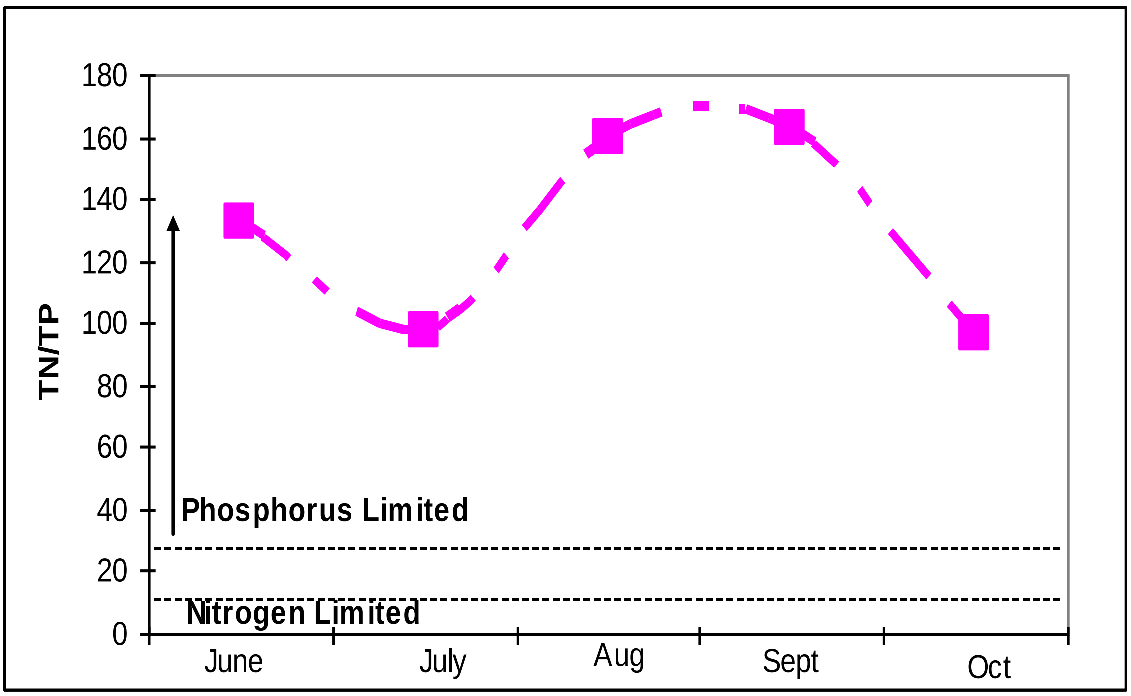


Figure 26- Nitrogen–to-Phosphorus Ratios in a Typical (Monthly Mean) Year for Oquaga Lake

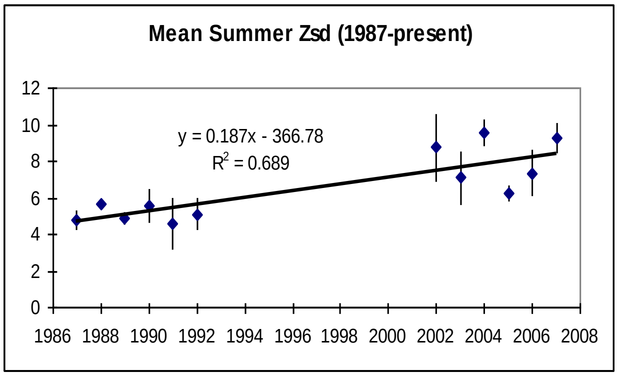


Figure 27. Annual Average Summer Water Clarity for Oquaga Lake

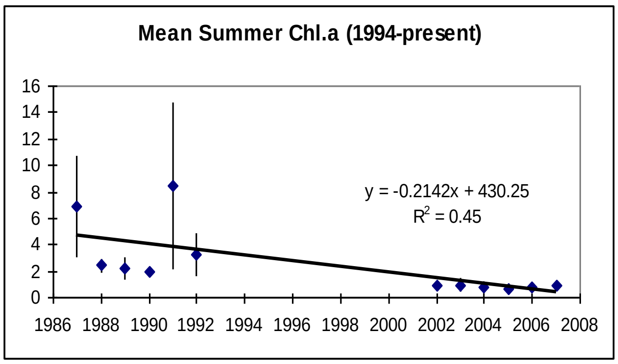


Figure 28. Annual Average Summer Chlorophyll a for Oquaga Lake

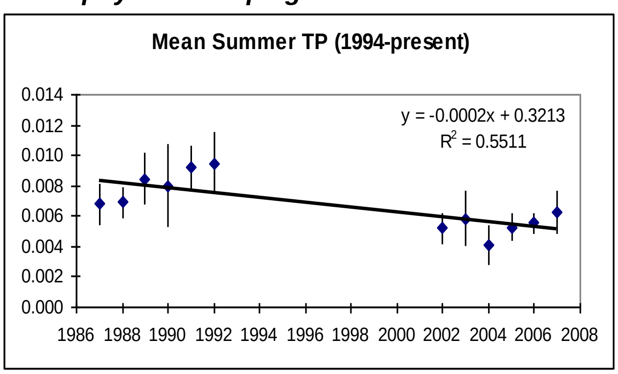


Figure 29. Annual Average Summer Total Phosphorus for Oquaga Lake

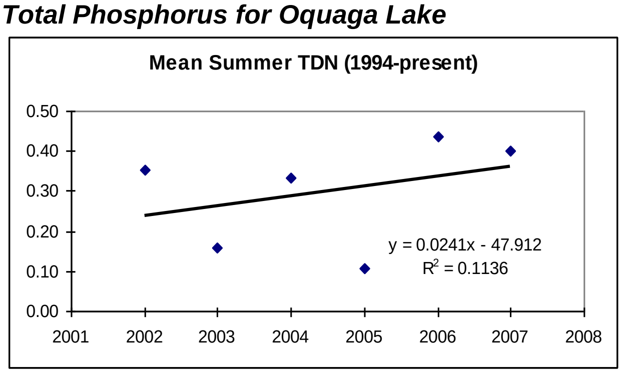


Figure 30. Annual Average Summer Total Nitrogen for Oquaga Lake

Annual Averages, 1987-present

Wettest Years: 2006, 2003
Driest Years: 1988
Highest Clarity: 2004, 2007
Lowest Clarity: 1991, 1987, 1989
Long Term Trend?: Increasing?
Discussion: Water clarity readings have generally increased since the late 1980s, in a manner that may be statistically significant. Water transparency was higher than normal in 2007.

Wettest Years: 2006, 2003
Driest Years: 1988
Highest Chl.a: 1991, 1987
Lowest Chl.a: 2002-2007
Long Term Trend?: Decreasing?
Discussion: Algae levels have been lower in recent years than in the period from 1987-1992. The lower chlorophyll readings in recent years have generally corresponded to higher water transparency readings.

Wettest Years: 2006, 2003
Driest Years: 1988
Highest TP: 2007, 2006
Lowest TP: 2002, 1999
Long Term Trend?: Decreasing?
Discussion: Phosphorus readings have been lower in the last six years than in the first six years of CSLAP sampling. This is consistent with the lower chlorophyll *a* readings and higher water clarity over this same period.

Wettest Years: 2006, 2003
Driest Years: 1988
Highest Total N: 2006, 2007
Lowest Total N: 2005, 2003
Long Term Trend?: None apparent
Discussion: Total nitrogen readings have varied from year to year in a manner that does not appear to be statistically significant.

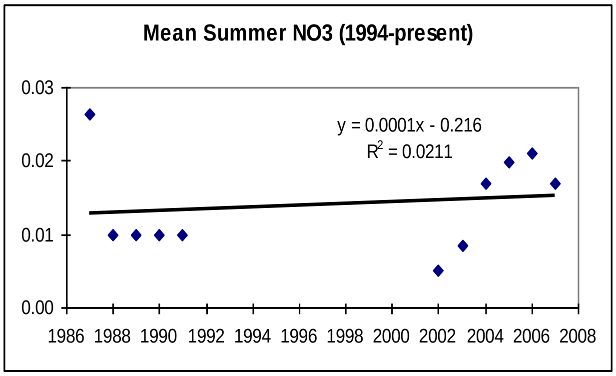


Figure 31. Annual Average Summer Nitrate for Oquaga Lake

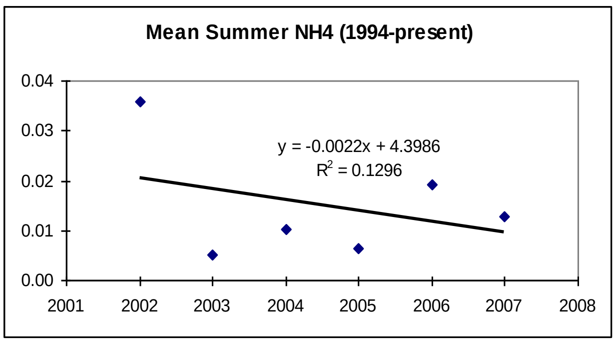


Figure 32. Annual Average Summer Ammonia for Oquaga Lake

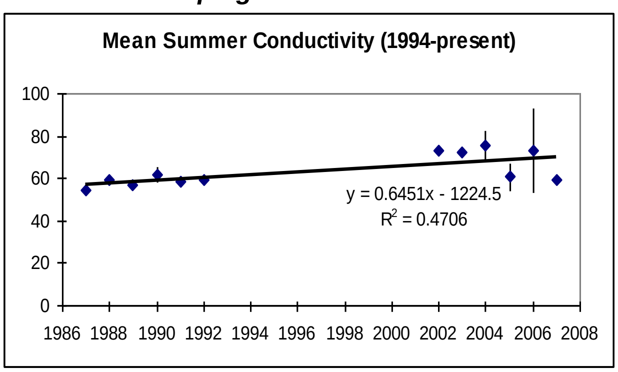


Figure 33. Annual Average Summer Conductivity for Oquaga Lake

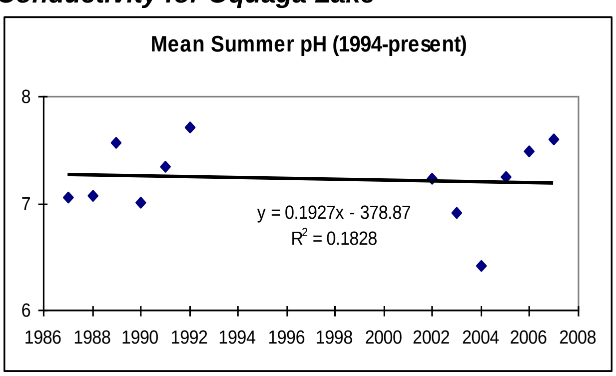


Figure 34. Annual Average Summer pH for Oquaga Lake

Annual Averages, 1987-present

Wettest Years: 2006, 2003
Driest Years: 1988
Highest Nitrate: 1987, 2006, 2005
Lowest Nitrate: 2002, 2003
Long Term Trend?: None apparent
Discussion: Nitrate readings have been slightly higher than normal in the last four years, but nearly all readings have been very low, and no long-term trends have been apparent.

Wettest Years: 2006, 2003
Driest Years: 1988
Highest Ammonia: 2002
Lowest Ammonia: 2003, 2005
Long Term Trend?: None apparent
Discussion: Ammonia readings have been very stable in the last five years, and all readings have been fairly low. No long-term trends have been apparent.

Wettest Years: 2006, 2003
Driest Years: 1988
Highest Cond.: 2004, 2006
Lowest Cond.: 1987, 1989
Long Term Trend?: Increasing?
Discussion: Conductivity readings have generally been higher in the last six years than in the period from 1987 to 1992, although all readings have been indicative of softwater lakes. However, the variability within most sampling seasons may be greater than the small increase from the late 1980s to the present.

Wettest Years: 2006, 2003
Driest Years: 1988
Highest pH: 1992, 1989, 2007
Lowest pH: 2004
Long Term Trend?: None apparent
Discussion: pH readings have increased in the last three years, despite no consistent conductivity trends over the same period, but no long-term trends have been apparent.

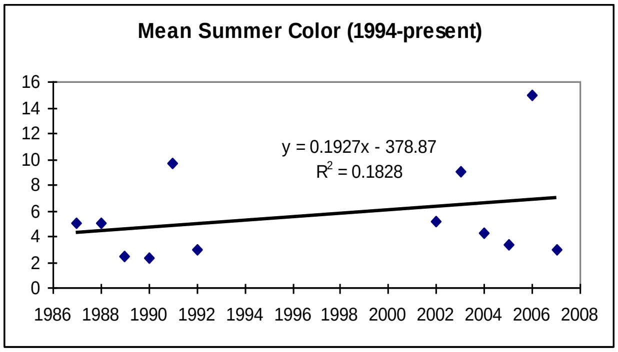


Figure 35. Annual Average Summer Color for Oquaga Lake

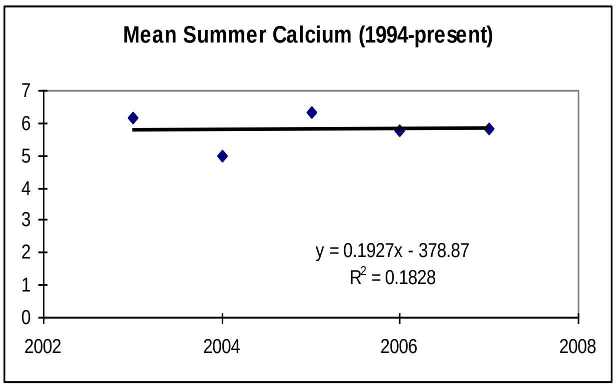


Figure 36. Annual Average Summer Calcium for Oquaga Lake

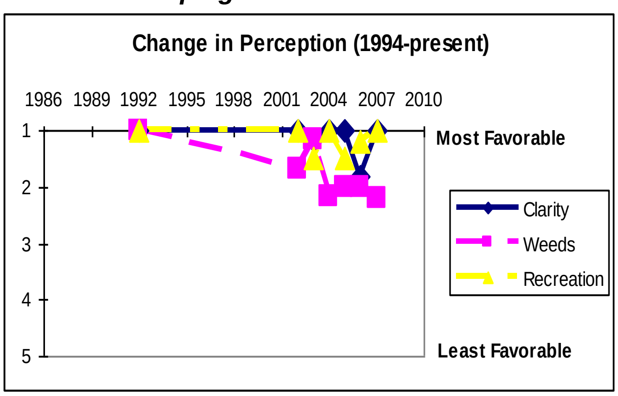


Figure 37. Annual Average Summer Lake Perception for Oquaga Lake

(QA = clarity, ranging from (1) crystal clear to (3) definite algae greenness to (5) severely high algae levels;
QB = weeds, ranging from (1) not visible to (3) growing to the surface to (5) dense growth covers lake;
QC = recreation, ranging from (1) could not be nicer to (3) slightly impaired to (5) lake not usable)

Annual Averages, 1987-present

Wettest Years:	2006, 2003
Driest Years:	1988
Highest Color:	2006, 1991, 2003
Lowest Color:	1990, 1989, 2007
Long Term Trend?:	None apparent

Discussion: Color readings have been somewhat variable from year to year, and despite the rise in color in 2006, no long-term trends have been apparent.

Wettest Years:	2006, 2003
Driest Years:	1988
Highest Calcium:	2005, 2003
Lowest Calcium:	2004
Long Term Trend?:	None apparent

Discussion: Calcium levels have been low and stable over the last five years, with no apparent long-term trends.

Wettest Years:	2006, 2003
Driest Years:	1988
Most Favorable WQ:	1992, 2001, ’03, 04, ‘07
Least Favorable WQ:	2006
Highest Weed Cov.	2004, 2007, 2005, 2006
Lowest Weed Cov.	2003, 1992
Most Favorable Rec.	1992, 2002, 2004, 2007
Least Favorable Rec.	2003, 2005
Long Term Trend?:	Increasing aquatic plant coverage?

Discussion: Recreational assessments were highly favorable in 2007, consistent with the highly favorable water quality assessments and despite higher aquatic plant coverage. The latter has generally been higher in recent years, although no impacts to recreational uses of the lake have been apparent.

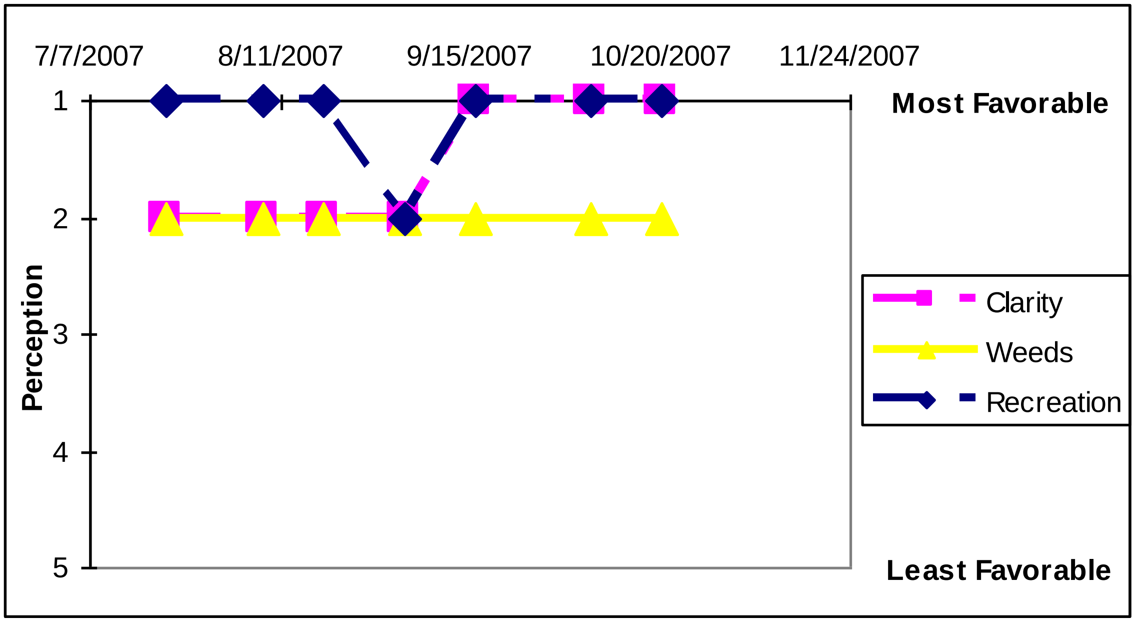


Figure 38. 2007 Lake Perception Data for Oquaga Lake

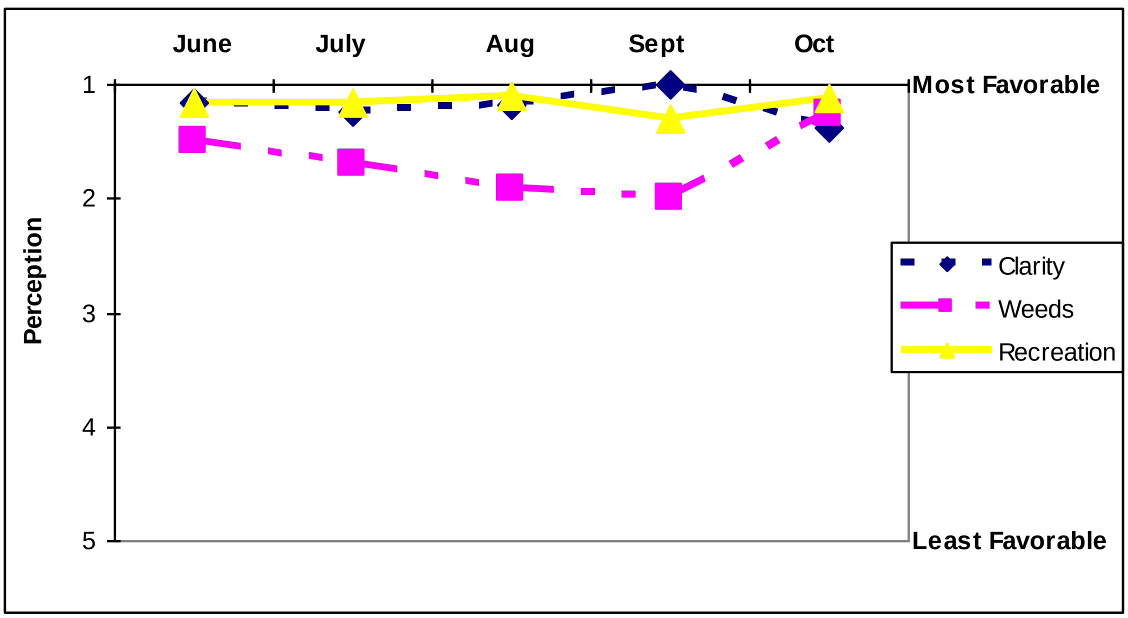


Figure 39- Lake Perception Data in a Typical (Monthly Mean) Year for Oquaga Lake

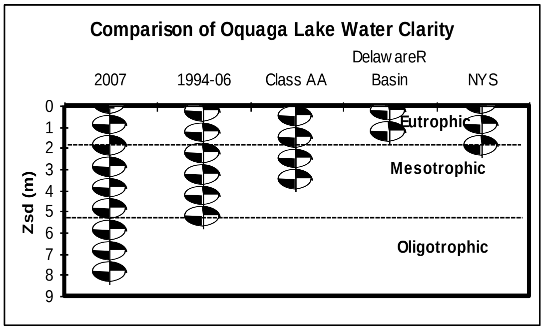


Figure 40. *Comparison of 2007 Secchi Disk Transparency to Lakes With the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes*

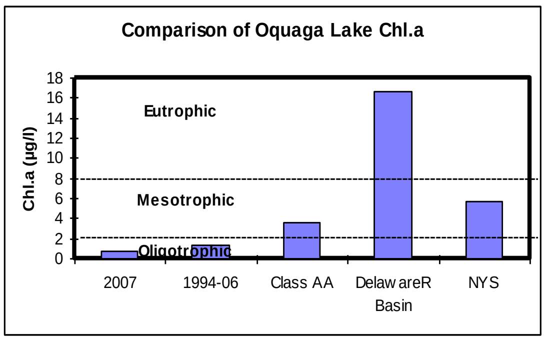


Figure 41. *Comparison of 2007 Chlorophyll a to Lakes with the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes*

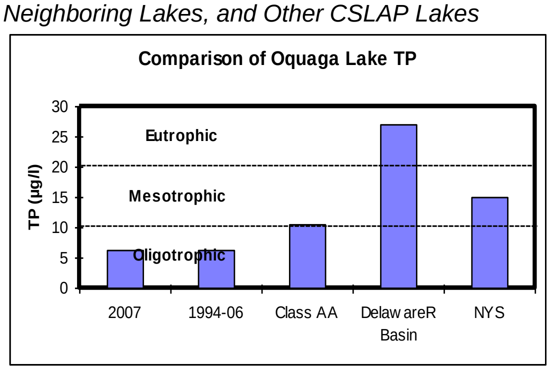


Figure 42. *Comparison of 2007 Total Phosphorus to Lakes With the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes*

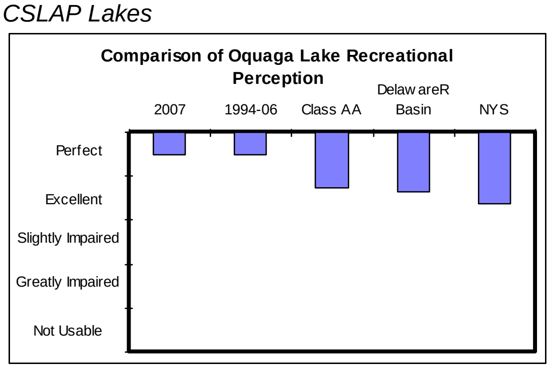


Figure 43. *Comparison of 2007 Recreational Perception to Lakes With the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes*

How does Oquaga Lake compare to other lakes?

Annual Comparison of Median Readings for Eutrophication Parameters and Recreational Assessment For Oquaga Lake in 2007 to Historical Data for Oquaga Lake, 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 Oquaga Lake—in 2007, 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 Oquaga Lake in 2007:

a) Using water clarity as an indicator, Oquaga Lake is less productive than other Class AA lakes, other Delaware River basin lakes, and other NYS lakes.
b) Using chlorophyll *a* readings as an indicator, Oquaga Lake is less productive than other Delaware River basin lakes, other NYS lakes, and other Class AA lakes.
c) Using phosphorus as an indicator, Oquaga Lake is less productive than other Delaware River basin lakes, other NYS lakes, and other Class AA lakes.
d) Using QC on the field-observations form as an indicator, Oquaga Lake is more suitable for recreation than other Delaware River basin lakes, other Class AA lakes, and other NYS lakes.

Appendix A. Raw Data for Oquaga Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	TKN	TN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
30	Oquaga L	6/13/1987	30.0	3.63	1.5	0.005	0.02				8	7.15	55		
30	Oquaga L	6/21/1987	30.0	5.75	1.5	0.007	0.02				9	7.16	54		1.20
30	Oquaga L	7/5/1987	30.0	5.25	1.5	0.009	0.01				5	7.08	54		2.70
30	Oquaga L	7/11/1987	30.0	5.75	1.5	0.006	0.01				2	7.04	54		
30	Oquaga L	7/19/1987	27.0	5.50	1.5	0.003	0.01				6	7.07	54		2.70
30	Oquaga L	7/26/1987	30.0	3.88	1.5	0.006	0.01				5	6.95	54		6.40
30	Oquaga L	8/3/1987	30.0	2.75	1.5	0.009	0.01				5	6.88	55		19.20
30	Oquaga L	8/10/1987	30.0	3.38	1.5	0.008	0.01				5	6.85	55		14.40
30	Oquaga L	8/17/1987	30.0	5.25	1.5	0.005	0.01				6	7.13	56		1.70
30	Oquaga L	8/23/1987	30.0	5.25	1.5	0.005	0.01				4	7.07	53		3.90
30	Oquaga L	8/30/1987	30.0	4.50	1.5	0.005	0.01				6	7.49	53		
30	Oquaga L	9/7/1987	30.0	5.25	1.5	0.012	0.18				3	7.16	56		9.90
30	Oquaga L	9/16/1987	30.0	6.00	1.5	0.005	0.02				2	7.39	63		5.00
30	Oquaga L	10/10/1987	30.0	4.25	1.5	0.007	0.01				6	7.11	54		10.60
30	Oquaga L	10/23/1987	30.0	4.63	1.5										
30	Oquaga L	7/1/1988	30.0	5.75	1.5	0.007	0.01				5	6.33	61		3.25
30	Oquaga L	7/13/1988	30.0	6.50	1.5	0.009					4	8.06	66		4.66
30	Oquaga L	7/21/1988	30.0	5.00	1.5	0.011	0.01				5	7.39	57		2.74
30	Oquaga L	7/28/1988	30.0	6.25	1.5	0.006					5	7.55	57		1.06
30	Oquaga L	8/4/1988	30.0	6.00	1.5	0.005	0.01				3	7.98	60		1.37
30	Oquaga L	8/11/1988	30.0	5.50	1.5	0.006					8				1.63
30	Oquaga L	8/18/1988	30.0	5.50	1.5	0.006	0.01				7	7.14	56		2.07
30	Oquaga L	8/25/1988	30.0	4.75	1.5	0.006					7				2.15
30	Oquaga L	9/2/1988	30.0	5.50	1.5	0.008	0.01				3	7.78	57		2.00
30	Oquaga L	9/15/1988	30.0	5.75	1.5	0.005	0.01				3	7.62	60		3.18
30	Oquaga L	7/10/1989	30.0	4.88	1.5	0.005	0.01				3	7.85	57		2.33
30	Oquaga L	8/2/1989	30.0	4.25	1.5	0.007					2	7.40	58		1.20
30	Oquaga L	8/9/1989	30.0	4.25	1.5	0.009					2	7.89	55		
30	Oquaga L	8/19/1989	30.0	5.25	1.5	0.010	0.01				4	7.83	56		0.43
30	Oquaga L	8/26/1989	30.0	5.13	1.5	0.013					2	7.44			2.22
30	Oquaga L	9/4/1989	30.0	4.75	1.5	0.008					2	7.36	56		4.11
30	Oquaga L	9/13/1989	30.0	5.63	1.5	0.007	0.01				2	7.54	58		3.05
30	Oquaga L	7/14/1990	30.0	4.25	1.5	0.011	0.01				5	7.23	64		3.01
30	Oquaga L	7/20/1990	30.0	5.25	1.5	0.007					3	7.54	57		0.63
30	Oquaga L	8/3/1990	30.0	5.25	1.5	0.008	0.01				1	7.89	56		2.08
30	Oquaga L	8/20/1990	30.0	5.75	1.5	0.006					3	7.29	79		2.43
30	Oquaga L	9/1/1990	30.0	6.25	1.5	0.004	0.01				2	6.60	57		1.34
30	Oquaga L	9/11/1990	30.0	6.50	1.5	0.012					1	6.75	57		2.21
30	Oquaga L	9/27/1990	30.0	6.25	1.5	0.008	0.01				3	7.74	57		2.75
30	Oquaga L	7/1/1991	30.0	6.50	1.5	0.008	0.01				2	7.61	59		1.26
30	Oquaga L	7/15/1991	30.0	6.25	1.5	0.007					3	7.52	59		2.41
30	Oquaga L	7/28/1991	30.0	5.75	1.5	0.007	0.01				2	7.63	57		2.90
30	Oquaga L	8/13/1991	30.0	4.50	1.5	0.010					2	7.29	58		6.88
30	Oquaga L	8/26/1991	30.0	2.75	1.5	0.011	0.01				4	6.95	58		13.40
30	Oquaga L	9/9/1991	30.0	1.75	1.5	0.012					45	7.60	59		23.80
30	Oquaga L	6/25/1992	30.0	5.75	1.5	0.008					2	7.69	60		1.98
30	Oquaga L	7/24/1992	30.0	4.45	1.5	0.011					4	7.75	59		4.48
30	Oquaga L	10/4/1992	30.0	3.50	1.5	0.014	0.01				5	7.68	60		6.97
30	Oquaga L	06/23/02	16.0	5.45	1.5	0.007	0.00	0.02	0.40	129.58	8	7.52	72		1.17
30	Oquaga L	07/07/02	30.0	6.45	1.5	0.003	0.00	0.05	0.26	165.55	9				0.95
30	Oquaga L	07/21/02	30.0	8.15	1.5	0.007	0.01	0.05	0.29	93.72	6	7.47	73		0.56
30	Oquaga L	08/05/02	30.0	9.85	1.5	0.005	0.00	0.06	0.40	168.44	3	7.37	73		0.64
30	Oquaga L	08/18/02	30.0	10.20	1.5	0.005	0.01	0.03	0.40	163.73	3	6.90	74		0.97
30	Oquaga L	09/02/02	30.0	12.30	1.5	0.003	0.00	0.01	0.37	238.35	2	7.21	74		1.25
30	Oquaga L	09/25/02	26.0	9.58		0.006	0.00	0.02	0.53	206.89					
30	Oquaga L	10/06/02		6.85			0.01	0.03	0.26		7	7.46	73		0.48
30	Oquaga L	10/20/02	30.0	7.55		0.006	0.01	0.05	0.37	128.89	5	7.26	72		0.41
30	Oquaga L	6/30/2003	30.0	5.50	1.0	0.007	0.01	0.01	0.19	61.36	7	7.16	73	6.1	
30	Oquaga L	7/13/2003	30.0	5.05		0.006	0.00	0.00	0.16	60.51	10	7.20	72		1.72
30	Oquaga L	7/27/2003	30.0	5.90		0.011	0.00	0.00	0.03	5.15		7.08	70		1.19
30	Oquaga L	8/12/2003	30.0	9.70	1.5	0.004	0.01	0.00	0.18	100.44	11	6.41	78		1.58

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	TKN	TN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
30	Oquaga L	8/25/2003	30.0	9.50		0.003	0.03	0.01	0.23	151.53		7.14	72	6.2	0.23
30	Oquaga L	9/2/2003	30.0	6.90		0.005	0.00	0.00	0.18	83.53	8	7.15	72		0.13
30	Oquaga L	9/28/2003	30.0	9.45		0.006	0.00	0.01	0.23	85.30	7	6.68	69		0.50
30	Oquaga L	10/13/2003	30.0	9.35		0.007	0.00	0.00	0.22	72.49	6	7.18	74		1.12
30	Oquaga L	6/13/2004	30+	6.10	1.0	0.004	0.01	0.02			16	6.54	74		3.22
30	Oquaga L	6/29/2004	30+	10.20	1.0	0.003	0.01	0.01	0.27	214.45	9	5.78	80		0.10
30	Oquaga L	7/2/2004	30+	8.90	1.0										
30	Oquaga L	7/11/2004	30+	8.40	1.0	0.002	0.01	0.01	0.32		7	6.75	81		1.40
30	Oquaga L	7/25/2004				0.006	0.01	0.01	0.34	130.81	2	6.55	75		0.05
30	Oquaga L	8/10/2004	30+	9.40	1.0	0.007	0.02	0.02	0.36	122.79	2	6.80	76	5.0	1.80
30	Oquaga L	8/22/2004	30+	11.30	1.0	0.004	0.02	0.01	0.32	183.57	27	7.49	84		1.00
30	Oquaga L	9/6/2004		9.10		0.004	0.02	0.02	0.39	206.50	1	7.95	57		0.30
30	Oquaga L	9/26/2004	30+	7.40	1.5	0.003	0.02	0.01	0.48	299.97	2	7.08	50		0.70
30	Oquaga L	6/19/2005	30+	6.60	1.5	0.007	0.01	0.01	0.14	46.55	1	6.80	49	5.7	1.4
30	Oquaga L	7/9/2005	30+	5.50	1.5	0.004	0.07	0.01	0.10	54.86	1	7.40	68		0.7
30	Oquaga L	7/24/2005	30+	6.80	1.5	0.004	0.01	0.01	0.01	2.53	6	7.54	60		0.1
30	Oquaga L	8/9/2005	30+	6.10	1.5	0.005	0.01	0.01	0.11	48.53	1	7.42	70		0.8
30	Oquaga L	9/5/2005				0.006	0.01	0.01	0.19	65.71	9	7.86	56	7.0	0.3
30	Oquaga L	9/17/2005	30+	6.35		0.007	0.09	0.01	0.12	36.94	7	7.59	78		0.2
30	Oquaga L	10/9/2005	30+	6.75		0.005	0.01	0.01	0.10	45.14	4	7.82	35		0.2
30	Oquaga L	10/22/05	30+	4.73		0.009	0.01	0.01	0.06	16.31	6	7.37	22		1.2
30	Oquaga L	6/25/2006				0.004	0.03	0.02	0.42	209.99	27	8.07	127	5.8	0.67
30	Oquaga L	7/9/2006	30+	5.60	1.5	0.006	0.01	0.01	0.26	100.28	19	7.10	54		0.24
30	Oquaga L	7/23/2006	30+	5.70	1.5	0.007	0.03	0.02	0.47	157.57	18	7.52	66		1.62
30	Oquaga L	8/6/2006	30+	7.30	1.5	0.006	0.02	0.02	0.43	153.96		7.38	76		0.53
30	Oquaga L	8/20/2006	30+	9.25		0.004	0.02	0.03	0.64	352.26	5	8.28	55	5.8	0.69
30	Oquaga L	9/4/2006	30+	8.95		0.006			0.40	137.65	6	7.56	62		0.90
30	Oquaga L	9/17/2006	30+	10.80		0.005	0.02	0.05	0.47	229.64	10	6.68	66		0.44
30	Oquaga L	10/8/2006	30+	11.65	1.5	0.006	0.03	0.02	0.41	140.40	12	7.33	72		0.66
30	Oquaga L	7/8/2007	30+	10.80	1.0	0.005	0.06	0.02	0.51	218.19	1	7.17	75	5.1	1.06
30	Oquaga L	7/21/2007	30+	10.10	1.0	0.006	0.01	0.01	0.23	81.73	5	8.10	57		0.96
30	Oquaga L	8/8/2007	30+	8.85	1.0	0.005	0.00	0.01	0.44	215.91	2	7.67	60		0.68
30	Oquaga L	8/19/2007	30+	8.40	1.0	0.009	0.01	0.01	0.39	91.64	1	7.65	37		1.23
30	Oquaga L	9/3/2007	30+	8.25	12.0	0.006	0.00	0.02	0.45	156.93	6	8.20	68	6.5	0.44
30	Oquaga L	9/16/2007	30+	7.95		0.004	0.01	0.01	0.41	206.88	6	8.26	55		0.66
30	Oquaga L	10/7/2007	30+	9.05	1.5	0.009	0.06	0.11	0.71	174.26	3	7.50	62		0.77
30	Oquaga L	10/20/2007	30+	7.45	1.5		0.09	0.03	0.57		4	7.78	56		1.27
30	Oquaga L	7/8/2007	30+	10.80	1.0	0.005	0.06	0.02	0.51	218.19	1	7.17	75	5.1	1.06
30	Oquaga L	06/23/02	16.0			0.008	0.01	0.02	0.39	46.14					
30	Oquaga L	07/07/02	30.0			0.006	0.00	0.04	0.29	48.10					
30	Oquaga L	07/21/02	30.0			0.017	0.01	0.08	0.48	28.53					
30	Oquaga L	08/05/02	30.0			0.008	0.00	0.04	0.39	48.65					2.58
30	Oquaga L	08/18/02	30.0			0.007	0.02	0.04	0.46	65.00					
30	Oquaga L	09/02/02	30.0	8.15			0.00	0.01	0.37						
30	Oquaga L	09/25/02	26.0	9.58	24.0	0.008	0.00	0.04	0.37	46.20					
30	Oquaga L	10/06/02		6.85	20.0		0.01	0.05	0.34						
30	Oquaga L	10/20/02	30.0	7.55	15.0		0.01	0.05	0.33						
30	Oquaga L	6/30/2003				0.006	0.01	0.02	0.16	24.91					
30	Oquaga L	7/13/2003				0.005	0.00	0.00	0.14	28.54					
30	Oquaga L	7/27/2003			13.0	0.016	0.00	0.00	0.03	1.53					
30	Oquaga L	8/12/2003				0.010	0.00	0.00	0.19	19.31					
30	Oquaga L	8/25/2003			12.5	0.006	0.01	0.00	0.09	14.86					
30	Oquaga L	9/2/2003				0.005	0.01	0.04	0.16	30.09					
30	Oquaga L	9/28/2003				0.006	0.00	0.01	0.19	33.44					
30	Oquaga L	10/13/2003				0.006	0.00	0.00	0.11	16.95					
30	Oquaga L	6/13/2004				0.013	0.01	0.02							
30	Oquaga L	6/29/2004				0.007	0.01	0.01	0.27	41.04					
30	Oquaga L	7/2/2004													
30	Oquaga L	7/11/2004				0.003	0.01	0.01	0.25	97.70					
30	Oquaga L	7/25/2004				0.012	0.01	0.03	0.17	14.87					
30	Oquaga L	8/10/2004				0.005	0.01	0.02	0.13	26.07					
30	Oquaga L	8/22/2004				0.008	0.02	0.02	0.01	0.61					
30	Oquaga L	9/6/2004				0.007	0.02	0.03							
30	Oquaga L	6/19/2005				0.009									

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	TKN	TN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
30	Oquaga L	7/9/2005				0.007									
30	Oquaga L	7/24/2005				0.005									
30	Oquaga L	8/9/2005				0.005									
30	Oquaga L	9/5/2005				0.012									
30	Oquaga L	9/17/2005			13.0	0.011									
30	Oquaga L	10/9/2005			10.0	0.009									
30	Oquaga L	10/22/05				0.008									
30	Oquaga L	6/25/2006				0.007									
30	Oquaga L	7/9/2006	30+			0.009									
30	Oquaga L	7/23/2006	30+			0.010									
30	Oquaga L	8/6/2006	30+			0.014									
30	Oquaga L	8/20/2006	30+		15.0	0.008									
30	Oquaga L	9/4/2006	30+		20.0	0.006									
30	Oquaga L	9/17/2006	30+		12.0	0.006									
30	Oquaga L	10/8/2006	30+			0.008									
30	Oquaga L	7/8/2007				0.009									
30	Oquaga L	7/21/2007				0.008									
30	Oquaga L	8/8/2007				0.008									
30	Oquaga L	8/19/2007				0.010									
30	Oquaga L	9/3/2007				0.010									
30	Oquaga L	9/16/2007				0.006									
30	Oquaga L	10/7/2007				0.018									
30	Oquaga L	10/20/2007				0.007									

LNum	PName	Date	Zbot	Zsd	Zsamp	QaQc	TAir	TH20	QA	QB	QC	QD
30	Oquaga L	6/13/1987	30.0	3.63	1.5	1	23	19				
30	Oquaga L	6/21/1987	30.0	5.75	1.5	1	21	23				
30	Oquaga L	7/5/1987	30.0	5.25	1.5	1	24	23				
30	Oquaga L	7/11/1987	30.0	5.75	1.5	1	85	78				
30	Oquaga L	7/19/1987	27.0	5.50	1.5	1	29	25				
30	Oquaga L	7/26/1987	30.0	3.88	1.5	1	30	26				
30	Oquaga L	8/3/1987	30.0	2.75	1.5	1	25	24				
30	Oquaga L	8/10/1987	30.0	3.38	1.5	1	25	24				
30	Oquaga L	8/17/1987	30.0	5.25	1.5	1	29	26				
30	Oquaga L	8/23/1987	30.0	5.25	1.5	1	16	23				
30	Oquaga L	8/30/1987	30.0	4.50	1.5	1	26	19				
30	Oquaga L	9/7/1987	30.0	5.25	1.5	1	22	18				
30	Oquaga L	9/16/1987	30.0	6.00	1.5	1	22	19				
30	Oquaga L	10/10/1987	30.0	4.25	1.5	1	13	14				
30	Oquaga L	10/23/1987	30.0	4.63	1.5	1	17	12				
30	Oquaga L	7/1/1988	30.0	5.75	1.5	1	19	17				
30	Oquaga L	7/13/1988	30.0	6.50	1.5	1	28	24				
30	Oquaga L	7/21/1988	30.0	5.00	1.5	1	18	23				
30	Oquaga L	7/28/1988	30.0	6.25	1.5	1	26	24				
30	Oquaga L	8/4/1988	30.0	6.00	1.5	1	25	26				
30	Oquaga L	8/11/1988	30.0	5.50	1.5	1	27	25				
30	Oquaga L	8/18/1988	30.0	5.50	1.5	1	21	23				
30	Oquaga L	8/25/1988	30.0	4.75	1.5	1	20	21				
30	Oquaga L	9/2/1988	30.0	5.50	1.5	1	23	21				
30	Oquaga L	9/15/1988	30.0	5.75	1.5	1	14	16				
30	Oquaga L	7/10/1989	30.0	4.88	1.5	1	20	22				
30	Oquaga L	8/2/1989	30.0	4.25	1.5	1	22	24				
30	Oquaga L	8/9/1989	30.0	4.25	1.5	1	20	20				
30	Oquaga L	8/19/1989	30.0	5.25	1.5	1	21	24				
30	Oquaga L	8/26/1989	30.0	5.13	1.5	1	21	21				
30	Oquaga L	9/4/1989	30.0	4.75	1.5	1	18	20				
30	Oquaga L	9/13/1989	30.0	5.63	1.5	1	21	21				
30	Oquaga L	7/14/1990	30.0	4.25	1.5	1						
30	Oquaga L	7/20/1990	30.0	5.25	1.5	1	30	25				

LNum	PName	Date	Zbot	Zsd	Zsamp	QaQc	TAir	TH20	QA	QB	QC	QD
30	Oquaga L	8/3/1990	30.0	5.25	1.5	1	27	24				
30	Oquaga L	8/20/1990	30.0	5.75	1.5	1	15	21				
30	Oquaga L	9/1/1990	30.0	6.25	1.5	1	25	23				
30	Oquaga L	9/11/1990	30.0	6.50	1.5	1	20	21				
30	Oquaga L	9/27/1990	30.0	6.25	1.5	1	21	13				
30	Oquaga L	7/1/1991	30.0	6.50	1.5	1	18	26				
30	Oquaga L	7/15/1991	30.0	6.25	1.5	1	25	22				
30	Oquaga L	7/28/1991	30.0	5.75	1.5	1	23	24				
30	Oquaga L	8/13/1991	30.0	4.50	1.5	1	24	23				
30	Oquaga L	8/26/1991	30.0	2.75	1.5	1	18	23				
30	Oquaga L	9/9/1991	30.0	1.75	1.5	1	20	22				
30	Oquaga L	6/25/1992	30.0	5.75	1.5	1	23	19	1	1	1	
30	Oquaga L	7/24/1992	30.0	4.45	1.5	1	17	20	1	1	1	5
30	Oquaga L	10/4/1992	30.0	3.50	1.5	1	19	16				
30	Oquaga L	06/23/02	16.0	5.45	1.5	1	20	17	1	1	1	
30	Oquaga L	07/07/02	30.0	6.45	1.5	1	25	19	1	1	1	
30	Oquaga L	07/21/02	30.0	8.15	1.5	1	25	22	1	2	1	
30	Oquaga L	08/05/02	30.0	9.85	1.5	1	22	24	1	2	1	
30	Oquaga L	08/18/02	30.0	10.20	1.5	1	24		1	2	1	
30	Oquaga L	09/02/02	30.0	12.30	1.5	1	23	22	1	2	1	
30	Oquaga L	09/25/02	26.0	9.58		1	13					
30	Oquaga L	10/06/02		6.85		1	16		2	1	1	5
30	Oquaga L	10/20/02	30.0	7.55		1	10		1	1	2	5
30	Oquaga L	6/30/2003	30.0	5.50	1.0	1	21	22	1	1	1	
30	Oquaga L	7/13/2003	30.0	5.05		1	17	21	1	1	1	5
30	Oquaga L	7/27/2003	30.0	5.90		1	24		2	1	2	
30	Oquaga L	8/12/2003	30.0	9.70	1.5	1			1	1	1	
30	Oquaga L	8/25/2003	30.0	9.50		1	16	19	1	2	1	
30	Oquaga L	9/2/2003	30.0	6.90		1	16	17	1	1	3	5
30	Oquaga L	9/28/2003	30.0	9.45		1		16	1	1	2	5
30	Oquaga L	10/13/2003	30.0	9.35		1	16	12	1	1	1	
30	Oquaga L	6/13/2004	30+	6.10	1.0	1	21	19	2	2	1	5
30	Oquaga L	6/29/2004	30+	10.20	1.0	1	18	19	1	2	1	0
30	Oquaga L	7/2/2004	30+	8.90	1.0	1	19	20	1	2	1	0
30	Oquaga L	7/11/2004	30+	8.40	1.0	1	21	20	1	2	1	0
30	Oquaga L	7/25/2004				1						
30	Oquaga L	8/10/2004	30+	9.40	1.0	1	23	18	1	2	1	0
30	Oquaga L	8/22/2004	30+	11.30	1.0	1			1	2	1	0
30	Oquaga L	9/6/2004		9.10		1	18	17	1	3	1	5
30	Oquaga L	9/26/2004	30+	7.40	1.5	1	17	15	1	2	1	0
30	Oquaga L	6/19/2005	30+	6.60	1.5	1	16	15	1	2	2	5
30	Oquaga L	7/9/2005	30+	5.50	1.5	1	15	17	1	2	2	5
30	Oquaga L	7/24/2005	30+	6.80	1.5	1	20		1	2	1	0
30	Oquaga L	8/9/2005	30+	6.10	1.5	1	22	20	1	2	1	0
30	Oquaga L	9/5/2005				1						
30	Oquaga L	9/17/2005	30+	6.35		1	15	17	1	2	1	5
30	Oquaga L	10/9/2005	30+	6.75		1		11	1	1	1	5
30	Oquaga L	10/22/05	30+	4.73		1	7	8	2	1	1	158
30	Oquaga L	6/25/2006				1						
30	Oquaga L	7/9/2006	30+	5.60	1.5	1	18		2	2	1	0
30	Oquaga L	7/23/2006	30+	5.70	1.5	1	17	19	2	2	1	5
30	Oquaga L	8/6/2006	30+	7.30	1.5	1	17	20	2	2	1	0
30	Oquaga L	8/20/2006	30+	9.25		1	18	17	2	2	2	8
30	Oquaga L	9/4/2006	30+	8.95		1	16	14	1	2	1	5
30	Oquaga L	9/17/2006	30+	10.80		1	18	15	1	2	1	0
30	Oquaga L	10/8/2006	30+	11.65	1.5	1	12	10	1	2	1	0
30	Oquaga L	7/8/2007	30+	10.80	1.0	1	21	15	1	2	1	0
30	Oquaga L	7/21/2007	30+	10.10	1.0	1	19	16	1	2	1	0
30	Oquaga L	8/8/2007	30+	8.85	1.0	1	16	18	1	2	1	0

LNum	PName	Date	Zbot	Zsd	Zsamp	QaQc	TAir	TH20	QA	QB	QC	QD
30	Oquaga L	8/19/2007	30+	8.40	1.0	1	11	16	1	2	1	5
30	Oquaga L	9/3/2007	30+	8.25	12.0	1	18	15	1	3	1	0
30	Oquaga L	9/16/2007	30+	7.95		1	10	14	1	2	1	5
30	Oquaga L	10/7/2007	30+	9.05	1.5	1	14	13	2	2	1	5
30	Oquaga L	10/20/2007	30+	7.45	1.5	1	13	10	1	1	1	5
30	Oquaga L	06/23/02	16.0			2	20					
30	Oquaga L	07/07/02	30.0			2	25					
30	Oquaga L	07/21/02	30.0			2	25					
30	Oquaga L	08/05/02	30.0			2	22					
30	Oquaga L	08/18/02	30.0			2	24					
30	Oquaga L	09/02/02	30.0	8.15		2	23	10				
30	Oquaga L	09/25/02	26.0	9.58	24.0	2	13	14				
30	Oquaga L	10/06/02		6.85	20.0	2	16	9				
30	Oquaga L	10/20/02	30.0	7.55	15.0	2	10	55				
30	Oquaga L	6/30/2003				2						
30	Oquaga L	7/13/2003				2						
30	Oquaga L	7/27/2003			13.0	2						
30	Oquaga L	8/12/2003				2						
30	Oquaga L	8/25/2003			12.5	2						
30	Oquaga L	9/2/2003				2						
30	Oquaga L	9/28/2003				2						
30	Oquaga L	10/13/2003				2						
30	Oquaga L	6/13/2004				2						
30	Oquaga L	6/29/2004				2						
30	Oquaga L	7/2/2004				2						
30	Oquaga L	7/11/2004				2						
30	Oquaga L	7/25/2004				2						
30	Oquaga L	8/10/2004				2						
30	Oquaga L	8/22/2004				2						
30	Oquaga L	9/6/2004				2						
30	Oquaga L	9/26/2004				2						
30	Oquaga L	6/19/2005	30+			2						
30	Oquaga L	7/9/2005	30+			2						
30	Oquaga L	7/24/2005	30+			2						
30	Oquaga L	8/9/2005	30+			2						
30	Oquaga L	9/5/2005				2						
30	Oquaga L	9/17/2005	30+		13.0	2		6				
30	Oquaga L	10/9/2005	30+		10.0	2		4				
30	Oquaga L	10/22/05	30+			2		5				
30	Oquaga L	6/25/2006				2						
30	Oquaga L	7/9/2006	30+			2						
30	Oquaga L	7/23/2006	30+			2						
30	Oquaga L	8/6/2006	30+			2						
30	Oquaga L	8/20/2006	30+		15.0	2		4				
30	Oquaga L	9/4/2006	30+		20.0	2		4				
30	Oquaga L	9/17/2006	30+		12.0	2		6				
30	Oquaga L	10/8/2006	30+			2						
30	Oquaga L	7/8/2007				2						
30	Oquaga L	7/21/2007				2						
30	Oquaga L	8/8/2007				2						
30	Oquaga L	8/19/2007				2						
30	Oquaga L	9/3/2007				2						
30	Oquaga L	9/16/2007				2						
30	Oquaga L	10/7/2007				2						
30	Oquaga L	10/20/2007				2						