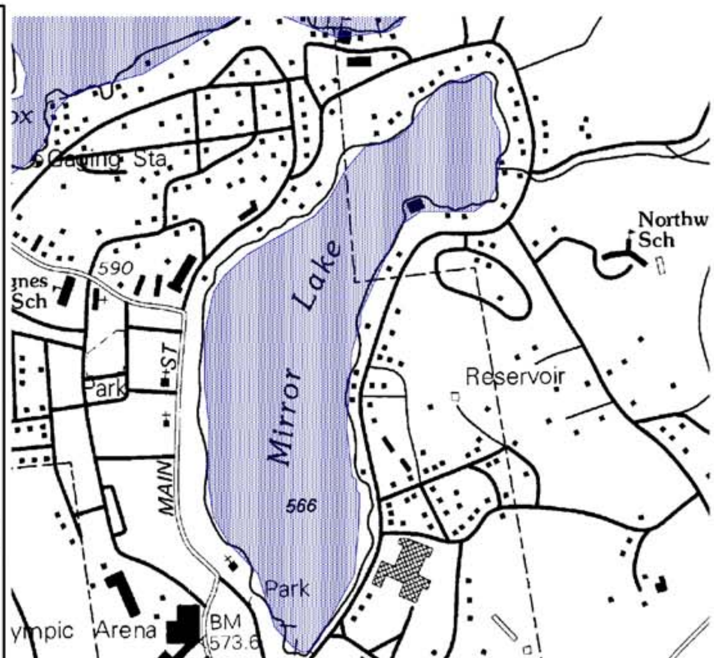
New York State Department of Environmental Conservation

Division of Water

New York
Citizens Statewide Lake Assessment Program
(CSLAP)

2007 Annual Report- Mirror Lake

June, 2008



New York State Department of Environmental Conservation

2007 INTERPRETIVE SUMMARY
ABRIDGED REPORT

NEW YORK
CITIZENS STATEWIDE
LAKE ASSESSMENT PROGRAM
(CSLAP)

MIRROR LAKE

Scott A. Kishbaugh, PE

NYS Department of Environmental Conservation
NY Federation of Lake Associations

June, 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 **Mirror Lake**.

Mirror Lake is a 122 acre, class B(T) lake found in the Town of North Elba in Essex County, in the northern Adirondack region of New York State. It was first sampled as part of CSLAP in 1998. The following volunteers have participated in CSLAP, and deserve most of the credit for the success of this program at **Mirror Lake**: **Elissa and Richard Schoenlank, Mark Wilcox, and Allison Smith.**

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- MIRROR 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: Mirror Lake was probably about as productive in 2007 as in the typical CSLAP sampling season. Water transparency readings were slightly higher than normal, but chlorophyll *a* readings were similar to those measured in the typical CSLAP sampling season, and phosphorus readings were slightly higher than normal.

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 and color readings have been higher in last five years, including 2007, than in the first four years of CSLAP sampling, although these higher readings do not indicate any water quality problems. Mirror Lake continued to exhibit characteristics typical of weakly colored lakes with water of intermediate hardness, low nitrogen levels, and circumneutral to weakly alkaline conditions. The lake may be susceptible to zebra mussel infestations, based on the 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 use assessments were similar in 2007 to those in most recent years, but continued to be less favorable than in the period from 1998-2000. This was coincident with slightly higher aquatic plant coverage (plants more frequently grew to the lake surface in recent years, including 2007) and a slight degradation in water quality assessments, despite higher water clarity. These recreational assessments continue to be slightly less favorable than in other lakes with similar water quality conditions and lack of nuisance weed problems.

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 None of the trophic indicators (water clarity, chlorophyll *a* and total phosphorus) have exhibited any significant long-term trends. pH and color readings have increased in the last several years, but it is not yet known if this represents a trend. Aquatic plant coverage increased from 2000 to 2003 and has been stable since then. While recreational and, to a lesser extent water quality, assessments have degraded slightly over this period, water quality conditions have been fairly stable, and recreational impacts have generally been associated with non-water quality related factors (such as foam, pollen, or excessive lake use).

ABRIDGED SUMMARY- MIRROR 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 Lake Champlain drainage basin do not include Mirror Lake. The CSLAP datasets suggest that no listings appear to be warranted, including the 2007 data.

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

Response: Aquatic plant surveys have not been conducted through CSLAP at Mirror Lake since 1999.

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

Response: Water quality conditions in Mirror Lake have been fairly stable. The slight degradation in recreational use perception should continue to be watched, particularly given the increase in aquatic plant coverage over the same period.

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NEW YORK STATE, CSLAP AND MIRROR 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 $R^2 > 0.33$).

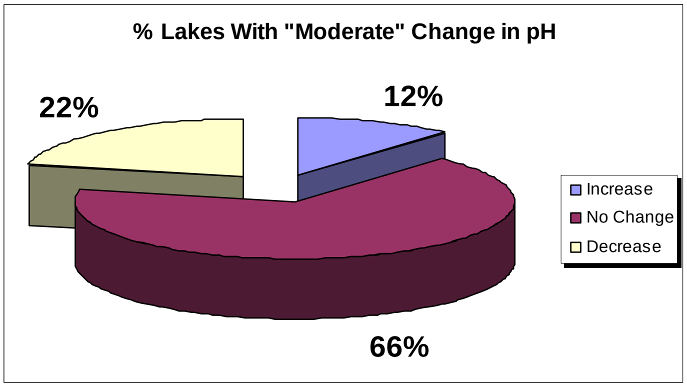


Figure 7a. %CSLAP Lakes Exhibiting Moderate Long-Term Change in pH

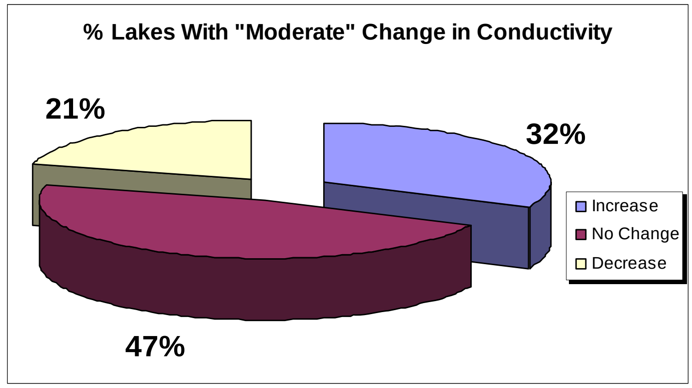


Figure 7b. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Conductivity

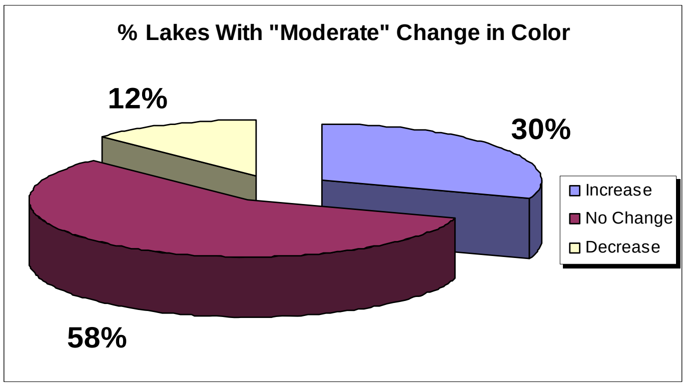


Figure 7c. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Color

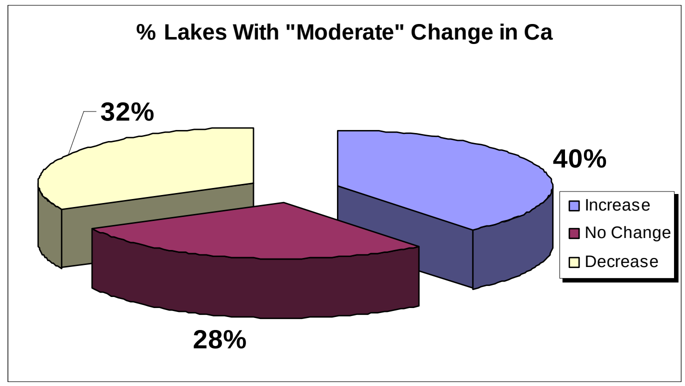


Figure 7d. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Calcium

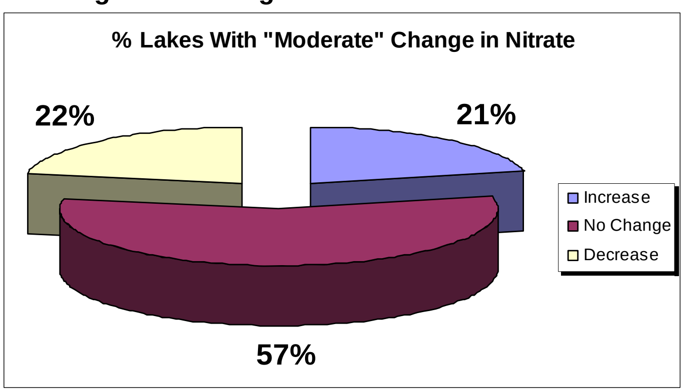


Figure 7e. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Nitrate

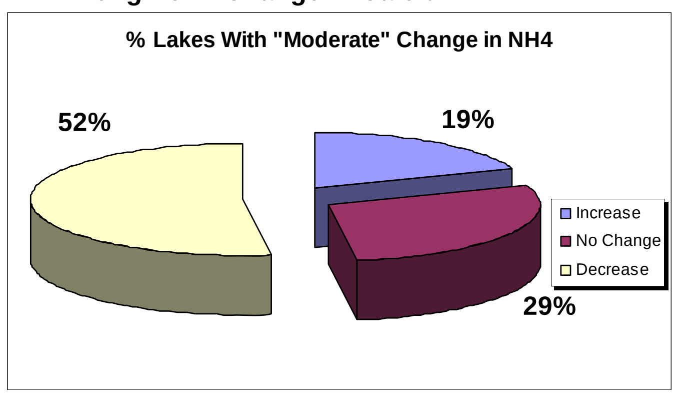


Figure 7f. %CSLAP Lakes Exhibiting Moderate Long-Term Changes in Ammonia

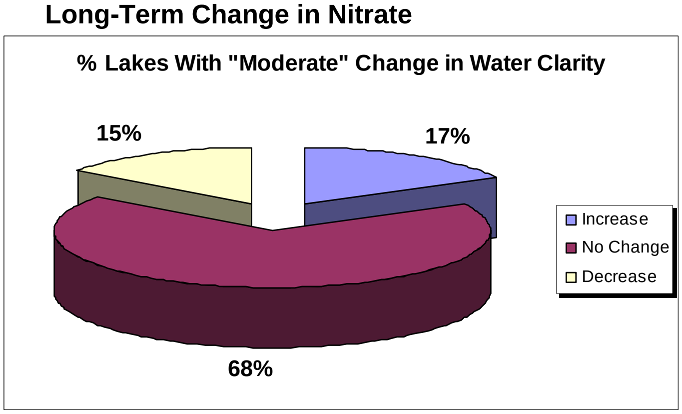


Figure 7g. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Water Clarity

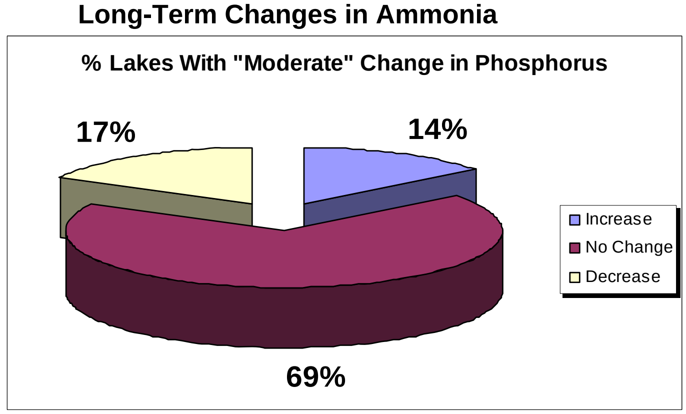


Figure 7h. %CSLAP Lakes Exhibiting Moderate Long-Term Changes in Phosphorus

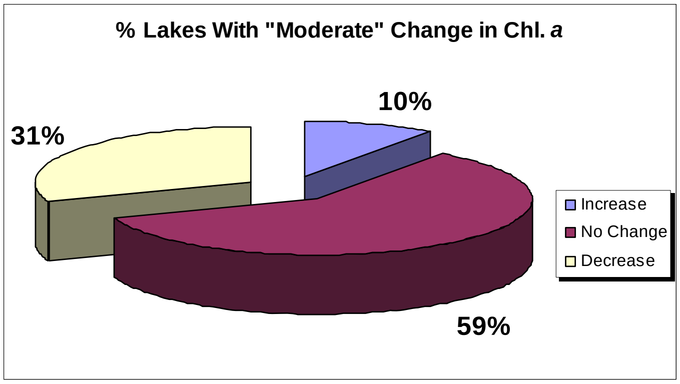


Figure 7i. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Chlorophyll *a*

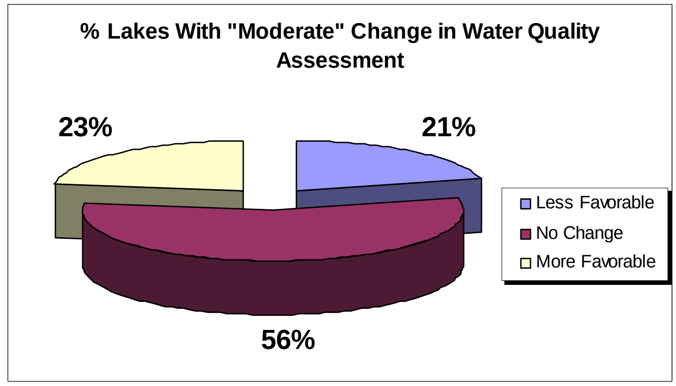


Figure 7j. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Water-quality Assessment

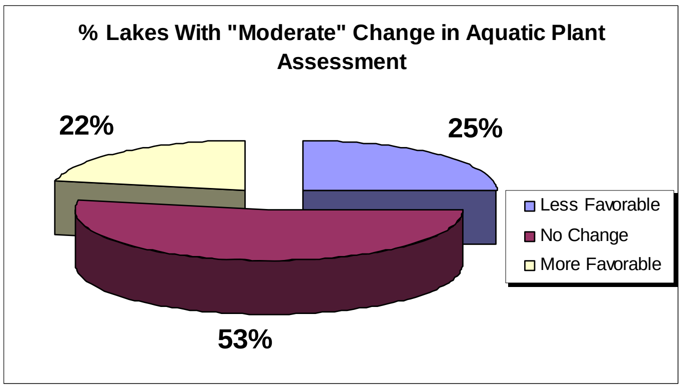


Figure 7k. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Aquatic Plant Assessment

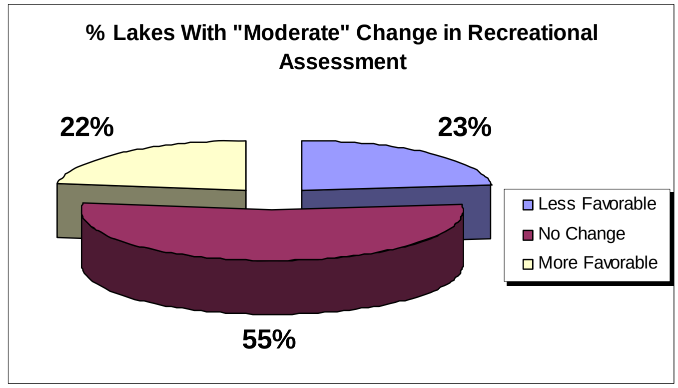


Figure 7l. %CSLAP Lakes Exhibiting Moderate Long-Term Change in Recreational Assessment

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.

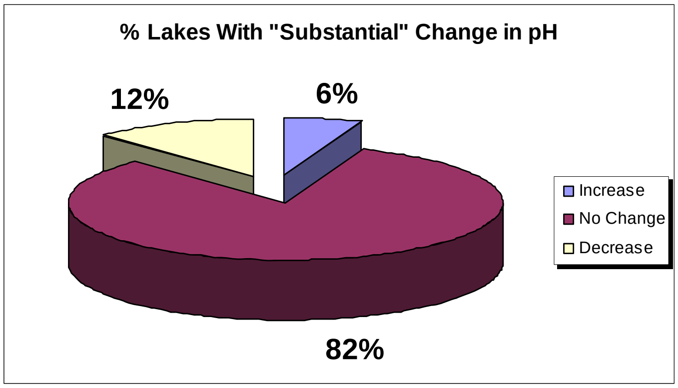


Figure 8a. %CSLAP Lakes Exhibiting Substantial Long-Term Change in pH

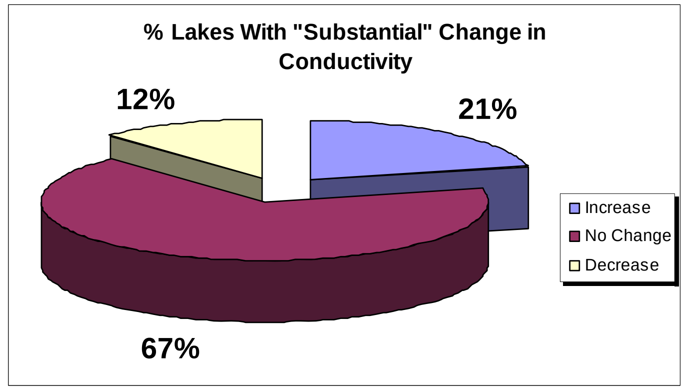


Figure 8b. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Conductivity

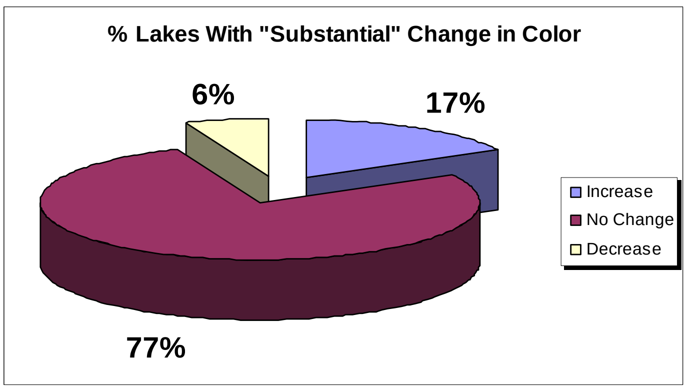


Figure 8c. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Color

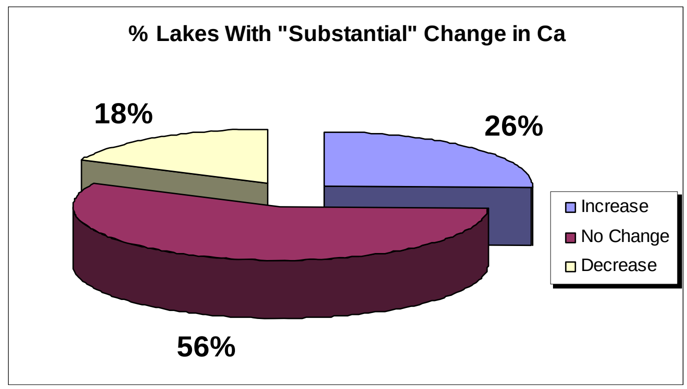


Figure 8d. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Calcium

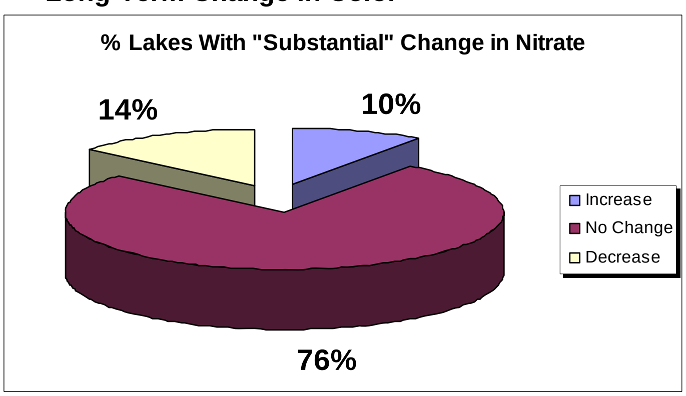


Figure 8e. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Nitrate

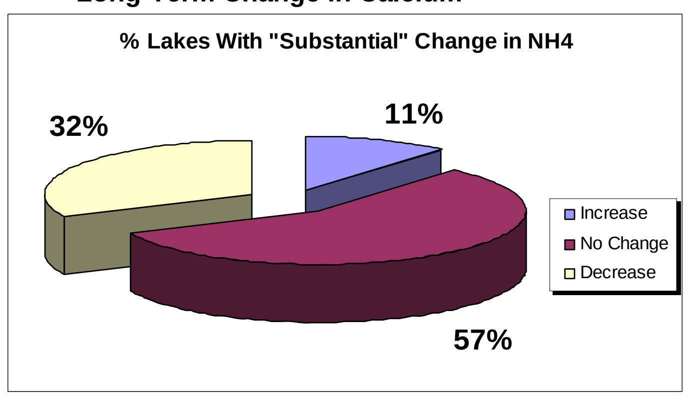


Figure 8f. %CSLAP Lakes Exhibiting Substantial Long-Term Changes in Ammonia

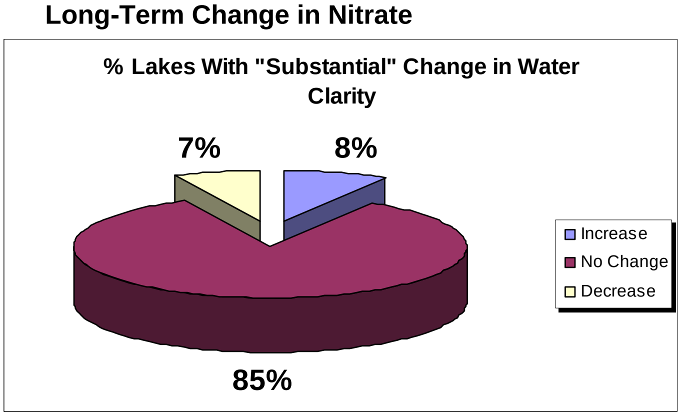


Figure 8g. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Water Clarity

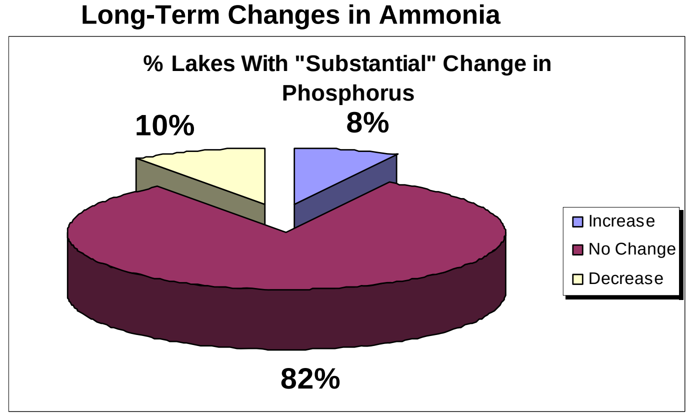
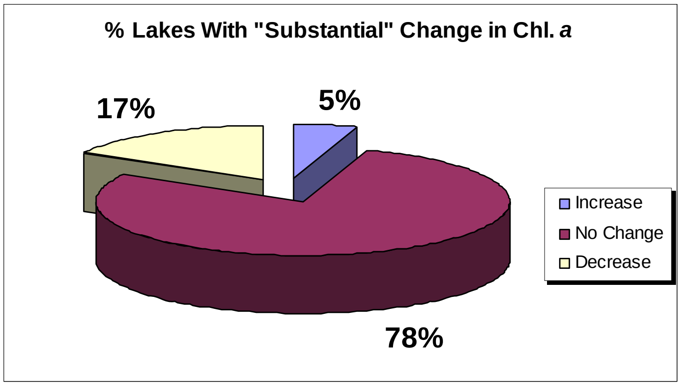


Figure 8h. %CSLAP Lakes Exhibiting Substantial Long-Term Changes in Phosphorus



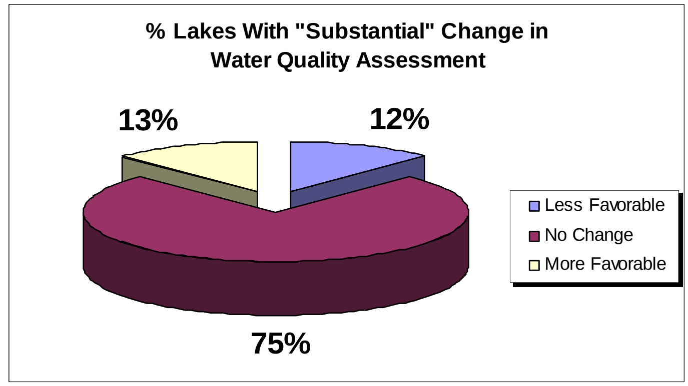
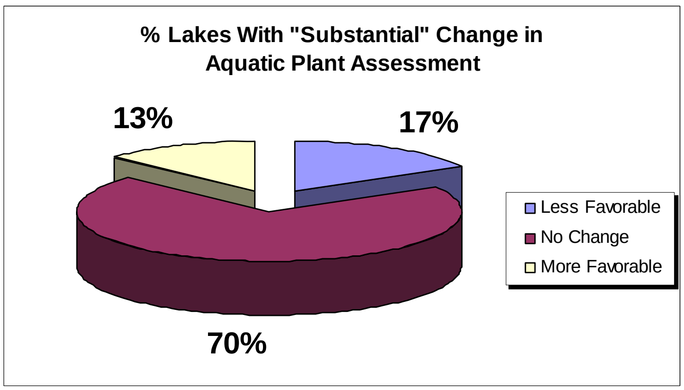


Figure 8i. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Chlorophyll *a*

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



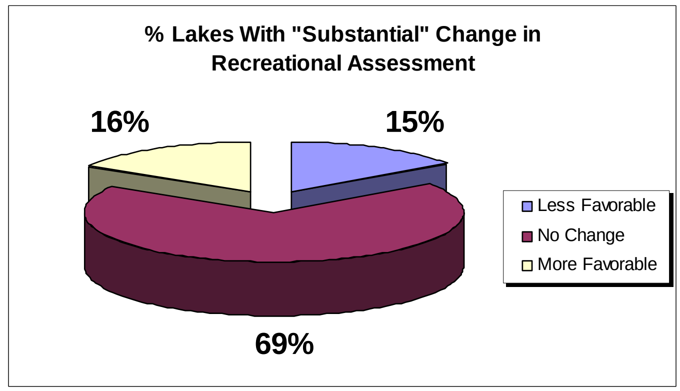


Figure 8k. %CSLAP Lakes Exhibiting Substantial Long-Term Change in Aquatic Plant Assessment

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.

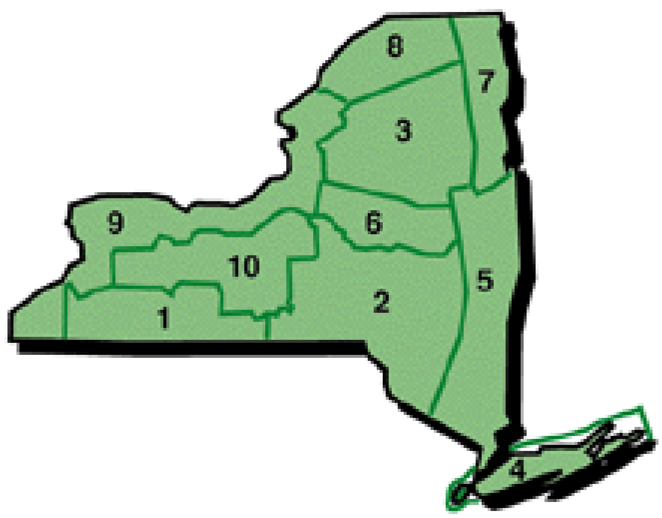


Figure 9- NOAA Weather Zones in New York State

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 Mirror Lake Water Quality Summary.**

Mirror Lake is in NOAA weather zone 3, the Northern Plateau. The precipitation patterns for this zone are summarized below.

Statewide and Mirror 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 Mirror 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 3 Avg: Winter-Spring / Summer
1986	Normal / Wet	Normal / Wet
1987	Dry / Normal	Dry / Normal
1988	Very Dry / Normal	Very Dry / Normal
1989	Wet / Normal	Normal / Very Wet
1990	Very Wet / Normal	Very Wet / Dry
1991	Normal / Normal	Normal / Normal
1992	Normal / Wet	Normal / Normal
1993	Wet / Normal	Wet / Dry
1994	Wet / Normal	Wet / Normal
1995	Very Dry / Normal	Very Dry / Normal
1996	Very Wet / Normal	Wet / Normal
1997	Normal / Normal	Wet / Normal
1998	Very Wet / Normal	Very Wet / Normal
1999	Normal / Normal	Normal / Normal
2000	Very Wet / Normal	Very Wet / Normal
2001	Normal / Normal	Normal / Normal
2002	Very Wet / Dry	Wet / Dry
2003	Normal / Wet	Normal / Normal
2004	Dry / Very Wet	Normal / Normal
2005	Normal / Normal	Dry / Wet
2006	Wet / Wet	Wet / Normal

Table 1: Statewide and NOAA Zone 3 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 Northern Plateau—which includes Mirror Lake— have indicated wet to very wet conditions over the last eleven years. The wettest years have been 2000 and 1998, while the driest years were 1995 and 1988. There has only been one dry winter (2005) and one dry summer (2002) in the last ten years in this region. Within the CSLAP sampling timetable for Mirror Lake, 2000 and 1998 were very wet, and no years were very dry.

DETAILED MIRROR 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 Mirror Lake

Year	Min	Avg	Max	N	Parameter
1998-07	**4.30**	**5.93**	**9.50**	**57**	**CSLAP Zsd**
2007	5.15	6.74	9.50	8	CSLAP Zsd
2006	4.35	5.52	8.60	8	CSLAP Zsd
2005	4.75	6.08	7.55	8	CSLAP Zsd
2004	4.95	6.35	7.63	8	CSLAP Zsd
2003	5.00	5.72	6.55	3	CSLAP Zsd
2001	4.90	5.32	5.90	5	CSLAP Zsd
2000	4.30	4.43	4.50	4	CSLAP Zsd
1999	6.80	7.44	8.40	5	CSLAP Zsd
1998	4.70	5.24	6.60	8	CSLAP Zsd
Year	Min	Avg	Max	N	Parameter
1998-07	**0.002**	**0.007**	**0.037**	**53**	**CSLAP Tot.P**
2007	0.005	0.011	0.037	8	CSLAP Tot.P
2007	0.005	0.009	0.012	8	CSLAP HypoTP
2006	0.005	0.006	0.009	8	CSLAP Tot.P
2006	0.004	0.011	0.048	8	CSLAP HypoTP
2005	0.002	0.006	0.015	8	CSLAP Tot.P
2005	0.005	0.007	0.012	8	CSLAP HypoTP
2004	0.003	0.005	0.006	7	CSLAP Tot.P
2004	0.006	0.011	0.020	5	CSLAP HypoTP
2003	0.004	0.006	0.007	4	CSLAP Tot.P
2003	0.016	0.031	0.055	3	CSLAP HypoTP
2001	0.004	0.007	0.010	6	CSLAP Tot.P
2000	0.005	0.007	0.014	4	CSLAP Tot.P
1999	0.004	0.005	0.006	5	CSLAP Tot.P
1998	0.005	0.006	0.006	3	CSLAP Tot.P
Year	Min	Avg	Max	N	Parameter
1998-07	**0.00**	**0.02**	**0.09**	**56**	**CSLAP NO3**
2007	0.00	0.02	0.05	8	CSLAP NO3
2006	0.00	0.03	0.09	7	CSLAP NO3
2005	0.01	0.02	0.03	8	CSLAP NO3
2004	0.01	0.02	0.05	8	CSLAP NO3
2004	0.02	0.07	0.21	5	CSLAP HyNO3
2003	0.00	0.01	0.02	4	CSLAP NO3
2003	0.00	0.02	0.05	3	CSLAP HyNO3
2001	0.01	0.02	0.08	6	CSLAP NO3
2000	0.01	0.01	0.01	4	CSLAP NO3
1999	0.01	0.01	0.01	5	CSLAP NO3
1998	0.01	0.02	0.04	6	CSLAP NO3
Year	Min	Avg	Max	N	Parameter
2003-07	**0.01**	**0.03**	**0.27**	**35**	**CSLAP NH4**
2007	0.01	0.06	0.27	8	CSLAP NH4
2006	0.01	0.03	0.06	7	CSLAP NH4
2005	0.01	0.03	0.10	8	CSLAP NH4
2004	0.01	0.02	0.09	8	CSLAP NH4

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 Mirror Lake (cont)

Year	Min	Avg	Max	N	Parameter
2003-07	**0.01**	**0.03**	**0.27**	**35**	**CSLAP NH4**
2004	0.03	0.06	0.10	5	CSLAP HyNH4
2003	0.01	0.01	0.02	4	CSLAP NH4
2003	0.01	0.22	0.53	3	CSLAP HyNH4
Year	Min	Avg	Max	N	Parameter
2003-07	**0.09**	**0.35**	**0.62**	**33**	**CSLAP TDN**
2007	0.22	0.48	0.61	8	CSLAP TDN
2006	0.38	0.48	0.62	8	CSLAP TDN
2005	0.09	0.17	0.25	8	CSLAP TDN
2004	0.22	0.29	0.33	6	CSLAP TDN
2004	0.24	0.35	0.53	3	CSLAP HyTDN
2003	0.13	0.22	0.39	3	CSLAP TDN
2003	0.29	0.29	0.29	2	CSLAP HyTDN
Year	Min	Avg	Max	N	Parameter
2003-07	**27.85**	**134.72**	**267.80**	**32**	**CSLAP TN/TP**
2007	27.85	155.25	267.80	8	CSLAP TN/TP
2006	145.93	182.12	242.44	8	CSLAP TN/TP
2005	30.47	80.97	160.56	8	CSLAP TN/TP
2004	108.02	133.36	161.22	5	CSLAP TN/TP
2004	47.31	64.12	86.27	3	CSLAP HyTN/TP
2003	51.49	99.18	194.48	3	CSLAP TN/TP
2003	28.70	34.26	39.82	2	CSLAP HyTN/TP
Year	Min	Avg	Max	N	Parameter
1998-07	**1**	**7**	**31**	**56**	**CSLAP TColor**
2007	1	7	14	8	CSLAP TColor
2006	3	10	31	6	CSLAP TColor
2005	5	10	17	7	CSLAP TColor
2004	3	8	19	8	CSLAP TColor
2003	5	10	16	4	CSLAP TColor
2001	4	5	6	6	CSLAP TColor
2000	4	6	7	4	CSLAP TColor
1999	3	5	7	5	CSLAP TColor
1998	3	6	11	8	CSLAP TColor
Year	Min	Avg	Max	N	Parameter
1998-07	**6.27**	**7.37**	**8.31**	**58**	**CSLAP pH**
2007	7.12	7.73	8.13	7	CSLAP pH
2006	6.74	7.66	8.30	8	CSLAP pH
2005	6.56	7.31	8.02	8	CSLAP pH
2004	6.61	7.39	8.31	8	CSLAP pH
2003	7.32	7.37	7.40	4	CSLAP pH
2001	6.41	7.23	8.22	6	CSLAP pH
2000	6.34	6.77	7.25	4	CSLAP pH
1999	6.27	7.20	8.00	5	CSLAP pH
1998	6.38	7.34	7.91	8	CSLAP pH

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

Year	Min	Avg	Max	N	Parameter
1998-07	**116**	**182**	**241**	**56**	**CSLAP Cond25**
2007	149	173	217	7	CSLAP Cond25
2006	116	165	188	8	CSLAP Cond25
2005	169	199	216	8	CSLAP Cond25
2004	173	209	241	8	CSLAP Cond25
2003	200	213	225	4	CSLAP Cond25
2001	176	182	191	6	CSLAP Cond25
2000	173	176	179	4	CSLAP Cond25
1999	179	180	182	5	CSLAP Cond25
1998	136	142	149	6	CSLAP Cond25
Year	Min	Avg	Max	N	Parameter
2003-07	**7.9**	**8.6**	**9.1**	**8**	**CSLAP Ca**
2007	8.4	8.8	9.1	2	CSLAP Ca
2006	7.9	8.0	8.2	2	CSLAP Ca
2005	8.5	8.5	8.5	2	CSLAP Ca
2004	9.0	9.0	9.0	1	CSLAP Ca
2003	8.9	8.9	8.9	1	CSLAP Ca
Year	Min	Avg	Max	N	Parameter
1998-07	**0.10**	**1.42**	**4.94**	**53**	**CSLAP Chl.a**
2007	0.10	1.37	3.74	8	CSLAP Chl.a
2006	0.10	1.08	2.11	7	CSLAP Chl.a
2005	0.32	0.98	1.30	7	CSLAP Chl.a
2004	0.28	0.98	1.90	7	CSLAP Chl.a
2003	0.69	1.26	1.58	3	CSLAP Chl.a
2001	0.74	1.21	1.76	4	CSLAP Chl.a
2000	0.81	1.61	2.51	4	CSLAP Chl.a
1999	0.46	1.19	1.88	5	CSLAP Chl.a
1998	0.64	2.75	4.94	8	CSLAP Chl.a
Year	Min	Avg	Max	N	Parameter
1998-07	**1**	**1.8**	**3**	**57**	**QA**
2007	2	2.0	2	8	QA
2006	2	2.1	3	8	QA
2005	1	1.9	2	8	QA
2004	2	2.0	2	7	QA
2003	1	1.8	2	4	QA
2001	2	2.0	2	6	QA
2000	1	1.3	2	4	QA
1999	1	1.4	2	5	QA
1998	1	1.6	2	7	QA
Year	Min	Avg	Max	N	Parameter
1998-07	**1**	**2.3**	**3**	**57**	**QB**
2007	2	2.5	3	8	QB
2006	2	2.6	3	8	QB
2005	2	2.6	3	8	QB

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

Year	Min	Avg	Max	N	Parameter
1998-07	**1**	**2.3**	**3**	**57**	**QB**
2004	2	2.6	3	7	QB
2003	3	3.0	3	4	QB
2001	1	2.3	3	6	QB
2000	1	1.8	3	4	QB
1999	1	2.2	3	5	QB
1998	1	1.0	1	7	QB
Year	Min	Avg	Max	N	Parameter
1998-07	**1**	**1.8**	**4**	**57**	**QC**
2007	2	2.1	3	8	QC
2006	2	2.3	3	8	QC
2005	1	2.1	4	8	QC
2004	2	2.0	2	7	QC
2003	1	1.8	2	4	QC
2001	1	1.5	2	6	QC
2000	1	1.3	2	4	QC
1999	1	1.4	2	5	QC
1998	1	1.1	2	7	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 Mirror Lake
Eutrophication Indicators

Parameter	Year	Minimum	Average	Maximum
Zsd	2007	5.15	6.74	9.50
(meters)	All Years	4.30	5.93	9.50
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
Phosphorus	2007	0.005	0.007	0.010
(mg/l)	All Years	0.002	0.006	0.015
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
Chl.a	2007	0.10	1.37	3.74
(µg/l)	All Years	0.10	1.42	4.94

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	Highest at Times	Yes	Oligotrophic	No	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	No	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	Lowest at Times	Yes	Oligotrophic	No	
(µg/l)	All Years			Oligotrophic		

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 Mirror Lake is an *oligotrophic*, or unproductive lake, based on chlorophyll *a,* Secchi disk transparency, and phosphorus readings. The lake was probably about as productive in 2007 as in the typical CSLAP sampling season. Water clarity readings were higher than normal in 2007, but phosphorus readings were also slightly higher than normal, and chlorophyll *a* readings were close to the long-term average for the lake. None of these trophic indicators have exhibited long-term changes, and the small differences from sample to sample and year to year are probably within the normal range of variability for Mirror Lake. There is only a weak correlation between changes in algae and nutrients, and 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 in and nutrient loading to the lake. None of these trophic indicators exhibit any predictable (or large) change during the summer. This is due in part to deepwater phosphorus levels that are only slightly higher than those measured at the lake surface during the summer. Phosphorus readings have at all times been below the state guidance value for lakes used for contact recreation (swimming), resulting in water clarity readings that easily exceed the minimum recommended readings for swimming beaches (= 1.2 meters). In short, Mirror Lake was probably about as productive as normal in 2007, and water quality conditions related to lake eutrophication (clarity, algae, nutrients) have been fairly stable since CSLAP sampling began in 1998.

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

Parameter	Year	Minimum	Average	Maximum
Nitrate	2007	0.00	0.02	0.05
(mg/l)	All Years	0.00	0.02	0.09
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
NH4	2007	0.01	0.06	0.27
(mg/l)	All Years	0.01	0.03	0.27
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
TDN	2007	0.22	0.48	0.61
(mg/l)	All Years	0.09	0.35	0.62
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
True Color	2007	1	7	14
(ptu)	All Years	1	7	31
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
pH	2007	7.12	7.73	8.13
(std units)	All Years	6.27	7.37	8.31
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
Conductivity	2007	149	173	217
(µmho/cm)	All Years	116	182	241
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
Calcium	2007	8.4	8.8	9.1
(mg/l)	All Years	7.9	8.6	9.1

These data indicate Mirror Lake is a weakly colored, circumneutral (near neutral pH) lake with low to undetectable nitrate readings, low ammonia levels, and soft water. Water transparency readings are more strongly influenced by algae than water color, and although color readings have been higher in the last five years than in the first four years of CSLAP sampling, these readings are still not high enough to influence water clarity. Surface ammonia and nitrate readings are consistently close to the analytical detection limit, and suggest that nitrogen does not represent a problem in Mirror Lake. Surface ammonia levels have decreased slightly in recent years, although it is likely that readings over the last five years represent normal variability for the lake. Deepwater ammonia and nitrate levels are slightly higher than in the surface waters, but these readings are also very low. pH readings are usually indicative of circumneutral (near neutral) lakes, and nearly all pH readings have been within the state water quality standards (=6.5 to 8.5), although these readings have been slightly higher in the last five years than in the first four years of CSLAP sampling. Conductivity readings are indicative of lakes with intermediate hardness. Calcium levels are near the threshold found to support zebra mussels, although these exotic animals have not been found in Mirror Lake. With the exception of the aforementioned slight increase in color and pH, none of the non-trophic indicators have exhibited any long-term trends.

TABLE 4- Current and Historical Data Summaries for Mirror 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	Lowest at Times	Yes	No	No	0	
(mg/l)	All Years			No		0	
Parameter	**Year**	**Was 2007 Ammonia the Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**Ammonia High?**	**Ammonia 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?**	**% Samples Exceeding TDN Standard**	
TDN	2007	Within Normal Range	Yes	No	No	0	
(mg/l)	All Years			No		0	
Parameter	**Year**	**Was 2007 Color the Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**Colored Lake?**	**Color Changing?**		
True Color	2007	Lowest at Times	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	Both Highest and Lowest at Times	Yes	Yes	No	0	0
(std units)	All Years			Yes		0	9
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	Intermediate	No		
(µmho/cm)	All Years			Intermediate			
Parameter	**Year**	**Was 2007 Calcium Highest or Lowest on Record?**	**Was 2007 a Typical Year?**	**Support Zebra Mussels?**	**Calcium Changing?**		
Calcium	2007	Highest at Times	Yes	Uncertain	No		
(mg/l)	All Years			Uncertain			

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 Mirror Lake

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

Parameter	Year	Minimum	Average	Maximum
QA	2007	2	2.0	2
(Clarity)	All Years	1	1.8	3
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
QB	2007	2	2.5	3
(Plants)	All Years	1	2.3	3
Parameter	**Year**	**Minimum**	**Average**	**Maximum**
QC	2007	2	2.1	3
(Recreation)	All Years	1	1.8	4

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	Within Normal Range	Yes	Yes	0	0	0	0
(Clarity)	All Years				2	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 at Times	Yes	Yes	50	0	0	0
(Plants)	All Years				49	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	Within Normal Range	Yes	Yes	13	0		
(Recreation)	All Years				7	2		

Mirror Lake has most frequently been described as “not quite crystal clear,” assessments somewhat less favorable than in other lakes with similar water clarity and color readings. These assessments have been relatively stable over the last five years. Aquatic plants densities and coverage increased from 2000 to 2003 and have been stable in the last several years, with plants frequently growing to the lake surface. However, “excessive weed growth” has never resulted in recreational use impacts in the lake, even when plant coverage was much greater. Mirror Lake is usually reported as “excellent” for most recreational uses, although these assessments have degraded slightly since 2000, due to excessive lake use or poor weather rather than for water quality reasons. As a result, these assessments are less favorable than in other similar lakes. Recreational and water quality assessments are stable during the summer and fall, despite slight seasonal increases in aquatic plant coverage.

Mirror Lake has been described by the CSLAP sampling volunteers as “slightly” impaired during 7% of the CSLAP sampling sessions and “substantially” impaired 2% of the time. These recreational impacts have never been associated with excessive algae or excessive weeds.

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

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

Figures 23 and 24 compare data for the measured eutrophication parameters for Mirror Lake in 2007 and since CSLAP sampling began at Mirror 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.

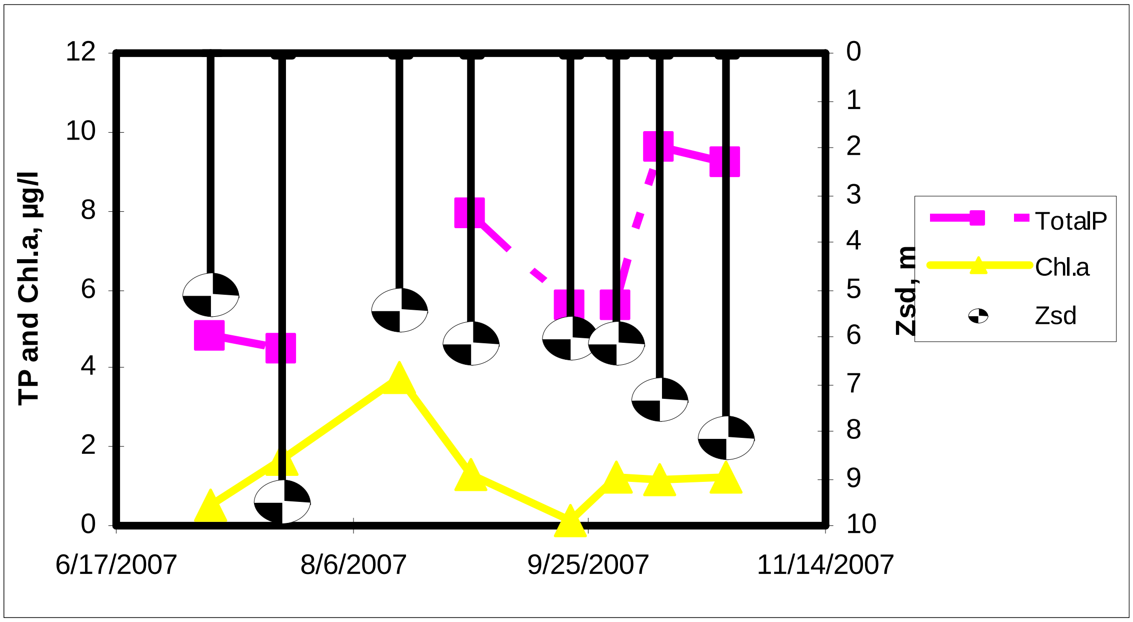


Figure 23. 2007 Eutrophication Data for Mirror Lake

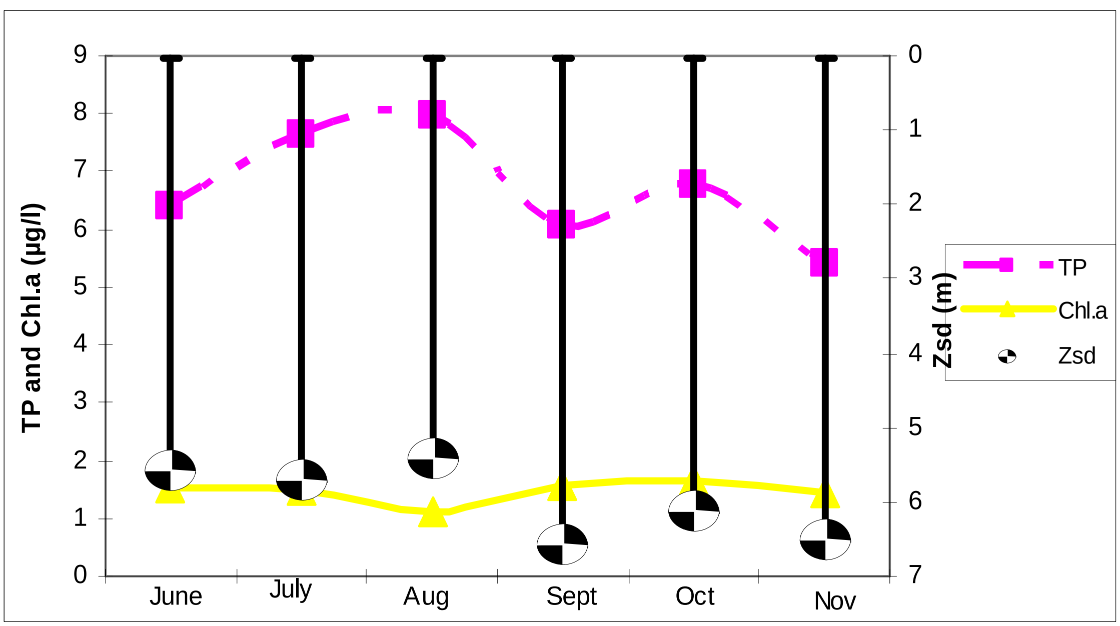


Figure 24- Eutrophication Data in a Typical (Monthly Mean) Year for Mirror Lake

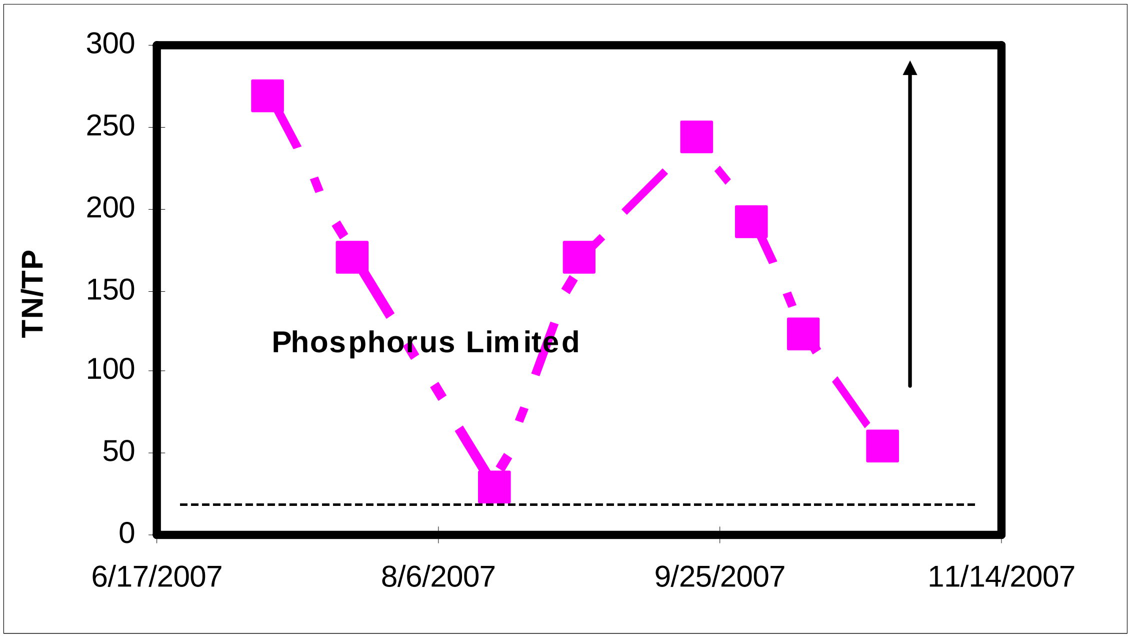


Figure 25. 2007 Nitrogen-to-Phosphorus Ratios for Mirror Lake

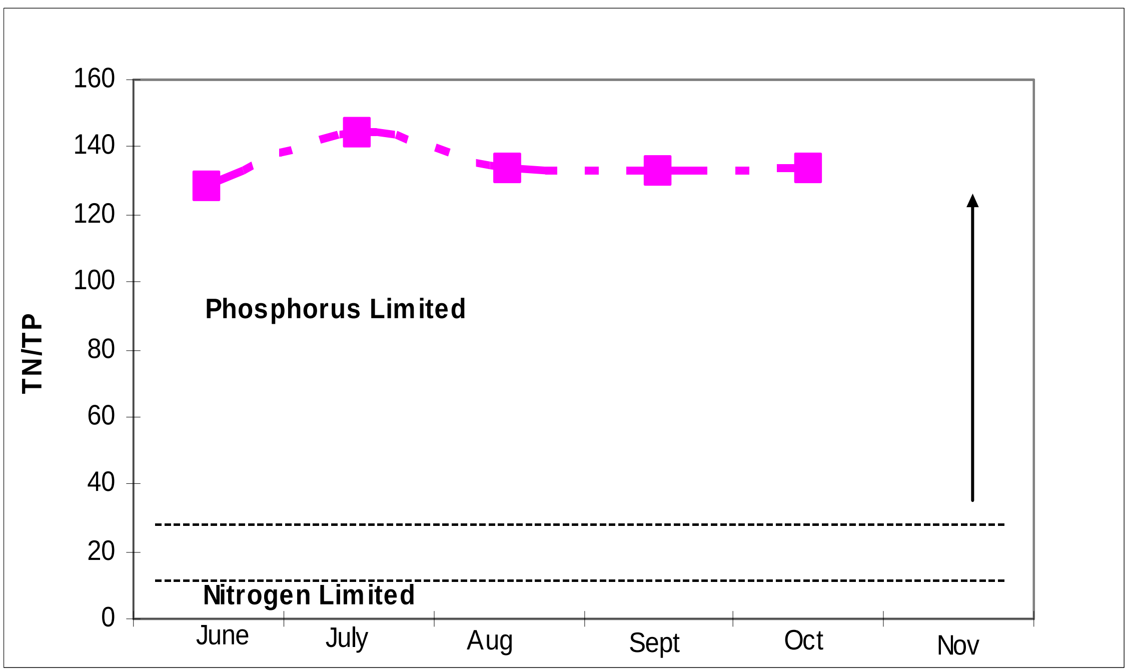


Figure 26- Nitrogen–to-Phosphorus Ratios in a Typical (Monthly Mean) Year for Mirror Lake

Annual Averages, 1998-present

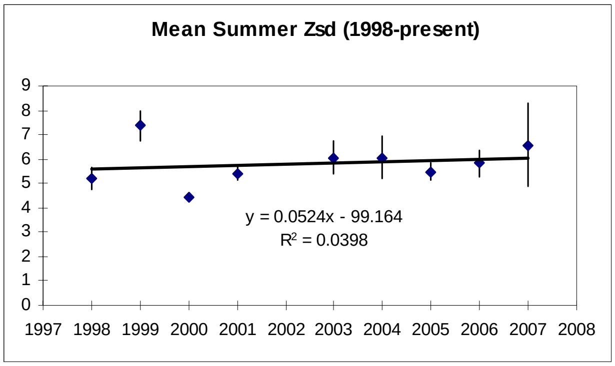


Figure 27. Annual Average Summer Water Clarity for Mirror Lake

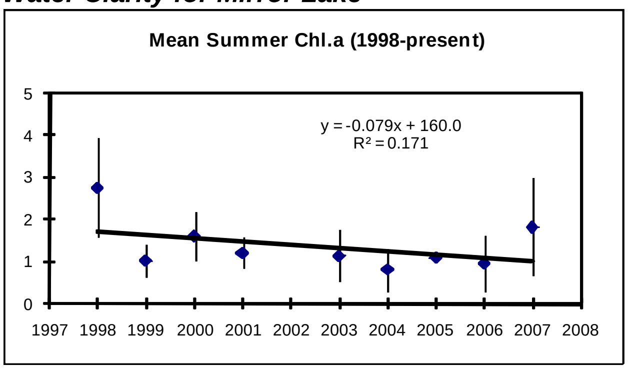


Figure 28. Annual Average Summer Chlorophyll a for Mirror Lake

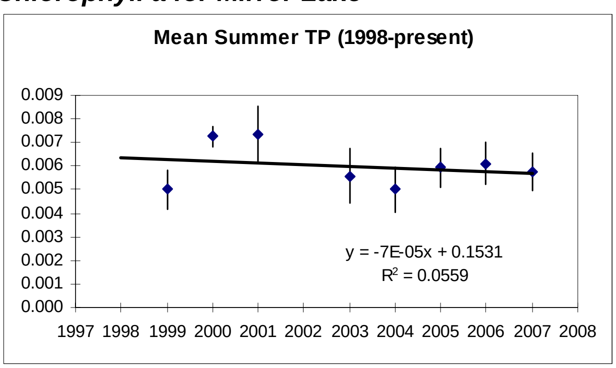


Figure 29. Annual Average Summer Total Phosphorus for Mirror Lake

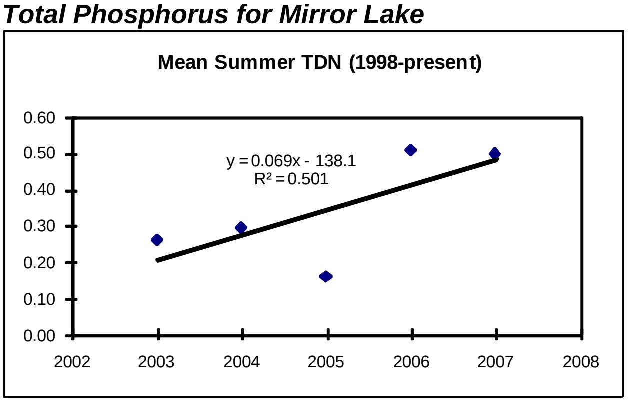


Figure 30. Annual Average Summer Total Nitrogen for Mirror Lake

Wettest Years: 2000, 1998
Driest Years: none
Highest Clarity: 1999, 2007
Lowest Clarity: 2000, 1998
Long Term Trend?: None apparent
Discussion: Water clarity readings have varied slightly from year to year in a manner that does not appear to be statistically significant. The lowest clarity readings occurred in the wettest years, suggesting a connection between precipitation and water quality.

Wettest Years: 2000, 1998
Driest Years: none
Highest Chl.a: 1998, 2007
Lowest Chl.a: 2004, 1999, 2006
Long Term Trend?: None apparent
Discussion: Chlorophyll *a* readings were fairly stable from 1999 through 2006, with higher readings generally occurring in 1998 and 2007. However, algae levels were somewhat variable in each CSLAP sampling season.

Wettest Years: 2000, 1998
Driest Years: none
Highest TP: 2001
Lowest TP: 1999, 2004
Long Term Trend?: None apparent
Discussion: Phosphorus readings have varied slightly from year to year in a manner that does not appear to be statistically significant.

Wettest Years: 2000, 1998
Driest Years: none
Highest Total N: 2007, 2006
Lowest Total N: 2005
Long Term Trend?: Increasing?
Discussion: Total nitrogen readings were higher in the last two years than in the previous three years, although it is not known if this indicates a true increase in total nitrogen or part of the normal range of variability in the lake.

Annual Averages, 1998-present

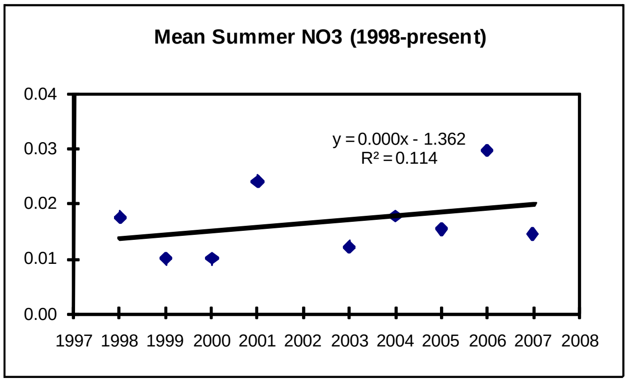


Figure 31. Annual Average Summer Nitrate for Mirror Lake

Wettest Years: 2000, 1998
Driest Years: none
Highest Nitrate: 2006, 2001
Lowest Nitrate: 1999, 2000
Long Term Trend?: None apparent
Discussion: Nitrate readings have varied slightly from year to year in a manner that does not appear to be statistically significant.

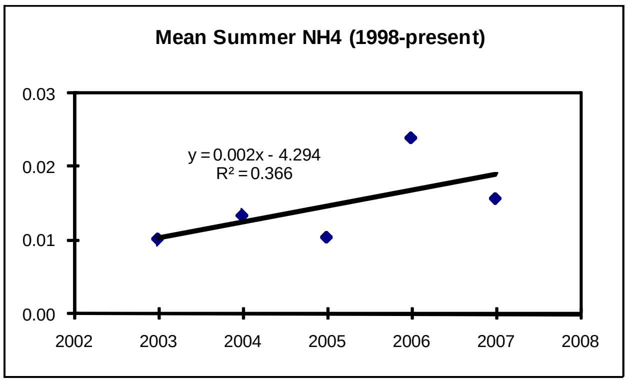


Figure 32. Annual Average Summer Ammonia for Mirror Lake

Wettest Years: 2000, 1998
Driest Years: none
Highest Ammonia: 2006
Lowest Ammonia: 2003, 2005
Long Term Trend?: None apparent
Discussion: Ammonia readings have been slightly higher in the last two years than in the previous three years of CSLAP sampling, although long-term trends are not (yet?) apparent.

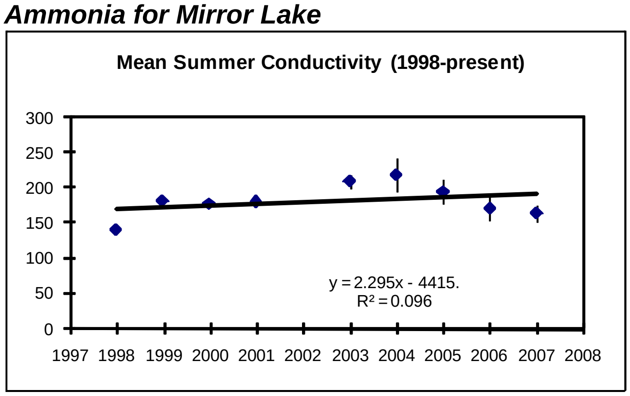


Figure 33. Annual Average Summer Conductivity for Mirror Lake

Wettest Years: 2000, 1998
Driest Years: none
Highest Cond.: 2004, 2003
Lowest Cond.: 1998
Long Term Trend?: None apparent
Discussion: Conductivity readings generally increased from 1998 to 2004, but have decreased since then, suggesting that no long-term trends have been apparent.

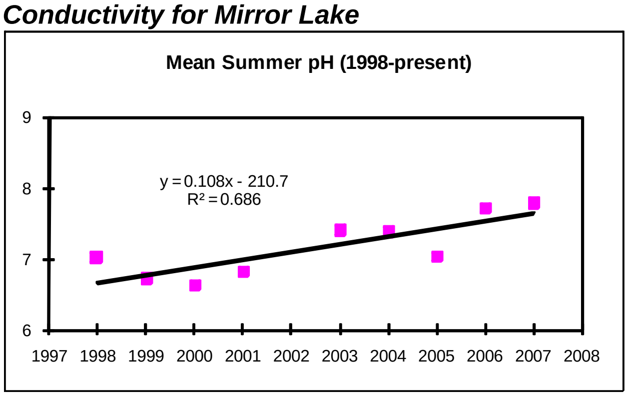


Figure 34. Annual Average Summer pH for Mirror Lake

Wettest Years: 2000, 1998
Driest Years: none
Highest pH: 2006, 2007
Lowest pH: 2000
Long Term Trend?: Increasing?
Discussion: pH readings increased from 2001 to 2007, in a manner that may be statistically significant, despite the lack of similar increase in conductivity readings.

Annual Averages, 1998-present

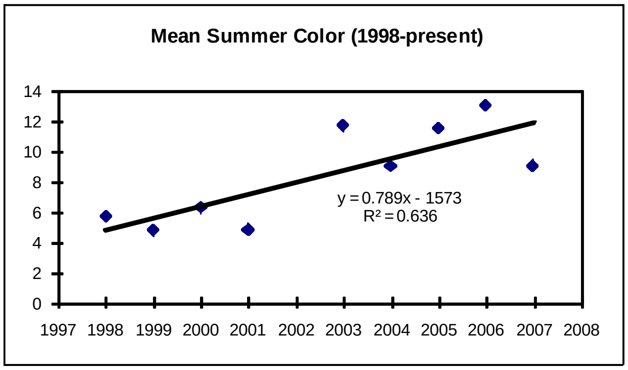


Figure 35. Annual Average Summer Color for Mirror Lake

Wettest Years: 2000, 1998
Driest Years: none
Highest Color: 2006, 2005, 2003
Lowest Color: 2001, 1999
Long Term Trend?: Increasing?
Discussion: Color readings increased from the early 2000s to the present, consistent with the pattern observed in many CSLAP lakes.

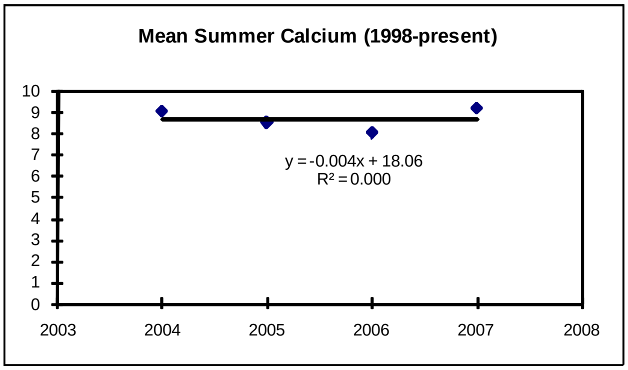


Figure 36. Annual Average Summer Calcium for Mirror Lake

Wettest Years: 2000, 1998
Driest Years: none
Highest Calcium: 2007
Lowest Calcium: 2006
Long Term Trend?: None apparent
Discussion: Calcium readings have varied slightly from year to year in a manner that does not appear to be statistically significant.

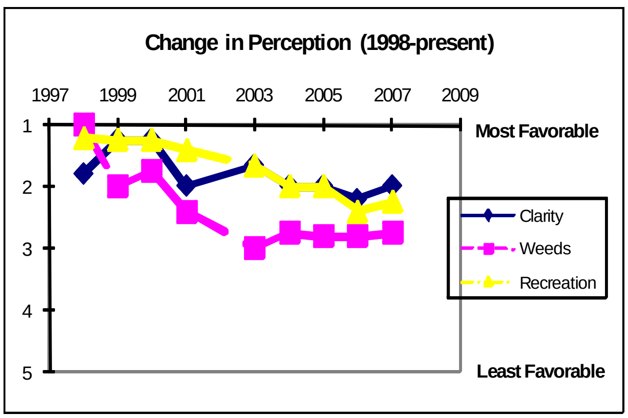


Figure 37. Annual Average Summer Lake Perception for Mirror Lake

(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)

Wettest Years: 2000, 1998
Driest Years: none
Most Favorable WQ: 1999, 2000
Least Favorable WQ: 2006, 2007, 2001
Highest Weed Cov. 2003, 2004-07
Lowest Weed Cov. 1998
Most Favorable Rec. 1998-2000
Least Favorable Rec. 2006, 2007
Long Term Trend?: Recreation degraded?
Discussion: Recreational assessments have been less favorable in the last six years than in the first three years of CSLAP sampling. This degradation closely mirrored increases in aquatic plant coverage, and to a lesser extent less favorable water quality assessments, over the same period.

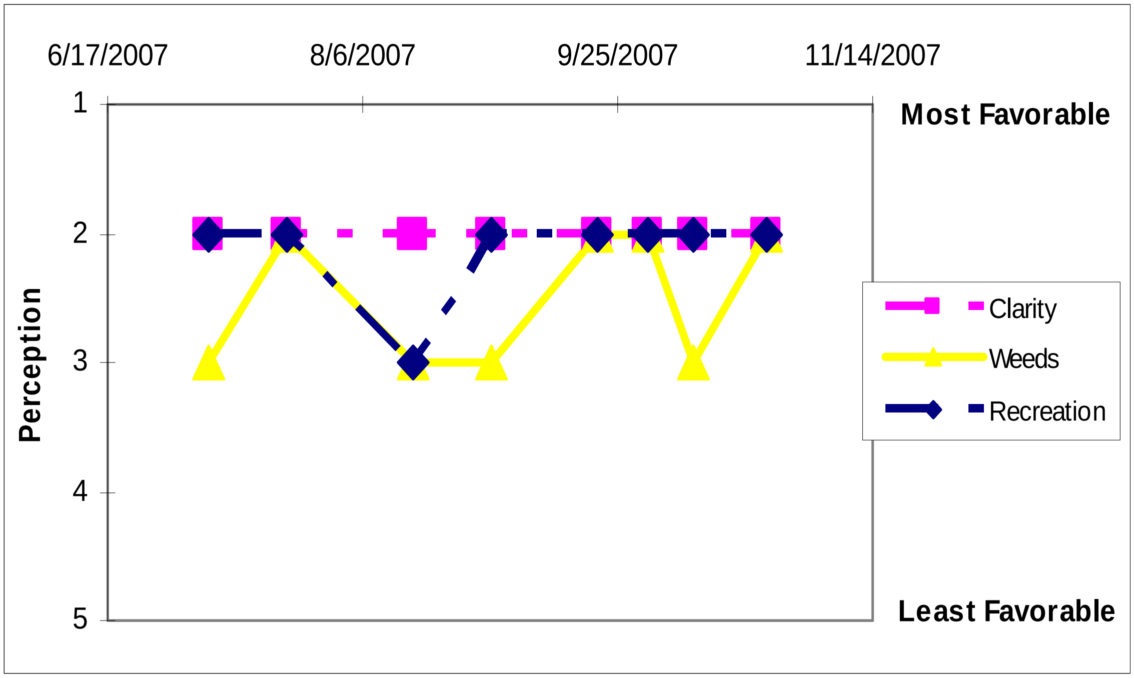


Figure 38. 2007 Lake Perception Data for Mirror Lake

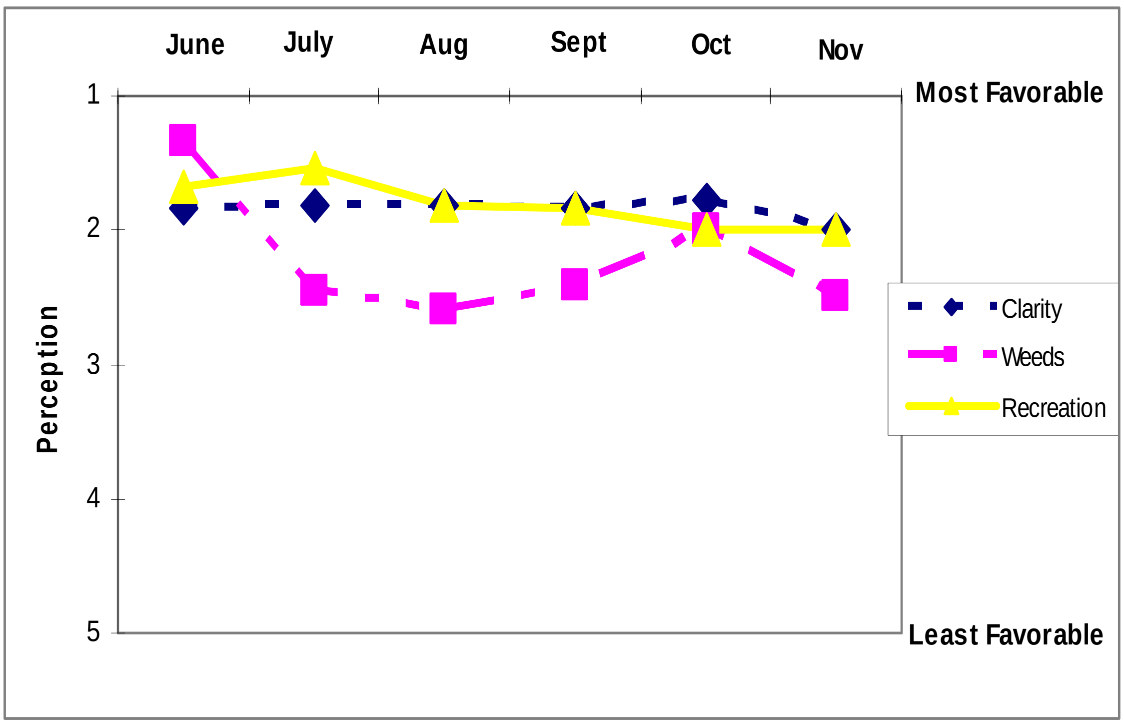


Figure 39- Lake Perception Data in a Typical (Monthly Mean) Year for Mirror Lake

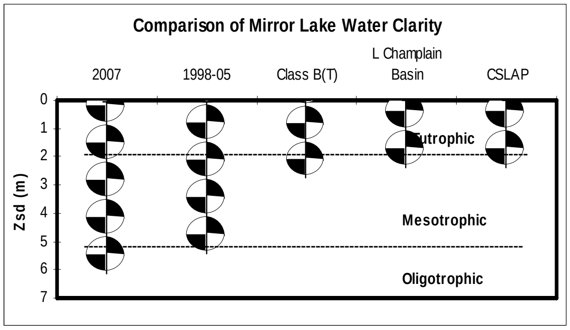


Figure 40. *Comparison of 2007 Secchi Disk Transparency to Lakes With the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes*

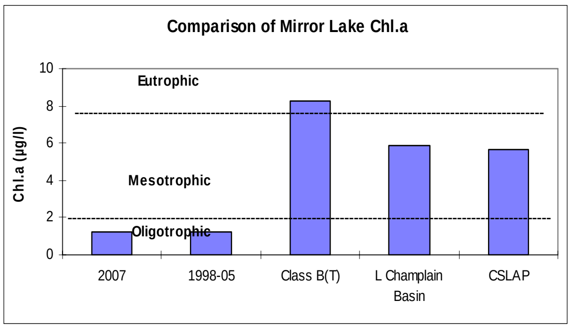


Figure 41. *Comparison of 2007 Chlorophyll a to Lakes with the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes*

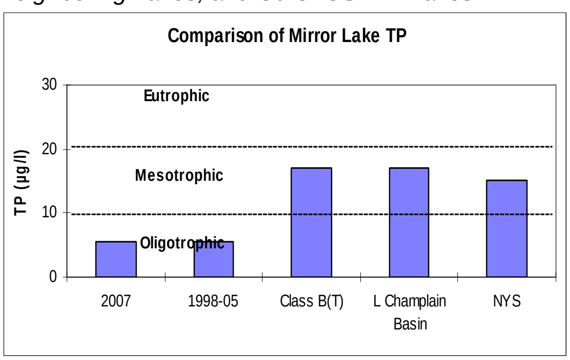


Figure 42. *Comparison of 2007 Total Phosphorus to Lakes With the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes*

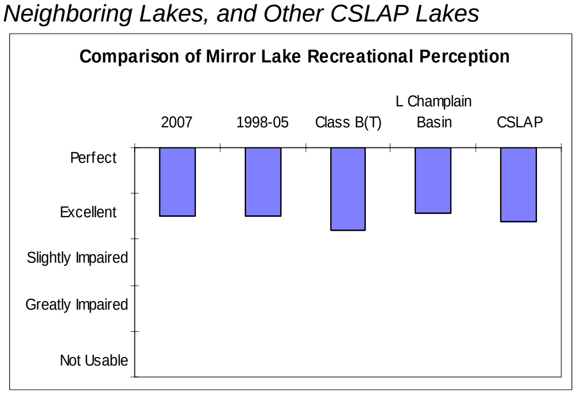


Figure 43. *Comparison of 2007 Recreational Perception to Lakes With the Same Water-Quality Classification, Neighboring Lakes, and Other CSLAP Lakes*

How does Mirror Lake compare to other lakes?

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

a) Using water clarity as an indicator, Mirror Lake is less productive than other Lake Champlain basin lakes, other Class B(T) lakes, and other NYS lakes.
b) Using chlorophyll *a* concentrations as an indicator, Mirror Lake is less productive than other Lake Champlain basin lakes, other Class B(T) lakes, and other NYS lakes.
c) Using total phosphorus concentrations as an indicator, Mirror Lake is less productive than other Lake Champlain basin lakes, other Class B(T) lakes, and other NYS lakes.
d) Using QC on the field-observations form as an indicator, Mirror Lake is about as suitable for recreation as other NYS lakes, other Class B(T) lakes, and other Lake Champlain basin lakes.

Appendix A. Raw Data for Mirror Lake

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
149	Mirror L	6/23/1998	19.0	5.00	1.5		0.04				5	6.38			4.72
149	Mirror L	7/6/1998	17.1	5.00	1.5		0.01				3	7.91			4.94
149	Mirror L	7/21/1998	18.0	4.80	1.5		0.01				6	7.44	136		0.64
149	Mirror L	8/11/1998	17.7	4.70	1.5		0.01				4	7.23	137		1.55
149	Mirror L	8/23/1998	17.7	5.20	1.5						11	7.37	140		1.76
149	Mirror L	9/13/1998	18.2	6.60	1.5	0.006					5	7.61	144		2.98
149	Mirror L	9/26/1998	17.2	5.30	1.5	0.005	0.01				6	7.17	145		2.76
149	Mirror L	10/13/1998	17.1	5.30		0.006	0.01				6	7.58	149		2.67
149	Mirror L	6/20/1999	17.0	8.40	1.5	0.004	0.01				4	8.00	182		0.46
149	Mirror L	7/26/1999	16.8	7.20	1.5	0.005	0.01				6	6.72	181		0.86
149	Mirror L	8/12/1999	16.3	7.10	1.5	0.005	0.01				3	7.30	180		1.50
149	Mirror L	8/28/1999	16.8	6.80	1.5	0.006	0.01				6	6.27	179		1.24
149	Mirror L	9/27/1999	17.6	7.70	1.5	0.006	0.01				7	7.71	179		1.88
149	Mirror L	6/17/2000	16.5	4.30	2.0	0.005	0.01				7	6.98	173		2.51
149	Mirror L	7/12/2000	16.7	4.40		0.014	0.01				4	6.34	176		1.56
149	Mirror L	8/4/2000	16.0	4.50		0.005	0.01				7	6.51	176		1.54
149	Mirror L	8/28/2000	16.5	4.50	1.5	0.005	0.01				7	7.25	179		0.81
149	Mirror L	6/28/2001	14.7	5.10	2.0	0.007	0.08				5	7.78	178		1.26
149	Mirror L	7/17/2001	15.0		2.0	0.004	0.01				4	6.49	176		1.76
149	Mirror L	7/31/2001	14.4	5.40	2.0	0.009	0.01				4	6.41	178		1.06
149	Mirror L	8/27/2001	17.0	5.90	2.0	0.006	0.01				6	7.79	185		0.74
149	Mirror L	9/5/2001	14.7	5.30	2.0	0.010	0.01				5	8.22	181		
149	Mirror L	9/24/2001	15.1	4.90	2.0	0.007	0.01				4	6.67	191		
149	Mirror L	7/25/2003			1.0	0.006	0.01	0.01	0.13	23.44	12	7.39	206		
149	Mirror L	8/14/2003	14.7	6.55	1.0	0.004	0.00	0.01	0.39	88.40	16	7.36	200		0.69
149	Mirror L	9/6/2003	17.1	5.60	1.0	0.007	0.02	0.01			7	7.40	219		1.58
149	Mirror L	9/22/2003	15.1	5.00		0.006	0.00	0.02	0.15	23.41	5	7.32	225	8.9	1.50
149	Mirror L	6/28/2004	14.3	4.95	1.5	0.004	0.01	0.01	0.28	65.56	19	6.84	241		0.40
149	Mirror L	7/20/2004	13.8	5.65	1.5		0.01	0.01	0.33		3	8.31	240		0.28
149	Mirror L	8/5/2004	13.9	5.30	1.5	0.005	0.02	0.03	0.22	49.10	5	7.81	197		0.80
149	Mirror L	8/24/2004	13.9	6.80	1.5	0.006	0.05	0.03	0.32	57.07	10	7.76	237		1.90
149	Mirror L	9/13/2004	14.6	7.63	1.5	0.006	0.02	0.01	0.32	58.08	8	7.51	174	9.0	0.60
149	Mirror L	10/5/2004	14.7	7.45	1.5	0.003	0.01	0.01	0.24	73.28	10	6.61	173		
149	Mirror L	11/1/2004	14.8	5.55	1.5	0.006	0.01	0.01			5	7.58	211		1.80
149	Mirror L	11/17/2004	12.5	7.50	1.5	0.005	0.03	0.09			6	6.72	202		1.10
149	Mirror L	6/27/2005	13.40	5.50	1.5	0.007	0.01	0.02	0.10	13.85		7.03	208	8.5	1.21
149	Mirror L	7/13/2005	14.10	5.50	1.5	0.004	0.02	0.01	0.17	39.91	12	6.56	169		
149	Mirror L	8/1/2005	14.10	4.75		0.010	0.02	0.01	0.25	25.59	17	7.63	213		1.00
149	Mirror L	8/18/2005	11.40	6.00	1.5	0.004	0.01	0.01	0.09	24.93	9	7.58	171		1.01
149	Mirror L	9/1/2005	12.50	5.60	1.5	0.005	0.03	0.01	0.18	38.86	8	7.42	210	8.5	1.12
149	Mirror L	9/21/2005	10.90	7.25	1.5	0.003	0.01	0.10	0.21	63.68	9	7.47	216		0.32
149	Mirror L	10/5/2005	9.90	7.55	1.5	0.002	0.02	0.03	0.17	72.98	5	6.76	199		0.89
149	Mirror L	10/24/05	10.50	6.50	1.5	0.015	0.03	0.02	0.21	14.65	7	8.02	209		1.30
149	Mirror L	6/24/2006	12.5	5.95	1.5	0.005	0.02	0.02	0.44	95.41	31	7.63	184	7.9	0.27
149	Mirror L	7/14/2006	12.5	5.35	1.5	0.009	0.09	0.06	0.62	66.33		7.83	168		0.75
149	Mirror L	8/1/2006	12.0	4.65	1.5	0.005	0.02	0.02	0.51	110.20		8.08	181		1.50
149	Mirror L	8/14/2006	11.0	4.40	1.5	0.007	0.01	0.02	0.52	79.36	5	8.30	187		2.11
149	Mirror L	8/25/2006	11.0	4.35	1.5	0.006	0.00	0.01	0.46	83.69	3	7.36	131	8.2	0.10
149	Mirror L	9/20/2006	12.0	8.60	1.5	0.007			0.45	67.47	7	7.14	188		1.35
149	Mirror L	10/10/2006	12.0	5.40	1.5	0.006	0.00	0.02	0.45	74.48	7	6.74	116		1.48
149	Mirror L	10/27/2006	13.0	5.45	1.5	0.005	0.04	0.04	0.38	85.33	6	8.16	164		
149	Mirror L	7/7/2007	11.5	5.15	1.5	0.005	0.04	0.03	0.58	267.8	14	7.9	170	9.1	0.55
149	Mirror L	7/22/2007	14.0	9.50		0.005	0.01	0.01	0.34	168.7	9	8.1	179		1.70
149	Mirror L	8/16/2007	10.0	5.45			0.01	0.02	0.46	27.8	8	8.1	149		3.74
149	Mirror L	8/31/2007	9.0	6.15		0.008	0.00	0.01	0.61	169.9	5	7.4	155		1.30
149	Mirror L	9/21/2007	8.0	6.05	1.5	0.006	0.05	0.10	0.61	242.9	8	7.8	176	8.4	0.10
149	Mirror L	10/1/2007	9.0	6.15	1.5	0.006	0.01	0.27	0.48	190.4	1	7.7	164		1.21
149	Mirror L	10/10/2007	9.0	7.35	1.5	0.010	0.02	0.01	0.53	121.6	5				1.15
149	Mirror L	10/24/2007	9.0	8.15	1.5	0.009	0.02	0.05	0.22	52.8	3	7.1	217		1.23
149	Mirror L	8/14/2003				0.023	0.00	0.01	0.29	13.05					
149	Mirror L	9/6/2003				0.055	0.05	0.53							

LNum	PName	Date	Zbot	Zsd	Zsamp	Tot.P	NO3	NH4	TDN	TN/TP	TColor	pH	Cond25	Ca	Chl.a
149	Mirror L	9/22/2003			1.5	0.016	0.03	0.13	0.29	18.10					
149	Mirror L	6/28/2004													
149	Mirror L	7/20/2004													
149	Mirror L	8/5/2004													
149	Mirror L	8/24/2004				0.020	0.21	0.08	0.53	26.72					
149	Mirror L	9/13/2004				0.006	0.03	0.03	0.24	39.21					
149	Mirror L	10/5/2004				0.013	0.09	0.03	0.28	21.50					
149	Mirror L	11/1/2004				0.006	0.02	0.10							
149	Mirror L	11/17/2004				0.009	0.02	0.04							
149	Mirror L	6/27/2005			9.5	0.006									
149	Mirror L	7/13/2005			9.0	0.005									
149	Mirror L	8/1/2005			9.5	0.006									
149	Mirror L	8/18/2005			10.0	0.005									
149	Mirror L	9/1/2005			9.5	0.006									
149	Mirror L	9/21/2005			9.5	0.012									
149	Mirror L	10/5/2005			9.5	0.008									
149	Mirror L	10/24/05			9.0	0.006									
149	Mirror L	6/24/2006	12.5		9.0	0.004									
149	Mirror L	7/14/2006	12.5		9.5	0.006									
149	Mirror L	8/1/2006	12.0		9.5	0.006									
149	Mirror L	8/14/2006	11.0		9.5	0.048									
149	Mirror L	8/25/2006	11.0		9.5	0.006									
149	Mirror L	9/20/2006	12.0		9.5	0.009									
149	Mirror L	10/10/2006	12.0		9.5	0.006									
149	Mirror L	10/27/2006	13.0		9.5	0.005									
149	Mirror L	7/7/2007	11.5		9.5	0.006									
149	Mirror L	7/22/2007	14.0			0.008									
149	Mirror L	8/16/2007	10.0			0.012									
149	Mirror L	8/31/2007				0.009									
149	Mirror L	9/21/2007	8.0		7.0	0.005									
149	Mirror L	10/1/2007	9.0		7.0	0.011									
149	Mirror L	10/10/2007	9.0		8.0	0.009									
149	Mirror L	10/24/2007	9.0		7.5	0.012									

LNum	PName	Date	Zbot	Zsd	Zsamp	QaQc	TAir	TH20	QA	QB	QC	QD
149	Mirror L	6/23/1998	19.0	5.00	1.5	1	20	9	2	1	1	
149	Mirror L	7/6/1998	17.1	5.00	1.5	1	21	20	2	1	1	
149	Mirror L	7/21/1998	18.0	4.80	1.5	1	27	24				
149	Mirror L	8/11/1998	17.7	4.70	1.5	1	24	22	2	1	1	5
149	Mirror L	8/23/1998	17.7	5.20	1.5	1	23	22	2	1	2	
149	Mirror L	9/13/1998	18.2	6.60	1.5	1	16	18	1	1	1	
149	Mirror L	9/26/1998	17.2	5.30	1.5	1	15	17	1	1	1	
149	Mirror L	10/13/1998	17.1	5.30		1	14	13	1	1	1	
149	Mirror L	6/20/1999	17.0	8.40	1.5	1	20	21	1	1	2	
149	Mirror L	7/26/1999	16.8	7.20	1.5	1	26	25	1	2	1	
149	Mirror L	8/12/1999	16.3	7.10	1.5	1	23	20	1	2	1	
149	Mirror L	8/28/1999	16.8	6.80	1.5	1	24	21	2	3	1	
149	Mirror L	9/27/1999	17.6	7.70	1.5	1	23	18	2	3	2	
149	Mirror L	6/17/2000	16.5	4.30	2.0	1	23	20	1	1	1	5
149	Mirror L	7/12/2000	16.7	4.40		1	21	20	1	1	1	
149	Mirror L	8/4/2000	16.0	4.50		1	18	21	1	2	1	
149	Mirror L	8/28/2000	16.5	4.50	1.5	1	19	20	2	3	2	
149	Mirror L	6/28/2001	14.7	5.10	2.0	1	24	22	2	1	1	
149	Mirror L	7/17/2001	15.0		2.0	1	22	20	2	3	1	
149	Mirror L	7/31/2001	14.4	5.40	2.0	1	22	21	2	3	2	
149	Mirror L	8/27/2001	17.0	5.90	2.0	1	24	22	2	3	1	
149	Mirror L	9/5/2001	14.7	5.30	2.0	1	16	20	2	2	2	
149	Mirror L	9/24/2001	15.1	4.90	2.0	1	20	17	2	2	2	
149	Mirror L	7/25/2003			1.0	1	20	21	2	3	1	0
149	Mirror L	8/14/2003	14.7	6.55	1.0	1	23	23	1	3	2	0

LNum	PName	Date	Zbot	Zsd	Zsamp	QaQc	TAir	TH20	QA	QB	QC	QD
149	Mirror L	9/6/2003	17.1	5.60	1.0	1	19	22	2	3	2	0
149	Mirror L	9/22/2003	15.1	5.00		1	20	18	2	3	2	0
149	Mirror L	6/28/2004	14.3	4.95	1.5	1	17	19				
149	Mirror L	7/20/2004	13.8	5.65	1.5	1	23	21	2	3	2	0
149	Mirror L	8/5/2004	13.9	5.30	1.5	1	17	22	2	2	2	8
149	Mirror L	8/24/2004	13.9	6.80	1.5	1	16	19	2	3	2	0
149	Mirror L	9/13/2004	14.6	7.63	1.5	1	17	19	2	3	2	0
149	Mirror L	10/5/2004	14.7	7.45	1.5	1	9	15	2	2	2	0
149	Mirror L	11/1/2004	14.8	5.55	1.5	1	2	8	2	2	2	5
149	Mirror L	11/17/2004	12.5	7.50	1.5	1	10	4	2	3	2	5
149	Mirror L	6/27/2005	13.40	5.50	1.5	1	24	20	2	2	2	0
149	Mirror L	7/13/2005	14.10	5.50	1.5	1	27	21	2	3	2	6
149	Mirror L	8/1/2005	14.10	4.75		1	21	18	2	3	2	6
149	Mirror L	8/18/2005	11.40	6.00	1.5	1	26	22	2	3	2	0
149	Mirror L	9/1/2005	12.50	5.60	1.5	1	26	20	2	3	2	0
149	Mirror L	9/21/2005	10.90	7.25	1.5	1	19	19	2	3	2	0
149	Mirror L	10/5/2005	9.90	7.55	1.5	1	21	21	1	2	1	0
149	Mirror L	10/24/05	10.50	6.50	1.5	1	16	20	2	2	4	45
149	Mirror L	6/24/2006	12.5	5.95	1.5	1	22	20	3	2	3	56
149	Mirror L	7/14/2006	12.5	5.35	1.5	1	28	21	2	3	2	0
149	Mirror L	8/1/2006	12.0	4.65	1.5	1	30	26	2	3	3	56
149	Mirror L	8/14/2006	11.0	4.40	1.5	1	20	21	2	3	2	56
149	Mirror L	8/25/2006	11.0	4.35	1.5	1	16	20	2	3	2	0
149	Mirror L	9/20/2006	12.0	8.60	1.5	1	14	16	2	3	2	0
149	Mirror L	10/10/2006	12.0	5.40	1.5	1	9	11	2	2	2	5
149	Mirror L	10/27/2006	13.0	5.45	1.5	1	6	7	2	2	2	5
149	Mirror L	7/7/2007	11.5	5.15	1.5	1	21	19	2	3	2	0
149	Mirror L	7/22/2007	14.0	9.50		1	17	21	2	2	2	57
149	Mirror L	8/16/2007	10.0	5.45		1	18	21	2	3	3	6
149	Mirror L	8/31/2007	9.0	6.15		1	15	20	2	3	2	
149	Mirror L	9/21/2007	8.0	6.05	1.5	1	15	17	2	2	2	0
149	Mirror L	10/1/2007	9.0	6.15	1.5	1	15	17	2	2	2	8
149	Mirror L	10/10/2007	9.0	7.35	1.5	1	12	15	2	3	2	0
149	Mirror L	10/24/2007	9.0	8.15	1.5	1	9	12	2	2	2	0
149	Mirror L	8/14/2003				2						
149	Mirror L	9/6/2003				2						
149	Mirror L	9/22/2003			1.5	2						
149	Mirror L	6/28/2004				2						
149	Mirror L	7/20/2004				2						
149	Mirror L	8/5/2004				2						
149	Mirror L	8/24/2004				2						
149	Mirror L	9/13/2004				2						
149	Mirror L	10/5/2004				2						
149	Mirror L	11/1/2004				2						
149	Mirror L	11/17/2004				2						
149	Mirror L	6/27/2005			9.5	2						
149	Mirror L	7/13/2005			9.0	2						
149	Mirror L	8/1/2005			9.5	2						
149	Mirror L	8/18/2005			10.0	2						
149	Mirror L	9/1/2005			9.5	2						
149	Mirror L	9/21/2005			9.5	2						
149	Mirror L	10/5/2005			9.5	2						
149	Mirror L	10/24/05			9.0	2						
149	Mirror L	6/24/2006	12.5		9.0	2						
149	Mirror L	7/14/2006	12.5		9.5	2						
149	Mirror L	8/1/2006	12.0		9.5	2						
149	Mirror L	8/14/2006	11.0		9.5	2						
149	Mirror L	8/25/2006	11.0		9.5	2						
149	Mirror L	9/20/2006	12.0		9.5	2						
149	Mirror L	10/10/2006	12.0		9.5	2						

LNum	PName	Date	Zbot	Zsd	Zsamp	QaQc	TAir	TH20	QA	QB	QC	QD
149	Mirror L	10/27/2006	13.0		9.5	2						
149	Mirror L	7/7/2007	11.5		9.5	2						
149	Mirror L	7/22/2007	14.0			2						
149	Mirror L	8/16/2007	10.0			2						
149	Mirror L	8/31/2007				2						
149	Mirror L	9/21/2007	8.0		7.0	2						
149	Mirror L	10/1/2007	9.0		7.0	2						
149	Mirror L	10/10/2007	9.0		8.0	2						
149	Mirror L	10/24/2007	9.0		7.5	2						