Highlights of the 2007 CSLAP reports.

In 2007, the Three Lakes Council authorized the second year of sampling for all three lakes as part of the NY CSLAP program (Citizens Statewide Lake Assessment Program). Thanks to all of the volunteers who helped collect the eight sets of samples. Waccabuc had been part of the program from 1986-1996, so has more trend data. We have a report on each lake's results from NYS DEC. Here are some highlights of the reports.

Lake Waccabuc: The CSLAP dataset usually indicates that Lake Waccabuc is a *mesotrophic*, or moderately productive lake, based on total phosphorus, chlorophyll *a*, and Secchi disk transparency readings. The lake was probably less productive in 2007 than in the typical CSLAP sampling season, and much less productive than in 2006. Water clarity readings increased, and nutrient and algae levels were lower. None of these indicators have exhibited any significant longterm trends, and it is likely that the small annual variability in water transparency, chlorophyll *a* and phosphorus readings was within the normal range for Lake Waccabuc. None of the water quality indicators exhibited significant differences since CSLAP sampling began in 1986. Conductivity readings rose from 1986 through 1996, but have been lower in the last two years, while pH readings were higher than normal in the last two years. It is likely that these small changes were within the normal variability for the lake. Lake Waccabuc continued to exhibit characteristics typical of weakly colored lakes with water of intermediate hardness, low nitrogen levels, and weakly alkaline conditions. It appears to be susceptible to zebra mussel infestations, based on calcium levels in the lake. The highly elevated deepwater phosphorus readings suggest that deepwater ammonia levels may also be elevated, although this has not been verified through CSLAP data collection. This may have implications for any deep potable water intakes in the lake. Lake Waccabuc appears to be more productive than other lakes classified for potable water (class A).

Lake Oscaleta. The CSLAP dataset usually indicates that Lake Oscaleta is a *mesoeutrophic*, or moderately to highly productive lake, based on phosphorus and chlorophyll *a* readings, while Secchi disk readings are typical of moderately productive lakes. The lake was probably less productive in 2007 than in 2006. Water clarity readings increased, due to lower nutrient and algae levels. With only two years of water quality data, trends cannot yet be evaluated. Lake productivity varies unpredictably during the summer. While deepwater phosphorus levels are higher than those at the lake surface, these data suggest internal nutrient loading is not significant. Surface phosphorus readings regularly exceed the state guidance value for lakes used for contact recreation (swimming), but Secchi disk transparency readings usually exceed the minimum recommended water clarity for swimming beaches (= 1.2 meters. In short, the productivity of Lake Oscaleta appeared to be lower in 2007 than in 2006, as indicated by slightly higher water transparency readings and lower phosphorus and chlorophyll *a* readings. Additional data will help to determine if readings in either or both years represent normal conditions in the lake, and if any long-term changes are occurring. Lake Oscaleta appears to be more productive than other lakes classified for contact recreation (class B).

Lake Rippowam. The CSLAP dataset usually indicates that Lake Rippowam is a *mesoeutrophic*, or moderately to highly productive lake, based on chlorophyll *a* readings, while Secchi disk and phosphorus readings may be more typical of moderately productive lakes. The lake was probably about as productive in 2007 as in 2006. Water clarity readings increased, and nutrient levels were lower, but algae levels were slightly higher in 2007. With only two years of water quality data, trends cannot yet be evaluated. Lake productivity varies unpredictably during the summer. Surface phosphorus readings regularly exceed the state guidance value for lakes used for contact recreation (swimming), but Secchi disk transparency readings usually exceed the minimum recommended water clarity for swimming beaches (= 1.2 meters. In short, the productivity of Lake Rippowam appeared to be similar in 2007 to that measured in 2006, as indicated by slightly higher water transparency and chlorophyll *a* readings and lower phosphorus levels. Additional data will help to determine if readings in either or both years represent normal conditions in the lake, and if any long-term changes are occurring. Lake Rippowam also appears to be more productive than other class B lakes.

Tropic Status Indicators:
Trophic Status Indicators are shorthand for the conditions of the lakes and their changes over time. Standards based on phosphorus, chlorophyll a, and Secchi disk readings define the stages of a lake from oligotrophic (least productive) to eutrophic (most productive). These readings are better than those in 2006, when most lake readings indicated eutrophic states.

O=oligotrophic, M=metatrophic, E=eutrophic

Parameter (Eutrophic range)	**Waccabuc**	**TSI**	**Oscaleta**	**TSI**	**Rippowam**	**TSI**
Phosphorus (>0.02)	0.017	M	0.019	M	0.018	M
Chloraphyll a (>8)	4.5	M	7.7	M	11.4	E
Secchi Disk (<2)	3.3	M	3.4	M	2.2	M

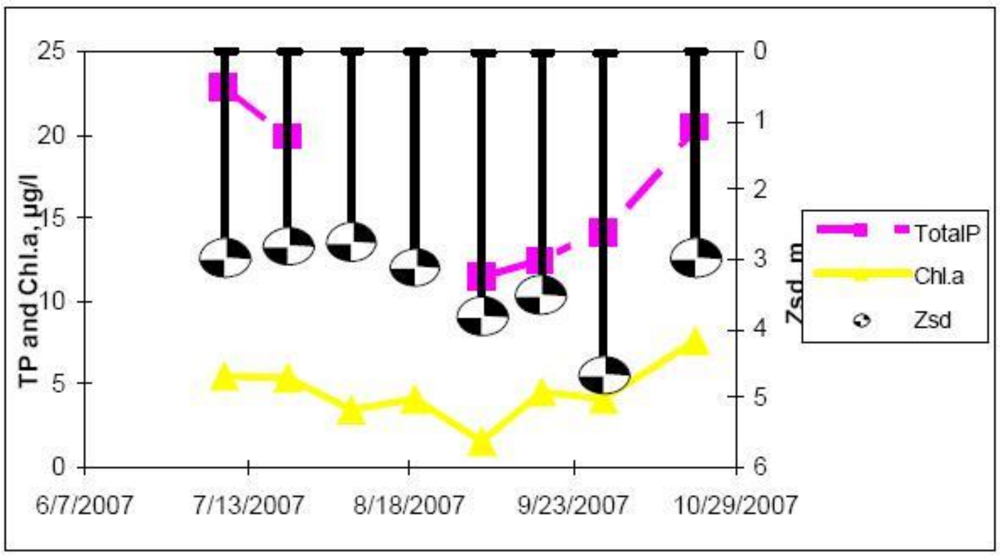
CSLAP Scorecard. Number of samples (out of 8) **better** than guidelines or standards, and compared to historical readings (in 2006, only valid for Waccabuc).

Parameter	Guideline	**Waccabuc**	Vs past	**Oscaleta**	Vs past	**Rippowam**	Vs past
Phosphorus	0.02 mg/l	4	better	6	better	5	better
Secchi disk	1.2 m	8	better	8	better	8	better
pH	>6.5,8.5<	8	better	7	better	7	better

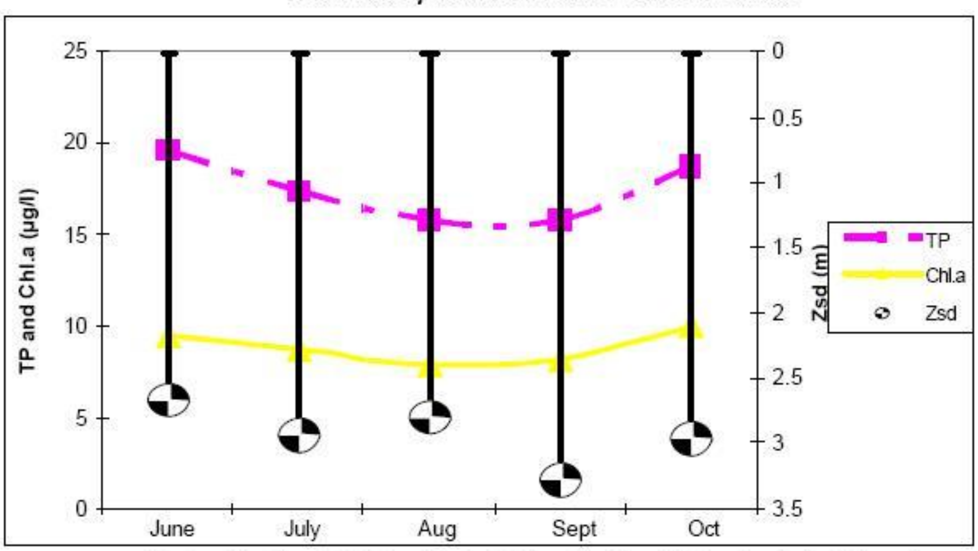
DO and Temperature. All three of our lakes stratify in the summer. A critical factor in the health of the lakes is the amount of dissolved oxygen in the bottom layer, because oxygen in the bottom layer allows fish to live in the cold water they prefer, and it helps keep phosphorous bound into the sediment. In all three lakes, we found that the bottom layer became anoxic, with levels of oxygen below 1 part per million. This is below the level that fish can live, and it is also so low that phosphorus can leach into the water from the sediment.

Graphs.
The first set of charts shows the chlorophyll a, total phosphorus, and Secchi depth readings (Zsd) for the sampling season, and for the average over all years of sampling, which is just two years for Oscaleta and Rippowam, and over 10 for Waccabuc. For all of these, better readings are closer to the bottom of the chart.

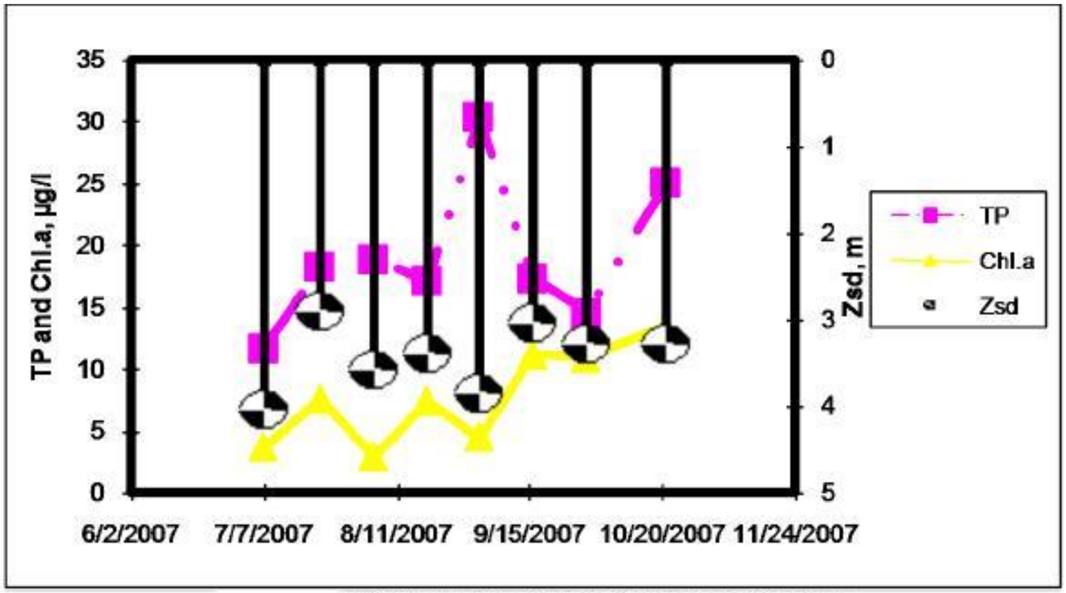
Eutrophic lakes readings are indicated with Total P above 20, chl. *a* above 8 (left axis) and Zsd less than 2m (right axis).



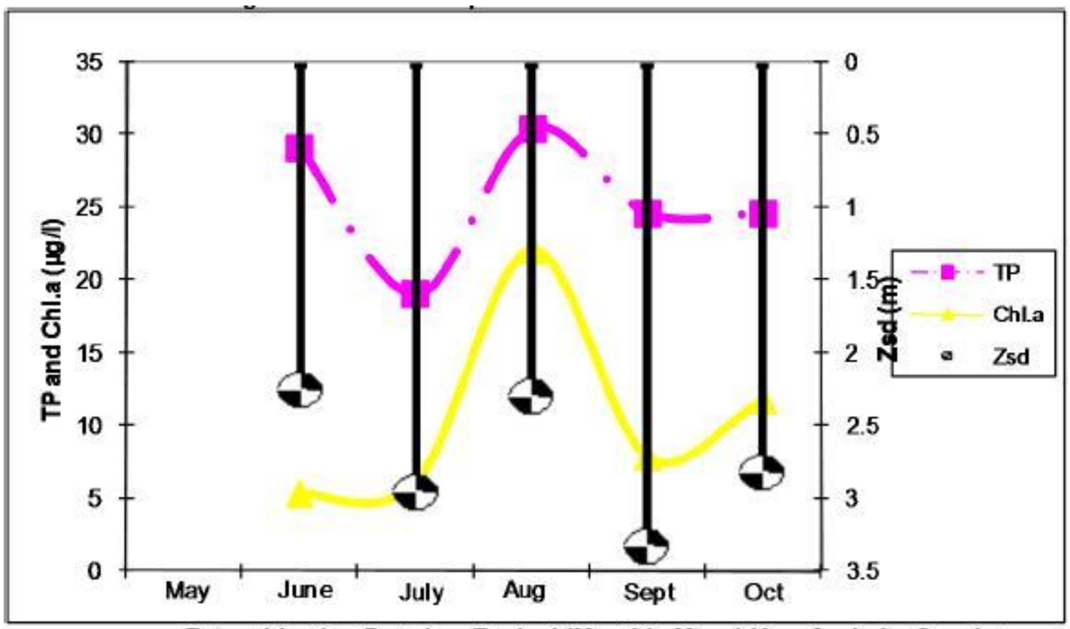
2007 Eutrophication Data for Lake Waccabuc



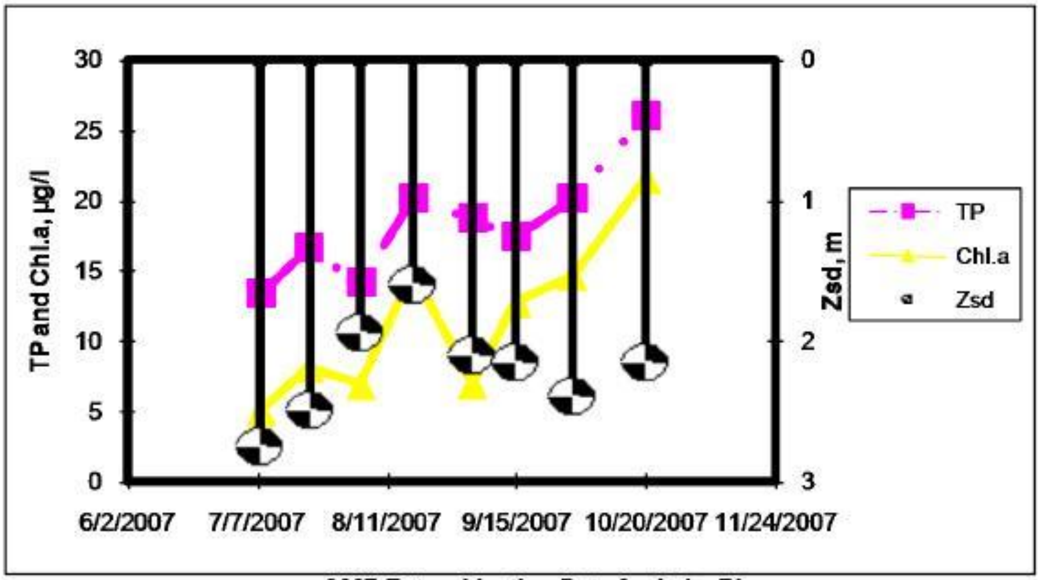
Eutrophication Data in a Typical (Monthly Mean) Year for Lake Waccabuc



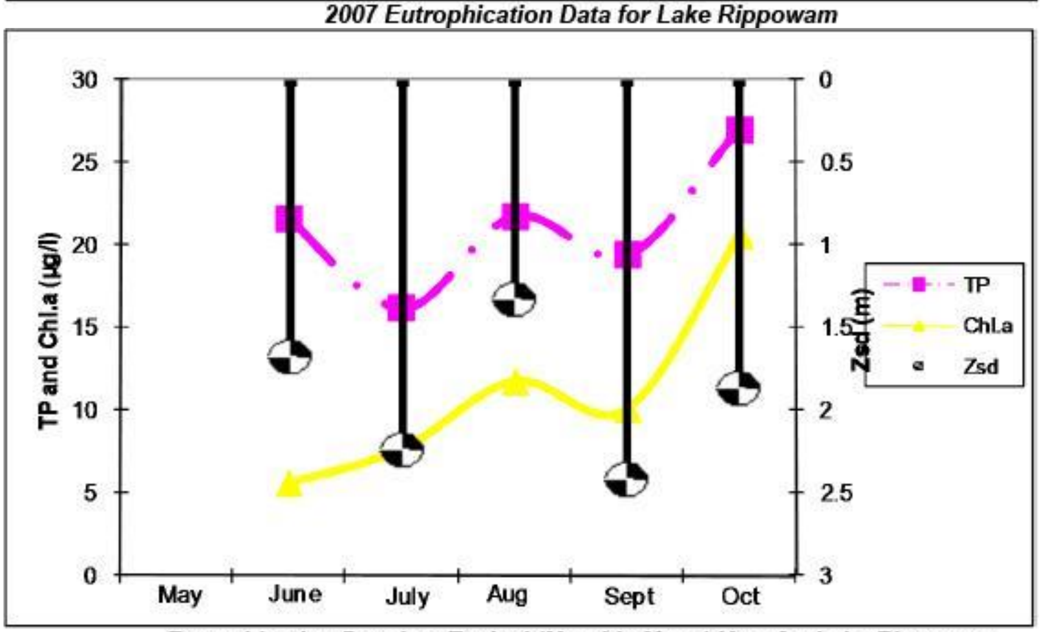
2007 Eutrophication Data for Lake Oscaleta



Eutrophication Data in a Typical (Monthly Mean) Year for Lake Oscaleta



2007 Eutrophication Data for Lake Rippowam



Eutrophication Data in a Typical (Monthly Mean) Year for Lake Rippowam

CSLAP Lake Management Alternatives. Recreational assessments are tied to lower-than-desired water transparency and to the presence of aquatic plants. The lack of water clarity appears to be linked to algae, linked in turn to nutrient concentrations. It is likely that management of water quality conditions in Lake Waccabuc, Oscaleta, and Rippowam should focus on reducing nutrient and sediment loading into the lake, through pumping and maintaining septic systems, using shoreline buffer zones, limiting use of lawn fertilizers, minimizing land disturbances in the near-lake watershed, and localized stormwater management. The lake associations should also minimize introductions of exotic plants and animals to the lakes, particularly given the strong connection between plant growth and the recreational assessments of the lakes.

SPECIFIC MONITORING CONSIDERATIONS FOR THE THREE LAKES

Continued sampling on these lakes will help to evaluate “normal” conditions on the lakes, and to identify water quality or use problems. Some additional parameters may be appropriate for evaluation at these lakes:

1. *Bacteria*- Lake Waccabuc is classified for potable water, and Lakes Oscaleta and Rippowam are classified for use for contact recreation and it is likely that swimming occurs on all three lakes. The use of the lakes for swimming and bathing can best be evaluated with bacteriological data. The state water quality standards reference sampling schedules requiring at least five samples per month. These data cannot be collected through CSLAP.
2. *Algal toxins*- Algal toxins, usually associated with blue green algae, may affect swimmers and others who ingest small amounts of water (as well as any lake residents who use Lake Waccabuc as a potable water supply without proper treatment.)
3. *Aquatic plants*- Detailed aquatic plant surveys have not been conducted through CSLAP at any of the Three Lakes. CSLAP samplers can collect and submit for identification any plant samples thought to be exotic or otherwise invasive, as well as any rare or unusual plants. Sampling protocols are also available to conduct systematic monitoring of aquatic plants for the purpose of evaluating aquatic plant management actions utilized at the lake. This is particularly important given the increasing concern about exotic plant growth in the Lower Hudson River region of the state.

CONSIDERATIONS FOR LAKE MANAGEMENT

CSLAP is intended for a variety of uses, such as collecting needed information for comprehensive lake management, although it is not capable of collecting all the needed information. To this end, this section includes a ***broad summary of the major lake problems and “considerations” for lake management.*** These “considerations” should not be construed as “recommendations”, since there is insufficient information available through CSLAP to assess if or how a lake should be managed. Issues associated with local environmental sensitivity, permits, and broad community management objectives also cannot be addressed here.

GENERAL CONSIDERATIONS

Nutrient controls can take several forms, depending on the original source of the nutrients:

- Septic systems can be regularly pumped or upgraded to reduce the stress on the leach fields which can be replaced with new soil or moving the discharge from the septic tank to a new field). Pumpout programs are usually quite inexpensive, particularly when lakefront residents negotiate a bulk rate discount with local pumping companies. Upgrading systems can be expensive, but may be necessary to handle the increased loading from home expansion or conversion to year-round residency. Replacing leach fields alone can be expensive and limited by local soil or slope conditions, but may be the only way to reduce actual nutrient loading from septic systems to the lake. It should be noted that upgrading or replacing the leach field may do little to change any bacterial loading to the lake, since bacteria are controlled primarily within the septic tank, not the leach field.
- Stormwater runoff control plans include street cleaning, artificial marshes, sedimentation basins, runoff conveyance systems, and other strategies aimed at minimizing or intercepting pollutant discharge from impervious surfaces. The NYSDEC has developed a guide called Reducing the Impacts of Stormwater Runoff to provide more detailed information about developing a stormwater management plan. This is a strategy that cannot generally be tackled by an individual homeowner, but rather requires the effort and cooperation of lake residents and municipal officials.
- There are numerous agriculture management practices such as fertilizer controls, soil erosion practices, and control of animal wastes, which either reduce nutrient export or retain particles lost from agricultural fields. Like stormwater controls, these require the cooperation of many watershed partners, including agricultural and horse farms.
- Streambank erosion can be caused by increased flow due to poorly managed urban areas, agricultural fields, construction sites, and deforested areas, or it may simply come from repetitive flow over disturbed streambanks. Control strategies may involve streambank stabilization, detention basins, revegetation, and water diversion.

Land use restrictions development and zoning tools such as floodplain management, master planning to allow for development clusters in more tolerant areas in the watershed and protection of more sensitive areas; deed or contracts which limit access to the lake, and cutting restrictions can be used to reduce pollutant loading to lakes. This approach varies greatly from one community to the next and frequently involves balancing lake use protection with land use restrictions. State law gives great latitude to local government in developing land use plans.

Lawn fertilizers frequently contain phosphorus, even though nitrogen is more likely to be the limiting nutrient for grasses and other terrestrial plants. By using lawn fertilizers with little or no phosphorus, eliminating lawn fertilizers or using lake water as a “fertilizer” at shoreline properties, fewer nutrients may enter the lake. Retaining the original flora as much as possible, or planting a buffer strip (trees, bushes, shrubs) along the shoreline, can reduce the nutrient load leaving a residential lawn.

Waterfowl introduce nutrients, plant fragments, and bacteria to the lake water through their feces. Feeding the waterfowl encourages congregation which in turn concentrates and increases this nutrient source, and will increase the likelihood that plant fragments, particularly from Eurasian watermilfoil and other plants that easily fragment and reproduce through small fragments, can be introduced to a previously uncolonized lake.

Although not really a “watershed control strategy”, establishing **no-wake zones** can reduce shoreline erosion and local turbidity. Wave action, which can disturb flocculent bottom sediments and unconsolidated shoreline terrain is ultimately reduced, minimizing the spread of fertile soils to susceptible portions of the lake.

Do not discard or introduce plants from one water source to another, or deliberately introduce a "new" species from catalogue or vendor. For example, do not empty bilge or bait bucket water from another lake upon arrival at another lake, for this may contain traces of exotic plants or animals. Do not empty aquaria wastewater or plants to the lake.

Boat propellers are a major mode of transport to uncolonized lakes. Propellers, hitches, and trailers frequently get entangled by weeds and weed fragments. Boats not cleaned of fragments after leaving a colonized lake may introduce plant fragments to another location. New introductions of plants are often found near public access sites.