

# LCI Lake Water Quality Summary

## General Information

**Lake Name:**

**Camp Chautauqua Pond**

**Location:**

Town of Randolph, Cattaraugus County, NY

**Basin:**

Allegheny River Basin

**Size:**

16.1 hectares (40 acres)

**Lake Origins:**

unknown

**Tributaries:**

Minor unnamed tributaries

**Watershed Area:**

1.2 Square Miles

**Lake Tributary to:**

Little Conewango Creek

**Water Quality Classification:**

C (best intended use: secondary contact recreation)

**Sounding Depth:**

8 meters (27 feet)

**Sampling Coordinates:**

42.103572, -78.95094

**Sampling Access Point:**

Private land (Girl Scouts of Western NY)

**Monitoring Program:**

Lake Classification and Inventory (LCI) Survey

**Sampling Date:**

September 14, 2011

**Samplers:**

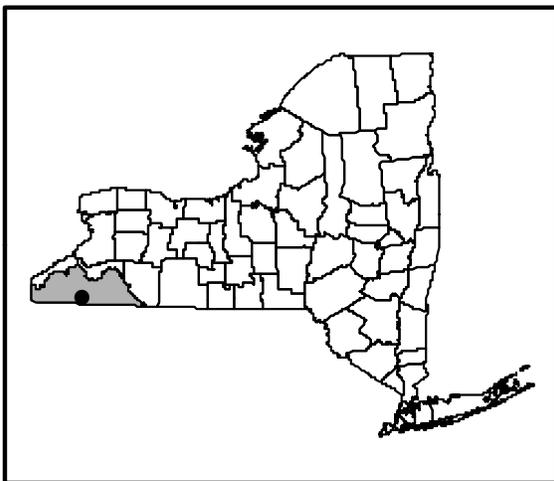
David Newman, NYSDEC Division of Water, Albany  
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## Lake Map

(sampling location marked with a circle)



## Background and Lake Assessment

Camp Chautauqua Pond is a 40 acre pond that is part of Camp Timbercrest, which is owned and maintained by the Girl Scouts of Western New York. The camp is used year-round by girl scouts as well as other groups for day and overnight gatherings. The pond is used for swimming, fishing and boating, while the rest of the surrounding land is used for hiking and other outdoor recreational activities.

The near shore area is mix of land covers of maintained grass and forest land. The larger watershed is predominantly forested, with the only significant development in the watershed being associated with the camp. The NYSDEC Division of Water's lake water quality database had no previous data for the pond, and thus the pond was included in the 2011 Lake Classification and Inventory (LCI) screening program. At this time there are no perceived water quality issues that would make this pond a candidate for additional monitoring in 2012.

Camp Chautauqua Pond can be characterized as *mesotrophic*, or moderately productive. The water clarity reading taken in mid September (TSI = 46, typical of *mesotrophic* waterbodies) was in the expected range given the total phosphorus reading (TSI = 43, typical of *mesotrophic* waterbodies), but was not as clear as expected given chlorophyll *a* reading (TSI = 38, typical of *oligotrophic* waterbodies). These data indicate that something other than algae is limiting water clarity, and that nutrient levels are in the moderate to low range and likely do not support persistent algal blooms on the pond.

In mid September, the pond's surface water was described as having a definite algal greenness, with a water clarity reading of 2.6 meters (~8.5 feet). The field crew did not observe any aquatic plants growing in the pond, but some early season aquatic plants may have already senesced for the season. A more thorough plant specific survey conducted earlier in the summer may find that there are aquatic plant species living in the pond.

Camp Chautauqua Pond exhibited thermal stratification, in which depth zones (warm water on top, cold water on the bottom during the summer) are establish as in most NYS lakes greater than 6 meters deep. The thermocline in mid September was in the 4 to 5 meter range. Anoxic (without oxygen) conditions were observed below 5 meters. It is likely that these anoxic conditions persist throughout the summer. pH readings indicate circumneutral surface waters, with conductivity readings indicating soft water (low ionic strength).

The pond appears typical of soft water, weakly colored, circumneutral pH waterbodies. Other water bodies with similar water quality characteristics support warmwater fish species, although the lack of cold oxygen-rich water may not be supportive of coldwater fish species. However, fisheries habitat cannot be fully evaluated by the LCI. A fisheries survey would need to be conducted to further evaluate the fisheries of the pond.

Phosphorus and nitrogen levels were both in the moderate to low range and well within the New York State water quality standards and guidance values. Ammonia, iron and manganese were elevated in the bottom waters, typical of waterbodies experiencing oxygen deficits below the thermocline. The manganese level was above the state's water quality standard and may cause taste or odor problems if deepwater withdrawals from the pond were used as a drinking water

source. Arsenic levels were above the laboratory's detection limit in the bottom water sample; however, arsenic was below the World Health Organization (WHO) standard for drinking water. Chloride levels were low in both the bottom and surface waters, indicating there has been little to no impact on the pond from road salting or runoff through urbanized areas.

## **Evaluation of Lake Condition Impacts to Lake Uses**

### ***Potable Water (Drinking Water)***

Camp Chautauqua Pond is not classified for use as a potable water supply. The LCI data are not sufficient to fully evaluate potable water use. The data that was collected indicated that iron and manganese levels may *threaten* the use of surface water withdrawals. Bottom water withdrawals may be *impaired* by manganese levels and *stressed* by iron levels.

### ***Contact Recreation (Swimming)***

Camp Chautauqua Pond is not classified for primary contact recreation, although the pond is currently used for swimming by individuals attending Camp Timbercrest. The New York State Water Quality Classification of *Class C* states that "water quality shall be suitable for primary contact recreation, although other factors may limit the use for this purpose". Bacteria data are needed to evaluate the safety of Camp Chautauqua Pond for swimming; however, these are not collected through the LCI. The data collected through the LCI indicated *no known impact* to the use of the pond for swimming.

### ***Non-Contact Recreation (Boating and Fishing)***

The data collected through the LCI also indicate *no known impact* to boating and fishing on the pond.

### ***Aquatic Life***

Organisms susceptible to high summer temperature may be *stressed* due to a lack of cold oxygen rich water in the pond during the summer. Additional biological studies would need to be conducted to further evaluate impacts to aquatic life.

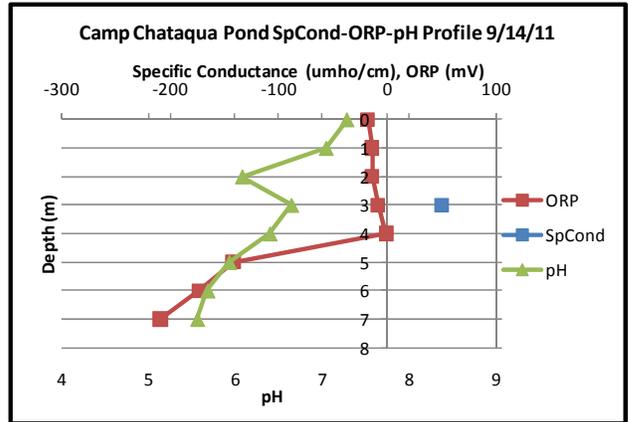
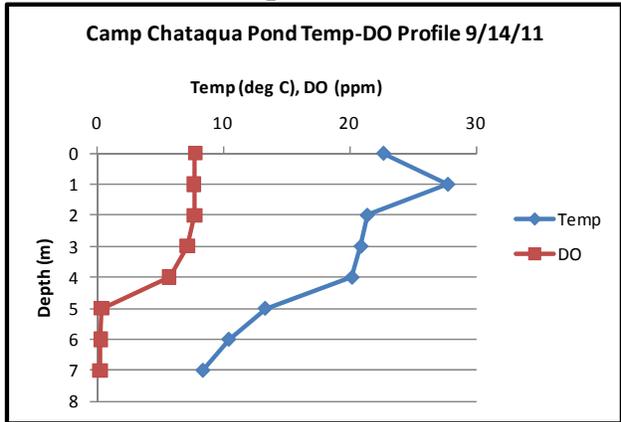
### ***Aesthetics***

These data indicate *no known impact* to the aesthetics of the pond.

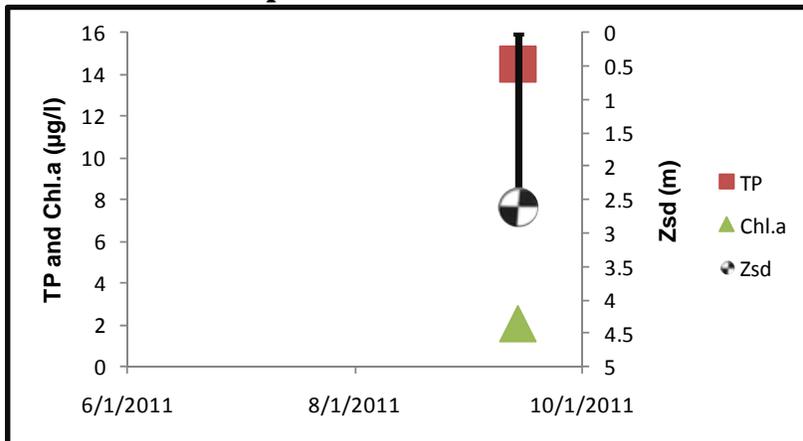
## **Additional Comments**

- The land owned by Camp Timbercrest includes the majority of the pond's watershed and therefore the majority of the land area that influences water quality within the pond. This should be kept in mind if any future developments at the camp are considered.
- Assuring that any boat brought to the pond has been cleaned and dried will help prevent the inadvertent introduction of invasive aquatic species. In addition, periodic surveillance for invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds.

## Time Series: Depth Profiles



## Time Series: Trophic Indicators



## WQ Sampling Results

### Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	2.6	Mesotrophic	Readings does not violate DOH guidance value
TSI-Secchi		46.2	Mesotrophic	No pertinent water quality standards
TP	mg/l	0.0145	Mesotrophic	Reading does not violate DEC guidance values
TSI-TP		42.7	Mesotrophic	No pertinent water quality standards
TSP	mg/l	0.0065	High % soluble Phosphorus	No pertinent water quality standards
NOx	mg/l	0.0066	Low nitrate	Reading does not violate guidance
NH4	mg/l	ND	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.26	Low organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	40.45	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	2.10	Mesotrophic	No pertinent water quality standards
TSI-CHLA		37.9	Oligotrophic	No pertinent water quality standards
Alkalinity	mg/l	11	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	14	Uncolored	No pertinent water quality standards
TOC	mg/l	3.3		No pertinent water quality standards
Ca	mg/l	4.56	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.176		Reading does not violate water quality standards
Mn	mg/l	0.0625		Reading does not violate water quality standards
Mg	mg/l	1.6		Reading does not violate water quality standards
K	mg/l	0.677		No pertinent water quality standards
Na	mg/l	2.27		Reading does not violate water guidance value
Cl	mg/l	2.9	Little impact from road salt	Reading does not violate water quality standards
SO4	mg/l	5.8		Reading does not violate water quality standards

## Bottom Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
TP-bottom	mg/l	0.0221		No pertinent water quality standards
TSP-bottom	mg/l	0.0042	Little available phosphorus	No pertinent water quality standards
NOx-bottom	mg/l	0.0028	No evidence of DO depletion	Reading does not violate water quality standards
NH4-bottom	mg/l	0.012	Evidence of DO depletion	Reading does not violate water quality standards
TKN-bottom	mg/l	0.25		No pertinent water quality standards
Alk-bottom	mg/l	13.2	Poorly Buffered	No pertinent water quality standards
TCOLOR-bottom	ptu	16	Weakly Colored	No pertinent water quality standards
TOC-bottom	mg/l	2.4		No pertinent water quality standards
Ca-bottom	mg/l	4.36	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe-bottom	mg/l	0.253		Reading does not violate water quality standards
Mn-bottom	mg/l	2.53	Taste or odor likely	Reading violates class 'A' water quality standards
Mg-bottom	mg/l	1.56		Reading does not violate water quality standards
K-bottom	mg/l	0.673		No pertinent water quality standards
Na-bottom	mg/l	2.39		Reading does not violate water guidance value
Cl-bottom	mg/l	3.5		Reading does not violate water quality standards
SO4-bottom	mg/l	5.6		Reading does not violate water quality standards
As-bottom	mg/l	0.942	Threat to deep potable water intakes	Reading does not violate water quality standards

## Lake Perception

	UNITS	Reading	Scientific Classification	Regulatory Comments
WQ Assessment	1-5, 1 best	3	Definite Algal Greenness	No pertinent water quality standards
Weed Assessment	1-5, 1 best	2	Plants Visible Below Surface	No pertinent water quality standards
Recreational Assessment	1-5, 1 best	2	Excellent for Most Uses	No pertinent water quality standards

## Legend Information

### General Legend Information

Surface Samples = integrated sample collected in the first 2 meters of surface water  
 Bottom Samples = grab sample collected from a depth of approximately 1 meter from the lake bottom  
 SECCHI = Secchi disk water transparency or clarity - measured in meters (m)  
 TSI-SECCHI = Trophic State Index calculated from Secchi, =  $60 - 14.41 * \ln(\text{Secchi})$

### Laboratory Parameters

ND = Non-Detect, the level of the analyte in question is at or below the laboratory's detection limit  
 TP = total phosphorus- milligrams per liter (mg/l)  
 Detection limit = 0.003 mg/l; NYS Guidance Value = 0.020 mg/l  
 TSI-TP = Trophic State Index calculated from TP, =  $14.42 * \ln(\text{TP} * 1000) + 4.15$   
 TSP = total soluble phosphorus, mg/l  
 Detection limit = 0.003 mg/l; no NYS standard or guidance value

NO <sub>x</sub>	= nitrate + nitrite nitrogen, mg/l Detection limit = 0.01 mg/l; NYS WQ standard = 10 mg/l
NH <sub>4</sub>	= total ammonia, mg/l Detection limit = 0.01 mg/l; NYS WQ standard = 2 mg/l
TKN	= total Kjeldahl nitrogen (= organic nitrogen + ammonia), mg/l Detection limit = 0.01 mg/l; no NYS standard or guidance value
TN/TP	= Nitrogen to Phosphorus ratio (molar ratio), = (TKN + NO <sub>x</sub> )*2.2/TP > 30 suggests phosphorus limitation, < 10 suggests nitrogen limitation
CHLA	= chlorophyll <i>a</i> , micrograms per liter (µg/l) or parts per billion (ppb) Detection limit = 2 µg/l; no NYS standard or guidance value
TSI-CHLA	= Trophic State Index calculated from CHLA, = 9.81*ln(CHLA) + 30.6
ALKALINITY	= total alkalinity in mg/l as calcium carbonate Detection limit = 10 mg/l; no NYS standard or guidance value
TCOLOR	= true (filtered or centrifuged) color, platinum color units (ptu) Detection limit = 5 ptu; no NYS standard or guidance value
TOC	= total organic carbon, mg/l Detection limit = 1 mg/l; no NYS standard or guidance value
Ca	= calcium, mg/l Detection limit = 1 mg/l; no NYS standard or guidance value
Fe	= iron, mg/l Detection limit = 0.1 mg/l; NYS standard = 0.3 mg/l
Mn	= manganese, mg/l Detection limit = 0.01 mg/l; NYS standard = 0.3 mg/l
Mg	= magnesium, mg/l Detection limit = 2 mg/l; NYS standard = 35 mg/l
K	= potassium, mg/l Detection limit = 2 mg/l; no NYS standard or guidance value
Na	= sodium, mg/l Detection limit = 2 mg/l; NYS standard = 20 mg/l
Cl	= chloride, mg/l Detection limit = 2 mg/l; NYS standard = 250 mg/l
SO <sub>4</sub>	= sulfate, mg/l Detection limit = 2 mg/l; NYS standard = 250 mg/l
As	=arsenic, mg/l Detection limit = 3.2 mg/l; NYS standard = 10 mg/l

### ***Field Parameters***

Depth	= water depth, meters
Temp	= water temperature, degrees Celsius
D.O.	= dissolved oxygen, in milligrams per liter (mg/l) or parts per million (ppm) NYS standard = 4 mg/l; 5 mg/l for salmonids
pH	= powers of hydrogen, standard pH units (S.U.) Detection limit = 1 S.U.; NYS standard = 6.5 and 8.5
SpCond	= specific conductance, corrected to 25°C, micromho per centimeter (µmho/cm) Detection limit = 1 µmho/cm; no NYS standard or guidance value
ORP	= Oxygen Reduction Potential, millivolts (MV) Detection limit = -250 mV; no NYS standard or guidance value

### ***Lake Assessment***

WQ Assessment	= <b>water quality assessment</b> , 5 point scale, 1= crystal clear, 2 = not quite crystal clear, 3 = definite algae greenness, 4 = high algae levels, 5 = severely high algae levels
Weed Assessment	= <b>weed coverage/density assessment</b> , 5 point scale, 1 = no plants visible, 2 = plants below surface, 3 = plants at surface, 4 = plants dense at surface, 5 = plants cover surface
Recreational Assessment	= <b>swimming/aesthetic assessment</b> , 5 point scale; 1 = could not be nicer, 2 = excellent, 3= slightly impaired, 4 = substantially impaired, 5 = lake not usable