

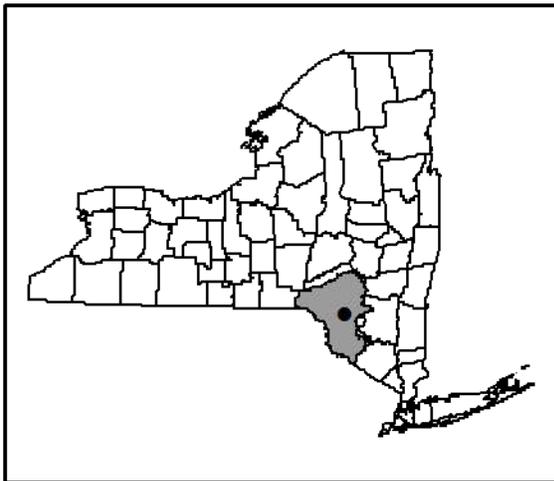
LCI Lake Water Quality Summary

General Information

| | |
|--------------------------------------|--|
| Lake Name: | Trojan Lake |
| Location: | Town of Rockland, Sullivan County, NY |
| Basin: | Delaware River Basin |
| Size: | 10.4 hectares (26 acres) |
| Lake Origins: | natural |
| Major Tributaries: | no known inlet |
| Lake Tributary to?: | Willowemoc Creek via a minor unnamed tributary |
| Water Quality Classification: | B(T) (best intended use: primary contact recreation) (T) the waterbody shall be suitable for trout survival |
| Sounding Depth: | 2.2 meters (7 feet) |
| Sampling Coordinates: | Latitude: 41.92620, Longitude: -74.79713 |
| Sampling Access Point: | path along outlet dam |
| Monitoring Program: | Lake Classification and Inventory (LCI) Survey |
| Sampling Date: | July 29, 2009 |
| Samplers: | Scott Kishbaugh, NYSDEC Division of Water, Albany Dan Hayes, NYSDEC Division of Water, Albany |
| Contact Information: | Scott Kishbaugh, NYSDEC Division of Water sakishba@gw.dec.state.ny.us ; 518-402-8282 |

Lake Map

(sampling location marked with a circle)



Background and Lake Assessment

Trojan Lake is a small private waterbody outside of Deckertown, Sullivan County, New York. Lake use appears to be limited to non-power boating (kayaking and canoeing) by lakefront residents. The lake was formed by a small dam which appears to be in a state of disrepair, and is dominated by a wetland bog in the center of the lake. The immediate area around the lake and the lake's watershed is predominately forested with a small number of homes within the watershed.

The lake was included in the New York State DEC Division of Water's 2009 screening (single sampling event) Lake Classification and Inventory (LCI) survey of the Delaware River Basin. Inclusion was based on an inquiry from a local resident on excessive aquatic weed growth in the lake. In addition the Division of Water did not previously have any water quality data for the lake.

Trojan Lake can generally be characterized as *mesoeutrophic*, or moderately to highly productive. The water clarity reading (TSI = 49, typical of *mesoeutrophic* lakes) was lower than expected given the phosphorus reading (TSI = 43, typical of *mesotrophic* lakes), but was expected given the chlorophyll *a* reading (TSI = 50, typical of *mesoeutrophic* lakes). These data suggest that baseline nutrient levels do not support persistent algae blooms, but there may tend to be slightly elevated algae levels in the lake during the summer.

The lake water appeared to have a brownish tint which was typical for other lakes in the area and may come from weak or organic acids (tannins) that enter the lake through the watershed. Water clarity was sufficient enough to see the bottom of the lake at the deepest point in the lake. Several native species of rooted aquatic plants were found in the lake and included: *Myriophyllum humile* (low watermilfoil), *Brasenia schreberi* (water shield), *Myriophyllum farwellii* (Farwells milfoil), and *Nuphar sp.* (yellow water lily). Farwells milfoil is listed as a threatened species by the New York State Natural Heritage Program due to the limited occurrences of the plant in the state. The most conspicuous portion of the plant community is the extensive growth of watershield along the eastern shore and in the entirety of the lake around the center island. This is a native plant species that is rarely the subject of active plant control.

Like most shallow water bodies, Trojan Lake was not thermally stratified. Temperature readings were consistent throughout the water column. pH readings indicate acidic water, with the pH readings throughout the water column falling below state's lower water quality standard (= 6.5). Low pH values were typical for other lakes sampled in northern Sullivan County, probably due to acid deposition and the naturally low buffering capacity associated with organic and thin underlying soil layers. Conductivity readings in Trojan Lake, like most of the other lakes sampled in the Delaware River Basin, were typical of soft water lakes (low ionic strength).

Trojan Lake appears to be typical of soft water, weakly colored, acidic lakes. Other lakes with similar water quality characteristics often support warmwater fisheries, although fisheries habitat cannot be fully evaluated through this monitoring program. Coldwater fisheries may not be supported, given the lack of cold water during the summer. Chloride and other ions exhibited low levels, indicating only minor impacts from road salting or other signs of stormwater runoff

through developed areas. Iron levels were slightly elevated. None of the other water quality indicators measured through this program indicate water quality problems.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Trojan Lake is not classified for use as a potable water supply, and it is unlikely that the lake supports this use. Although the LCI data are not sufficient to evaluate potable water use, these data suggest that surface waters may require substantial treatment due to elevated levels of iron and reduced pH.

Contact Recreation (Swimming)

Trojan Lake is classified for contact recreation—swimming and bathing—although it is not known if the lake supports this use. Bacteria data are needed to evaluate the safety of Trojan Lake for swimming, however these are not collected through the LCI. The water clarity reading was above the New York State Department of Health’s standard for protecting the safety of swimmers, and the water quality conditions of the open water areas of the lake appear to be adequate to support some swimming.

Non-Contact Recreation (Boating and Fishing)

Non-contact recreation may be somewhat limited by the extensive surface growth of watershield and lilies, although these impacts are minimized for non-power boating uses of the lake. The most likely areas of impeded boating access would be on the western and southern side of the island.

Aquatic Life

Aquatic life may be stressed by the acidity of the water in the lake. Organisms susceptible to high summer temperature may also be stressed due to a lack of cold water in the lake during the summer. Additional biological studies would need to be conducted to evaluate impacts to aquatic life.

Aesthetics

It is likely that the aesthetic uses of Trojan Lake should be supported by the favorable water quality conditions and lack of dense canopies of aquatic plants.

Additional Comments

- 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 in area.
- Any management of the watershield or surface plant communities in the lake, if undertaken, should be limited to securing access to the open water via creation of boating channels.

Aquatic Plant IDs

Exotic Plants:

None

Native Plants:

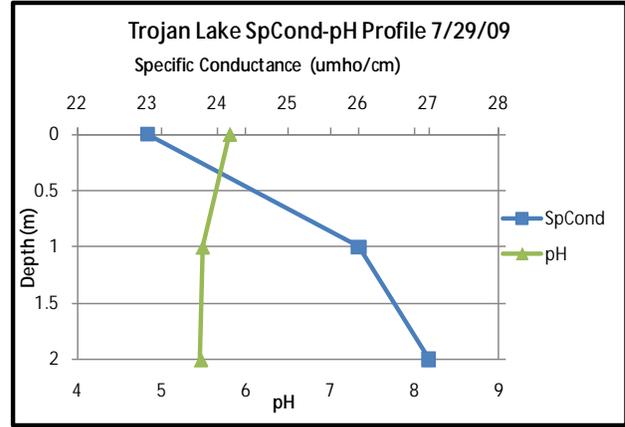
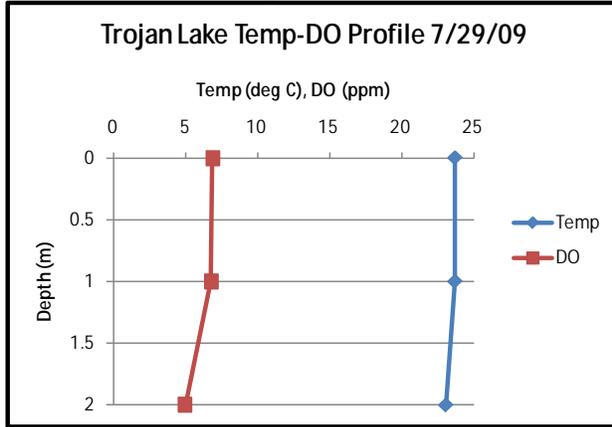
Brasenia schreberi (water shield)

Myriophyllum humile (low watermilfoil)

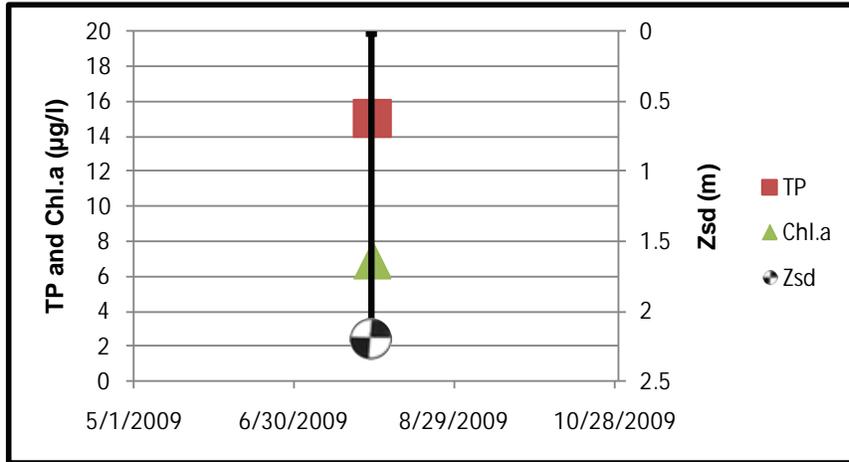
Myriophyllum farwellii (Farwells milfoil)

Nuphar sp. (yellow water lily)

Time Series: Depth Profiles



Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples

| | UNITS | Reading | Scientific Classification | Regulatory Comments |
|------------|--------|---------|--------------------------------|--|
| SECCHI | meters | 2.2 | Mesotrophic | Readings does not violate DOH guidance value |
| TSI-Secchi | | 48.6 | Mesotrophic | No pertinent water quality standards |
| TP | mg/l | 0.015 | Mesotrophic | Readings does not violate DEC guidance values |
| TSI-TP | | 43.2 | Mesotrophic | No pertinent water quality standards |
| TSP | mg/l | 0.0057 | High % soluble Phosphorus | No pertinent water quality standards |
| NOx | mg/l | ND | Low nitrate | Reading does not violate guidance |
| NH4 | mg/l | 0.026 | Low ammonia | Reading does not violate guidance |
| TKN | mg/l | 0.31 | Low organic nitrogen | No pertinent water quality standards |
| TN/TP | mg/l | 45.17 | Phosphorus Limited | No pertinent water quality standards |
| CHLA | ug/l | 6.9 | Mesotrophic | No pertinent water quality standards |
| TSI-CHLA | | 49.5 | Mesotrophic | No pertinent water quality standards |
| Alkalinity | mg/l | ND | Poorly Buffered | No pertinent water quality standards |
| TCOLOR | ptu | 20 | Weakly Colored | No pertinent water quality standards |
| TOC | mg/l | 6 | | No pertinent water quality standards |
| Ca | mg/l | 1.67 | Does Not Support Zebra Mussels | No pertinent water quality standards |
| Fe | mg/l | 0.403 | Taste or odor likely | Reading violates water quality standards |
| Mn | mg/l | 0.0868 | | Reading does not violate water quality standards |
| Mg | mg/l | 0.286 | | Reading does not violate water quality standards |
| K | mg/l | 0.196 | | No pertinent water quality standards |
| Na | mg/l | 2.89 | | Reading does not violate water quality standards |
| Cl | mg/l | 4.4 | Minor road salt runoff | Reading does not violate water quality standards |
| SO4 | mg/l | 3.5 | | Reading does not violate water quality standards |

Lake Perception

| | UNITS | Reading | Scientific Classification | Regulatory Comments |
|-------------------------|-------------|---------|------------------------------------|--------------------------------------|
| WQ Assessment | 1-5, 1 best | 2 | Not Quite Crystal Clear | No pertinent water quality standards |
| Weed Assessment | 1-5, 1 best | 4 | Dense Plant Growth at Lake Surface | No pertinent water quality standards |
| Recreational Assessment | 1-5, 1 best | 3 | Slightly Impaired | 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, = $14.42 \cdot \ln(\text{TP} \cdot 1000) + 4.15$ |
| TSP | = total soluble phosphorus, mg/l Detection limit = 0.003 mg/l; no NYS standard or guidance value |
| NOx | = nitrate + nitrite nitrogen, mg/l Detection limit = 0.01 mg/l; NYS WQ standard = 10 mg/l |
| NH4 | = 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), = $(\text{TKN} + \text{NOx}) \cdot 2.2 / \text{TP}$ > 30 suggests phosphorus limitation, < 10 suggests nitrogen limitation |
| CHLA | = chlorophyll <i>a</i> , micrograms per liter ($\mu\text{g/l}$) or parts per billion (ppb) Detection limit = 2 $\mu\text{g/l}$; no NYS standard or guidance value |
| TSI-CHLA | = Trophic State Index calculated from CHLA, = $9.81 \cdot \ln(\text{CHLA}) + 30.6$ |
| 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 |
| SO4 | = sulfate, mg/l Detection limit = 2 mg/l; NYS standard = 250 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 ($\mu\text{mho/cm}$) Detection limit = 1 $\mu\text{mho/cm}$; 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 = **water quality assessment**, 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 = **weed coverage/density assessment**, 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 = **swimming/aesthetic assessment**, 5 point scale; 1 = could not be nicer, 2 = excellent, 3= slightly impaired, 4 = substantially impaired, 5 = lake not usable