

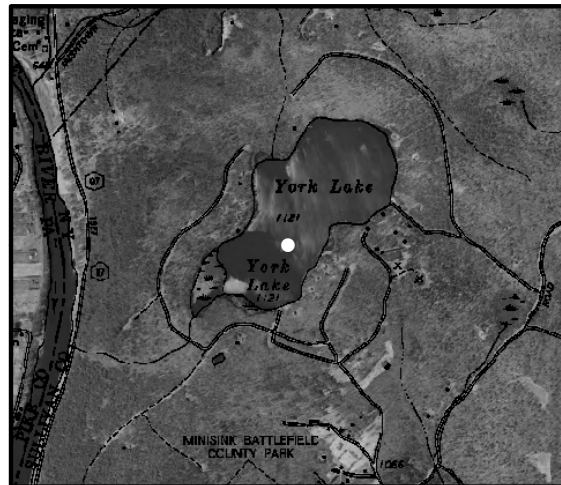
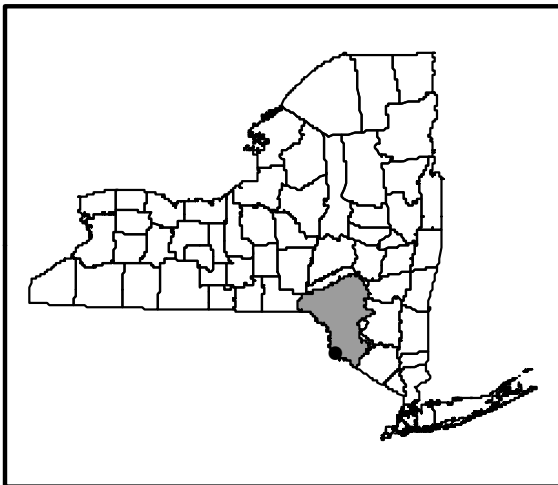
# LCI Lake Water Quality Summary

## General Information

<b>Lake Name:</b>	<b>York Lake</b>
<b>Location:</b>	Town of Yulan, Sullivan County, NY
<b>Basin:</b>	Delaware River Basin
<b>Size:</b>	41.4 hectares (102 acres)
<b>Lake Origins:</b>	natural
<b>Major Tributaries:</b>	no known inlet
<b>Lake Tributary to?:</b>	Delaware River via a minor unnamed tributary
<b>Water Quality Classification:</b>	B (best intended use: primary contact recreation)
<b>Sounding Depth:</b>	8.0 meters (26 feet)
<b>Sampling Coordinates:</b>	Latitude: 41.50011, Longitude: -74.96970
<b>Sampling Access Point:</b>	Private Beach
<b>Monitoring Program:</b>	Lake Classification and Inventory (LCI) Survey
<b>Sampling Date:</b>	July 30, 2009
<b>Samplers:</b>	David Newman, NYSDEC Division of Water, Albany Steven Finnemore, NYSDEC Division of Water, Albany
<b>Contact Information:</b>	David Newman, NYSDEC Division of Water <a href="mailto:djnewman@gw.dec.state.ny.us">djnewman@gw.dec.state.ny.us</a> ; 518-402-8201

## Lake Map

(sampling location marked with a circle)



## Background and Lake Assessment

York Lake is a private lake in southwestern Sullivan County. The lake's outlet is a small stream which travels about a half of a mile before it enters into the Delaware River. The lake has a small, almost entirely forested watershed with the exception of a small number of houses on forested lots. There is a small private beach used by individuals living in the area for swimming and boating. The New York State DEC had no previous water quality data for the lake, so the lake was included in the Division of Water's 2009 Lake Classification and Inventory (LCI) screening program. At this time there are no perceived water quality issues that would make this lake a candidate for the intensive (monthly sampling) survey in the Delaware River Basin for 2010.

York Lake can be characterized as *mesotrophic*, or moderately productive. The chlorophyll *a* reading (TSI = 50, typical of *eutrophic* lakes), was higher than expected given the water clarity reading (TSI = 39, at the high end of *oligotrophic* lakes), and the phosphorus reading (TSI = 39, at the high end of *oligotrophic* lakes). These data indicate that there are slightly elevated levels of chlorophyll *a* (algae) in the water column, but concentrations are not high enough to have a large impact on water clarity, and that baseline nutrient levels do not support persistent algal blooms. These data also suggest that the chlorophyll *a* readings in the lake are not representative of normal conditions in the lake.

During the late July sampling event the lake had a slight yellow/green color with the water clarity reading exceeding 14 feet. The yellow/green color is probably in response to dissolved organic matter and light reflection from the bottom sediments, as the water sample that was collected had little to no coloration. The lake had a sparse population of native floating leaf plants; however the plants were not identified to species level. No exotic invasive species were observed, however a more intense plant specific survey would need to be conducted to completely rule out the presence of exotic plants.

York Lake exhibited weak thermal stratification, in which depth zones (warm water on top, cold water on the bottom during the summer) are established, as in most NYS lakes greater than six meters in depth. The thermocline was found at a depth of about five meters, at which point dissolved oxygen levels dropped off. In the bottom two meters of the lake, hypoxic conditions (oxygen poor) conditions were present. pH readings decreased with lake depth and were indicative of slightly acidic water, with the surface reading being just above the state's water quality standard. This pH reading was among the lowest observed in the lakes sampled in the southwestern Delaware River Basin. The low pH may be imparted due to the low alkalinity (buffering capacity) found in the lake. Conductivity readings indicate soft water (low ionic strength), which was typical for other lakes in the Delaware River Basin.

The lake appears to be a typical softwater, uncolored, acidic lake. Other lakes with similar water quality characteristics may support warmwater fisheries. However, fisheries habitat cannot be fully evaluated through this monitoring program. Coldwater fisheries are unlikely to be supported, given the lack of cold water and high oxygen refugia necessary to protect any salmonids or aquatic life susceptible to high summer temperatures. It is not known if these coldwater fish have historically been supported in the pond.

Total phosphorus levels were slightly elevated in the bottom water sample. This is typical of lakes experiencing anoxic (lack of oxygen) conditions, which allow phosphorus bound in the sediments to be released into the water column. Dissolved phosphorus was low, indicating that most of the available phosphorus is already tied up in primary production (i.e. within algae cells). Like most New York state lakes, York Lake is phosphorus limited, which indicates that any phosphorus additions to the lake will fuel primary production in the form of algae. Chloride and other ions were either below the laboratories detection limit or low, which is typical of lakes in forested watersheds. None of the other water quality indicators measured through this program indicated water quality problems.

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

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

York Lake is not classified for use as a potable water supply. The LCI data are not sufficient to evaluate potable water use; however, these data indicate that deepwater withdrawals maybe impacted by elevated iron and manganese levels.

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

York Lake is classified for contact recreation and it was evident that this use is currently supported, as there were several individuals swimming in the lake at the time of sampling. Bacteria data are needed to evaluate the safety of the lake for swimming, however these data are not collected through the LCI. The data collected through the LCI indicate that swimming should be supported by the existing water quality conditions, at least from an aesthetics perspective.

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

York Lake also appears to support boating and fishing. There were no indications of threats to these uses.

### **Aquatic Life**

The low levels of dissolved oxygen in the bottom waters may stress some aquatic life; however, no direct affects of this were observed. Additional biological studies would need to be conducted to fully evaluate aquatic life.

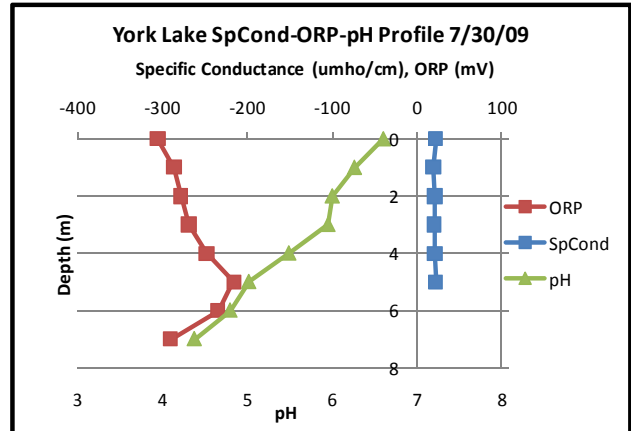
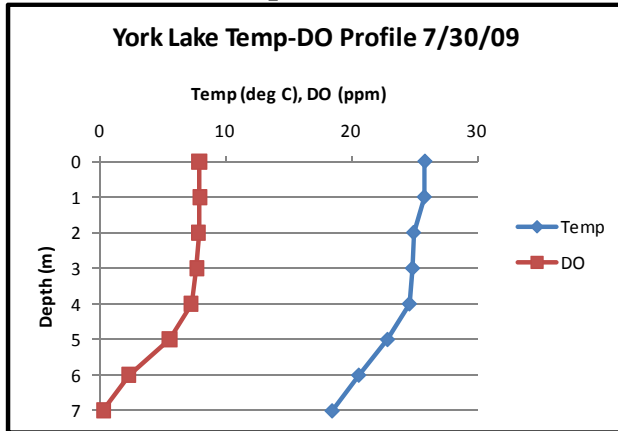
### **Aesthetics**

These data indicate that aesthetics should be fully supported.

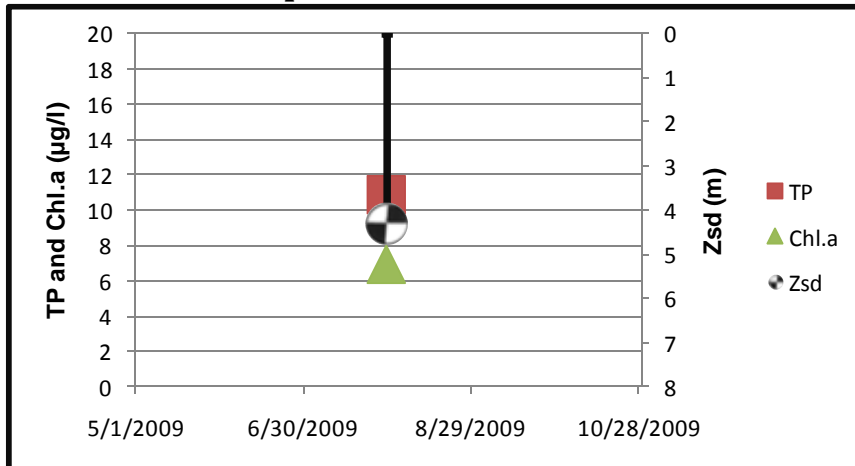
## **Additional Comments**

- 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. Educating the people who use the lake to the risk of invasive species and methods they can use to prevent their spread to York Lake would help minimize the threat of an invasive species from inadvertently being introduced.

## Time Series: Depth Profiles



## Time Series: Trophic Indicators



## WQ Sampling Results

### Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	4.3	Mesotrophic	Reading does not violate DOH guidance value
TSI-Secchi		39.0	Oligotrophic	No pertinent water quality standards
TP	mg/l	0.0109	Mesotrophic	Reading does not violate DEC guidance values
TSI-TP		38.6	Oligotrophic	No pertinent water quality standards
TSP	mg/l	0.0046	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	0.0041	Low nitrate	Reading does not violate guidance
NH4	mg/l	0.018	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.3	Low organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	61.38	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	ND	Uncolored	No pertinent water quality standards
TOC	mg/l	2.6		No pertinent water quality standards
Ca	mg/l	4.44	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.194		Reading does not violate water quality standards
Mn	mg/l	0.0546		Reading does not violate water quality standards
Mg	mg/l	1.3		Reading does not violate water quality standards
K	mg/l	0.903		No pertinent water quality standards
Na	mg/l	9.16		Reading does not violate water quality standards
Cl	mg/l	ND	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	0.0373	Elevated deepwater phosphorus	No pertinent water quality standards
TSP-bottom	mg/l	0.0062	Little available phosphorus	No pertinent water quality standards
NOx-bottom	mg/l	ND	No evidence of DO depletion	Reading does not violate water quality standards
NH4-bottom	mg/l	0.02	No evidence of DO depletion	Reading does not violate water quality standards
TKN-bottom	mg/l	0.57		No pertinent water quality standards
Alk-bottom	mg/l	5.1	Poorly Buffered	No pertinent water quality standards
TCOLOR-bottom	ptu	20	Weakly Colored	No pertinent water quality standards
TOC-bottom	mg/l	3.3		No pertinent water quality standards
Ca-bottom	mg/l	4.82	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe-bottom	mg/l	1.32	Taste or odor likely	Reading violates water quality standards

## Bottom Samples (continued)

Mn-bottom	mg/l	1.4	Taste or odor likely	Reading violates water quality standards
Mg-bottom	mg/l	1.32		Reading does not violate water quality standards
K-bottom	mg/l	1.07		
Na-bottom	mg/l	8.7		Reading does not violate water quality standards
Cl-bottom	mg/l	ND		Reading does not violate water quality standard
SO4-bottom	mg/l	5.1		Reading does not violate water quality standards
As-bottom	mg/l	ND	No evidence of potable water threats	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	3	Plants Grow to Lake Surface	No pertinent water quality standards
Recreational Assessment	1-5, 1 best	4	Substantially 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, = $14.42 * \ln(\text{TP} * 1000) + 4.15$
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), = $(\text{TKN} + \text{NOx}) * 2.2 / \text{TP}$ > 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, = $9.81 * \ln(\text{CHLA}) + 30.6$

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
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 ( $\mu\text{mho/cm}$ ) 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	= <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