

LCI Lake Water Quality Summary

General Information

Lake Name: Sand Pond

Location: Town of Highland and Lumberland, Sullivan County

Basin: Delaware River Basin

Size: 44.0 hectares (= 109 acres)

Lake Origins: natural

Major Tributaries: no known inlet

Lake Tributary to?: Halfway Brook via unnamed minor tributary

Water Quality Classification: B (best intended use: primary contact recreation)

Sounding Depth: 19.8 meters (= 65 feet)

Sampling Coordinates: Latitude: 41.51248, Longitude: -74.84240

Sampling Access Point: private beach (Derrick Richardson)

Monitoring Program: Lake Classification and Inventory (LCI) Survey

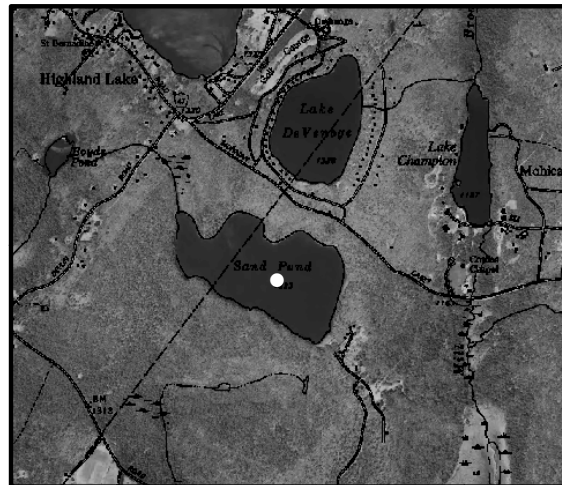
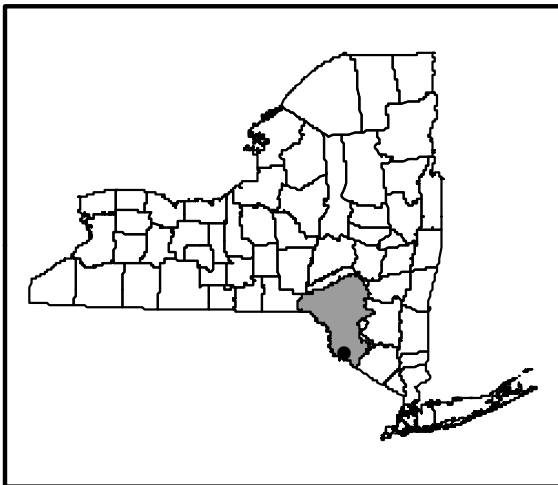
Sampling Date: 7/30/09

Samplers: David Newman, NYSDEC Division of Water, Albany
Steven Finnemore, NYSDEC Division of Water, Albany

Contact Information: David Newman, NYSDEC Division of Water
djnewman@gw.dec.state.ny.us; 518-402-8201

Lake Map

(sampling location marked with a circle)



Background and Lake Assessment

Sand Pond is a private waterbody surrounded by land owned by a single private landowner (Derrick Richardson). The entire shoreline of the lake is forested except for a small private beach used solely by the property owner and his guest. NYSDEC Division of Water's Lake Classification and Inventory Survey (LCI) had no previous water quality data for the lake and thus the lake was included in the 2009 LCI Delaware River Basin screening program. Due to the lack of public access and lack of perceived use impairments, the lake will not be considered for the 2010 intensive (monthly) monitoring program within the Delaware River Basin.

Sand Pond can generally be characterized as an *oligotrophic* lake, or an unproductive lake. The water clarity reading (TSI = 38, typical of *oligotrophic* lakes) is slightly lower than expected given the phosphorus (TSI = 29, typical of *oligotrophic* lakes) reading. The chlorophyll *a* reading was below the laboratory detection limit (typical of *oligotrophic* lakes). The Secchi disk reading of 4.5 meters is on the high end of *mesotrophic* (moderately productive lake); however, it is believed that water clarity is typically slightly greater than observed here, given the 17 foot Secchi disk reading recorded during a private monitoring effort in 2008. The lower clarity reading was probably due to the large amount of rainfall received the previous day (up to 4 inches reported in neighboring areas) and due to the high wind condition experienced during sampling, making it hard to obtain an accurate Secchi disk reading. The low nitrogen and phosphorus levels indicate that the conditions observed in late July are typical of the pond, with the pond not supporting high production of algae.

The water was almost crystal clear with no real green or tan color to the water. No rooted exotic or native aquatic plants were visible at the informal beach or other locations in the pond. There were a few native grasses growing in the shallow areas near the informal beach. The lack of aquatic vegetation was atypical compared to other lakes that were sampled in the Delaware River Basin.

The pond exhibits 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 deep. Due to the high wind it was difficult to accurately determine the depth at which stratification occurs, but based on the 2008 data it is probably in the 7 to 8 meter range. Low productivity lakes typically have oxygen rich water in the hypolimnion (bottom waters) throughout the summer, as was apparent in the 2008 data. pH reading indicate slightly acidic surface waters which was typical for other lakes in the region. Conductivity readings indicate soft water (low ionic strength) which is also typical of other nearby lakes.

Chloride and other ions levels were undetectable or low in both the surface and bottoms waters, indicating there is little influence from road salting or other stormwater, which would be expected with no major inlet to the pond and the lack of paved roads in the watershed. None of the other water quality indicators measured through this program indicated water quality problems.

Aquatic life cannot be fully evaluated though the LCI. pH and oxygen levels are fully supportive of aquatic life, but low nutrient levels may inhibit primary production, as was apparent with the lack of aquatic vegetation.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Sand Pond is not classified for use as a potable water supply. LCI data are not sufficient to evaluate potable water use, but the data collected do not show any threats that would hinder Sand Pond from being used as a drinking water supply.

Contact Recreation (Swimming)

Sand Pond is classified for contact recreation- swimming and bathing- it is believed that this use is currently supported. Bacteria data are needed to evaluate the safety of Sand Pond for swimming- these are not collected through the LCI. The data collected through the LCI indicate that swimming is an acceptable use due to the high water clarity and low levels of algae.

Non-Contact Recreation (Boating and Fishing)

Boating on the lake is currently supported. Angling may also be supported; however, low nutrient levels may suppress any fish populations.

Aquatic Life

Additional biological studies would need to be conducted to evaluate the aquatic life of Sand Pond; however, there were no indication aquatic life may be stressed.

Aesthetics

These data indicate that aesthetics should be fully supported, due to the lack of problems with excessive algae, poor water clarity, or invasive weeds.

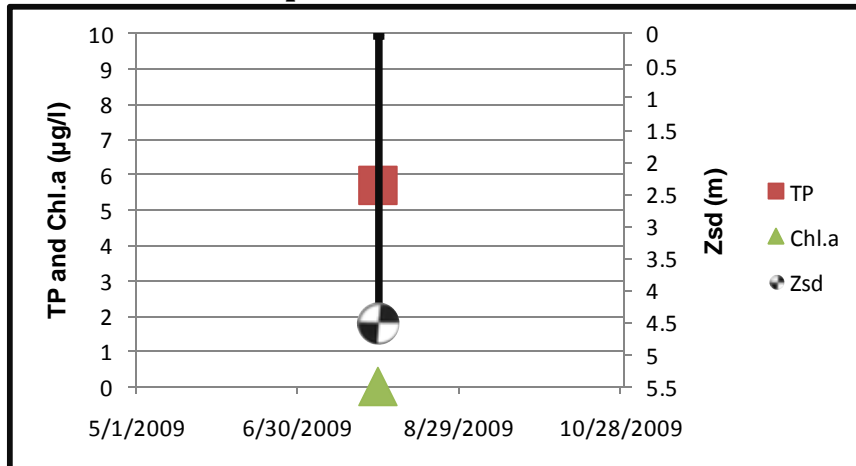
Additional Comments

1. 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. The current policy of not allowing outside boats and limited access to the lake should minimize the risk of the introduction of exotic species to the lake.
2. Water quality conditions can be evaluated by the use of water clarity measurements, previously conducted on the lake. This surrogate for nutrient and algae levels is easy to measure and may provide some early warnings of changes in water quality conditions, recognizing that multiple measurements may need to be collected to evaluate normal variability.

Aquatic Plant IDs

Exotic Plants: None observed
Native Plants: None observed

Time Series: Trophic Indicators



WQ Sampling Results: Sand Pond

Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	4.5	Mesotrophic	Readings does not violate DOH guidance value
TSI-Secchi		38.3	Oligotrophic	No pertinent water quality standards
TP	mg/l	0.0057	Oligotrophic	Readings does not violate DEC guidance values
TSI-TP		29.2	Oligotrophic	No pertinent water quality standards
TSP	mg/l	ND	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	0.0086	Low nitrate	Reading does not violate guidance
NH4	mg/l	0.025	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.34	Low organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	134.55	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	ND	Oligotrophic	No pertinent water quality standards
TSI-CHLA		ND	Oligotrophic	No pertinent water quality standards
Alkalinity	mg/l	8.6	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	ND	Uncolored	No pertinent water quality standards
TOC	mg/l	3.7		No pertinent water quality standards
Ca	mg/l	3.57	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.0347		Reading does not violate water quality standards
Mn	mg/l	0.0258		Reading does not violate water quality standards
Mg	mg/l	1.11		Reading does not violate water quality standards
K	mg/l	0.274		No pertinent water quality standards
Na	mg/l	0.809		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	4		Reading does not violate water quality standards

Bottom Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
TP-bottom	mg/l	0.0087		No pertinent water quality standards
TSP-bottom	mg/l	0.0048	High % soluble phosphorus	No pertinent water quality standards
NOx-bottom	mg/l	0.0113	No evidence of DO depletion	Reading does not violate water quality standards
NH4-bottom	mg/l	0.039	No evidence of DO depletion	Reading does not violate water quality standards
TKN-bottom	mg/l	0.24		No pertinent water quality standards
Alk-bottom	mg/l	10.5	Poorly Buffered	No pertinent water quality standards
TCOLOR-bottom	ptu	ND	Uncolored	No pertinent water quality standards
TOC-bottom	mg/l	3.1		No pertinent water quality standards
Ca-bottom	mg/l	3.83	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe-bottom	mg/l	0.025		Reading does not violate water quality standards

Bottom Samples (continued)

	UNITS	Reading	Scientific Classification	Regulatory Comments
Mn-bottom	mg/l	0.0172		Reading does not violate water quality standards
Mg-bottom	mg/l	1.31		Reading does not violate water quality standards
K-bottom	mg/l	0.247		No pertinent water quality standards
Na-bottom	mg/l	0.737		Reading does not violate water quality standards
Cl-bottom	mg/l	ND		Reading does not violate water quality standards
SO4-bottom	mg/l	4.1		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	1	Plants Usually Not Visible	No pertinent water quality standards
Recreational Assessment	1-5, 1 best	1	Could Not Be Nicer	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, = $60 - 14.41 \cdot \ln(\text{Secchi})$

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)

TSI-CHLA	Detection limit = 2 µg/l; no NYS standard or guidance value
ALKALINITY	= Trophic State Index calculated from CHLA, = $9.81 * \ln(\text{CHLA}) + 30.6$ = total alkalinity in mg/l as calcium carbonate
TCOLOR	Detection limit = 10 mg/l; no NYS standard or guidance value = true (filtered or centrifuged) color, platinum color units (ptu)
TOC	Detection limit = 5 ptu; no NYS standard or guidance value = total organic carbon, mg/l
Ca	Detection limit = 1 mg/l; no NYS standard or guidance value = calcium, mg/l
Fe	Detection limit = 1 mg/l; no NYS standard or guidance value = iron, mg/l
Mn	Detection limit = 0.1 mg/l; NYS standard = 0.3 mg/l = manganese, mg/l
Mg	Detection limit = 0.01 mg/l; NYS standard = 0.3 mg/l = magnesium, mg/l
K	Detection limit = 2 mg/l; NYS standard = 35 mg/l = potassium, mg/l
Na	Detection limit = 2 mg/l; no NYS standard or guidance value = sodium, mg/l
Cl	Detection limit = 2 mg/l; NYS standard = 20 mg/l = chloride, mg/l
SO4	Detection limit = 2 mg/l; NYS standard = 250 mg/l = sulfate, 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	= 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