

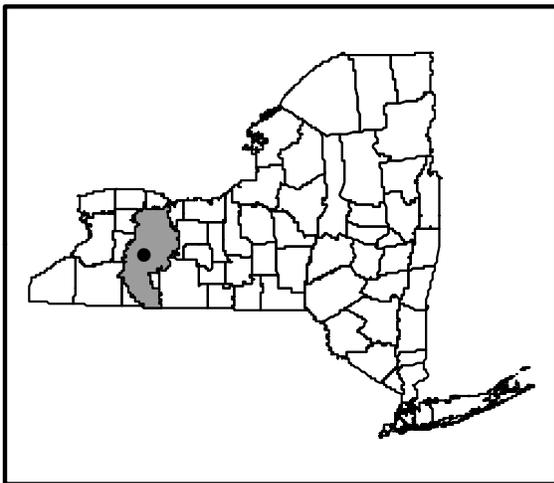
LCI Lake Water Quality Summary

General Information

Lake Name:	Rod and Gun Club Pond
Location:	Letchworth State Park, Town of Portage, Livingston County, New York
Basin:	Genesee River Basin
Size:	0.5 hectares (~ 1 acre)
Lake Origins:	natural
Major Tributaries:	none (seepage)
Lake Tributary to:	Genesee River via a minor unnamed tributary
Water Quality Classification:	B (best intended use: primary contact recreation)
Sounding Depth:	1.8 meters (6 feet)
Sampling Coordinates:	Latitude: 42.60468, Longitude: -77.98322
Sampling Access Point:	Small parking area off River Road (Letchworth State Park)
Monitoring Program:	Lake Classification and Inventory (LCI) Survey
Sampling Date:	August 4, 2009
Samplers:	David Newman, NYSDEC Division of Water, Albany Steven Finnemore, 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

Rod and Gun Club Pond is a small pond at the southeastern edge of Letchworth State Park in Livingston County. The pond is off the beaten path of main tourist areas of the park and is only accessible via a small grass parking area off a dirt road. The land immediately around the pond is forested, with a small amount of agricultural land within the watershed. Rod and Gun Club Pond was included in the 2009 Lake Classification and Inventory (LCI) screening survey of the Genesee River Basin at the request of the State Office of Parks Recreation and Historic Preservation (OPRHP), to provide OPRHP with additional water quality information for the pond. The elevated phosphorus levels and the appearance of algal scum on the pond's surface may make the pond a candidate for additional DEC monitoring during the summer of 2010.

Rod and Gun Pond can generally be characterized as *eutrophic*, or highly productive. The water clarity reading (TSI = 56, typical of *eutrophic* lakes) was higher than expected given the phosphorus reading (TSI = 66, typical of *eutrophic* lakes), but was lower than expected given the chlorophyll *a* reading (TSI = 49, typical of *mesoeutrophic* lakes). These data suggest that algal growth may be limited by phosphorus and other stressors.

Algal greenness was probably visible to the casual observer, and algal scum was visible on certain areas of the pond's surface. Three species of native rooted aquatic vegetation were observed in the pond and included: *Potamogeton natans* (floating brownleaf pondweed), *Najas flexilis* (slender naiad), and *Potamogeton zosteriformis* (flat stemmed pondweed). The plant community is typical for this area of New York State and no exotic aquatic plants species were observed.

Water samples were collected to evaluate the potential presence of harmful algal blooms—cyanobacteria that might trigger the release of algal toxins or taste and odor compounds. The samples from the pond were run through a phycocyanin detector and recorded readings of 40 phycocyanin units. Any sampling results above 100 units may be associated with the presence of more than 1.0 µg/l of microcystis-LR, corresponding to the World Health Organization (WHO) guidance to protect drinking water supplies (it is not yet known what phycocyanin readings might result in microcystis-LR readings above 5-10 µg/l, the guidance to protect contact recreation). The results from these detectors can be highly variable, and should only be used as an indication of a potential problem.

Like most shallow water bodies, Rod and Gun Club Pond was not thermally stratified. Temperature and dissolved oxygen readings were consistent throughout the water column. Dissolved oxygen readings were low throughout the water column with anoxic (lack of oxygen) conditions just above the pond's bottom. Low oxygen levels are common in ponds with elevated algae levels. pH readings indicate slightly alkaline water, and conductivity readings indicate moderately hard water (high ionic strength). The conductivity and pH readings were similar to those seen in another small pond in the park, and probably represent typical conditions for small waterbodies in this area of New York State.

Rod and Gun Club Pond appears to be typical of moderately hardwater, weakly colored alkaline lakes. Other lakes with similar water quality characteristics often support warmwater fisheries. However, the low oxygen levels in the pond may stress fish populations, although fisheries

habitat cannot be fully evaluated through this monitoring program. It is unlikely the pond supports coldwater fish species, given the lack of cold oxygen rich water during the summer months. A fisheries survey would be required to evaluate fish community structure. Chloride and other ions were found at low levels, which is typical for waterbodies in forested watersheds. Phosphorous values were above the state's guidance value and may contribute to algal blooms in the pond. The nitrogen to phosphorus ratio showed that either nutrient may be the limiting factor for algal growth. Iron levels were slightly elevated and may be associated with the reduced dissolved oxygen levels in the pond. 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)

Rod and Gun Club Pond is not classified for potable water supply. LCI data are not sufficient to evaluate potable water use; however, iron levels were above the state drinking water quality standards.

Contact Recreation (Swimming)

Rod and Gun Club Pond is classified for primary contact recreation. It was not reported whether the park allows people to swim in the pond and whether people do partake in swimming in the pond. Bacteria data are needed to evaluate the safety of swimming in the pond; however, these data are not collected through the LCI. The data collected through the LCI showed the water clarity was just above the NYSDOH guidance value to protect swimmer's safety. The small size and shallow depth of the pond may also detract from active contact recreation.

Non-Contact Recreation (Boating and Fishing)

Due to the small size of the pond, boating does not appear to be supported. Shoreline fishing may be supported; however, suboptimal oxygen levels may not support a fish population in the pond.

Aquatic Life

Reduced oxygen levels in the pond may stress aquatic life. Additional biological studies would need to be conducted to fully evaluate aquatic life.

Aesthetics

These data indicate that aesthetics may be slightly stressed due to reduced water clarity and the presence of algal scum on the pond's surface.

Additional Comments

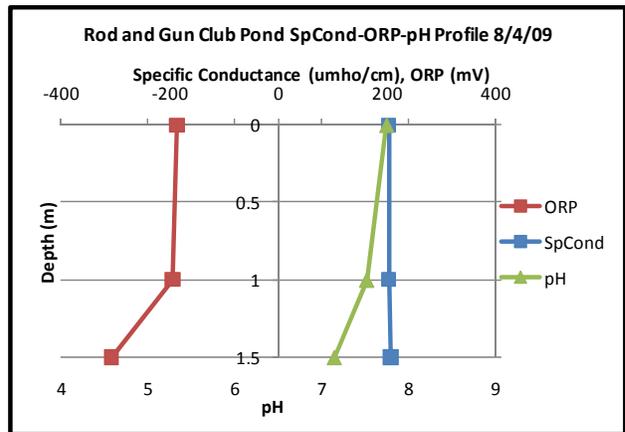
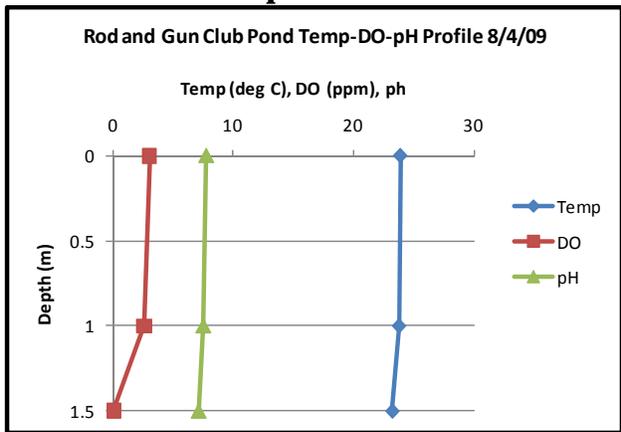
- Periodic surveillance for invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds.
- Algae identification would determine if the lake may suffer from harmful algal blooms (HABs) and/or the production of algal toxins. This may be conducted through future generations of the LCI or on-going monitoring conducted by NYSOPRHP. In the interim, if any algal blooms are suspected at Rod and Gun Club Pond in the future, the Livingston

County Health Department should be notified to conduct additional investigations to determine if restrictions on drinking or swimming in lake water may be appropriate.

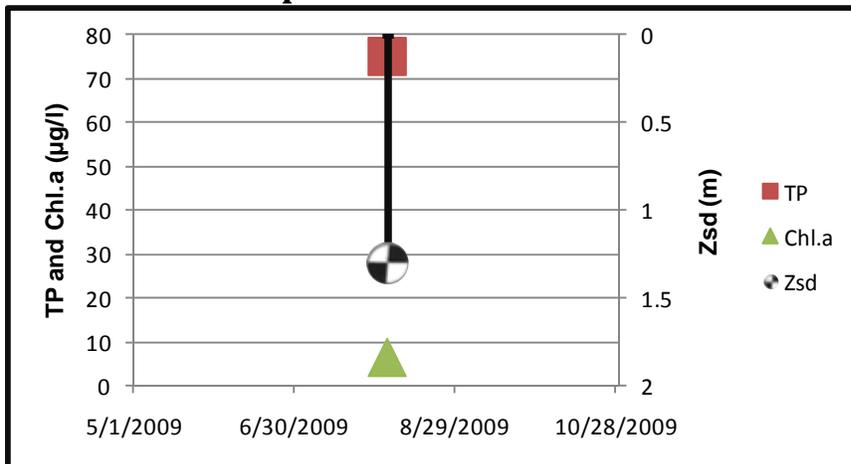
Aquatic Plant ID

Exotic Plants: None
 Native Plants: *Potamogeton natans* (floating brownleaf pondweed)
Najas flexilis (slender naiad)
Potamogeton zosteriformis (flat stemmed pondweed)

Time Series: Depth Profiles



Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	1.3	Eutrophic	Reading does not violate DOH guidance value
TSI-Secchi		56.2	Eutrophic	No pertinent water quality standards
TP	mg/l	0.0751	Eutrophic	Sample exceeds guidance value
TSI-TP		66.4	Eutrophic	No pertinent water quality standards
TSP	mg/l	0.018	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	0.0031	Low nitrate	Reading does not violate guidance
NH4	mg/l	0.011	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.81	Elevated organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	23.82	Nutrient Limitation Unclear	No pertinent water quality standards
CHLA	ug/l	6.4	Mesotrophic	No pertinent water quality standards
TSI-CHLA		48.8	Mesotrophic	No pertinent water quality standards
Alkalinity	mg/l	110	Moderately Buffered	No pertinent water quality standards
TCOLOR	ptu	30	Weakly Colored	No pertinent water quality standards
TOC	mg/l	9		No pertinent water quality standards
Ca	mg/l	28.8	Minimally Supports Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.561	Taste or odor likely	Reading violates water quality standards
Mn	mg/l	0.206		Reading does not violate water quality standards
Mg	mg/l	10.4		Reading does not violate water quality standards
K	mg/l	3.51		No pertinent water quality standards
Na	mg/l	5.35		Reading does not violate water quality standards
Cl	mg/l	5.6	Minor road salt runoff	Reading does not violate water quality standards
SO4	mg/l	8.3		Reading does not violate water quality standards

Lake Perception

	UNITS	Reading	Scientific Classification	Regulatory Comments
WQ Assessment	1-5, 1 best	4	High Algae Levels	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	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
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 ($\mu\text{g/l}$) 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, = $9.81 * \ln(\text{CHLA}) + 30.6$
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