LCI Lake Water Quality Summary

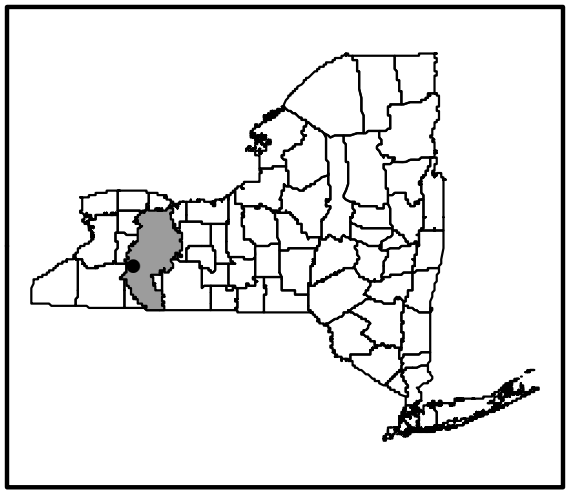
General Information

Lake Name: Spring Lake

Location:	Town of Hume, Allegany County, NY
Basin:	Genesee River Basin
Size:	10.4 hectares (= 25.7 acres)
Lake Origins:	natural
Major Tributaries:	no known inlet
Lake Tributary to:	Cold Creek via a minor unnamed tributary
Water Quality Classification:	C (best intended use: secondary contact recreation)
Max Sounding Depth:	not able to take a sounding
Sampling Coordinates:	Latitude: 42.49672, Longitude: -78.17710
Sampling Access Point:	Hike in to outlet via Flanagan Road (TNC property)
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:	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

Spring Lake is a small lake (~ 26 acres) in northwestern Allegany County. A small portion of the eastern shore of the lake is owned by the Nature Conservancy with the rest of the shoreline being owned by a separate private land owner. A little over half of the shoreline is forested or wetland with the remaining land being agricultural. It appeared that the lake may support boating, fishing, and possibly swimming.

The lake was included in the NYSDEC Division of Water's (DOW) 2009 Lake Classification Inventory Survey (LCI), due to a lack of historical water quality data in the DOW water quality database. Due to the high phosphorus levels found in the water, Spring Lake may be a candidate for more intensive sampling (monthly) during the summer of 2010, although this would be pending the availability of state funds to support this monitoring and obtaining permission from the private land owner to use their property to launch a boat on the lake.

The lake was accessed via the lake outlet through a large wetland on the north side of the lake. A water sample was taken at the lake outlet and observations were made from that location. The lack of boat access to the lake prevented many of the standard LCI parameters from being assessed.

Spring Lake can be generally characterized as *eutrophic*, or highly productive. The phosphorus reading (TSI = 63, typical of highly eutrophic lakes) was expected given the chlorophyll *a* reading (TSI = 62, typical of high eutrophic lakes). A water clarity reading was not able to be taken due to the inability to launch a boat on the lake. These data indicate that baseline nutrient levels may support persistent algal blooms in the lake.

The lake was observed to have a slight algal greenness, which would be expected given the chlorophyll *a* readings in the lake. Rooted and floating aquatic vegetation was visible growing near the shore of the lake. The composition of the plant community is typical of lakes in this area of the state and was comprised of floating leaf plants *Nymphaea sp.* (white water lily) and *Lemna minor* (common duckweed) and the submergent plant *Ceratophyllum demersum* (coontail). No exotic plants were observed; however, a more extensive survey of the plants of Spring Lake would need to be conducted to rule out the existence of exotic plants.

Standard field parameters (dissolved oxygen, pH, conductivity, temperature, and ORP) were not taken due to the difficulty of accessing the lake.

Nitrogen (both nitrate and organic nitrogen) and phosphorus levels were elevated, typical of eutrophic lakes. The elevated nutrient levels may be associated with agricultural runoff. Iron levels were above the drinking water standards (= 0.3mg/l). Chloride levels were below the state water quality standard, but may indicate that there may be minor inputs of chlorides to the lake from road salting. There were no other indications of water quality issues found by the parameters that were analyzed.

Aquatic life cannot be fully evaluated through the LCI. However, eutrophic lakes that stratify during the summer, typical in lakes with a depth of more than 6 meters, tend to have depressed dissolved oxygen levels in the bottom waters. If this is the case for Spring Lake, the bottom

waters would probably not be supportive of aquatic life. No specific impacts to aquatic life were observed from the lake outlet.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Spring Lake is not classified for use as a potable water supply. Although the LCI data are not sufficient to evaluate potable water use, these data suggest that the lake water would require substantial treatment to serve a potable water supply, due to high algae levels and elevated iron readings.

Contact Recreation (Swimming)

Spring Lake is not classified for contact recreation- swimming and bathing, however this use may currently be supported. Bacteria data are needed to evaluate the safety of Spring Lake for swimming- these are not collected through the LCI. The data collected through the LCI indicate that swimming may be stressed due to high algae levels which may result in poor water clarity. Future use of the lake for contact recreation may require management of nutrient sources and reduction of algae levels to provide safe and aesthetically acceptable swimming conditions.

Non-Contact Recreation (Boating and Fishing)

Spring Lake is classified for non-contact recreation- boating and fishing. The observation of a boat dock on the western shore of the lake would indicate that the lake is currently used for boating. The data collected through the LCI would indicate that boating should continue to be a supported use of the lake. Angling may be affected by shoreline surface rooted plant growth (mostly lilies), although this cannot be evaluated through the program.

Aquatic Life

Additional biological studies would need to be conducted to fully evaluate any impacts to aquatic life.

Aesthetics

These data indicate that aesthetics may be threatened by elevated algae levels and shoreline vegetation.

Additional Comments

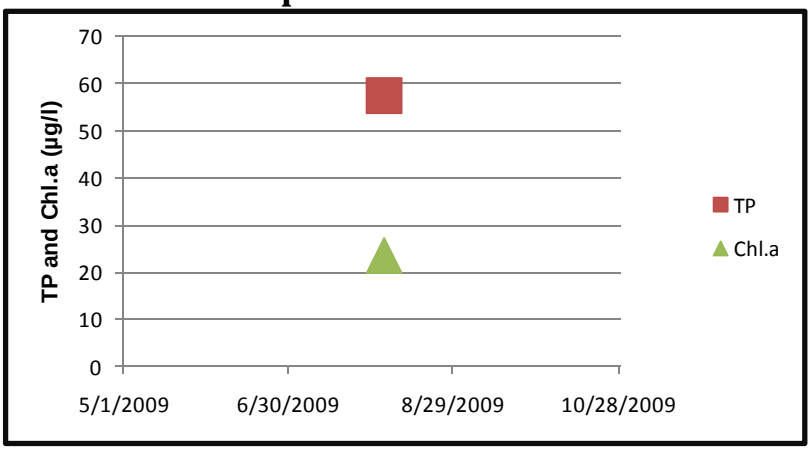
1. Periodic surveillance for invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds.
2. Algae identification would determine if the lake may suffer from harmful algal blooms (HABs) and/or the production of algal toxins. This may be conducted through future generations of the LCI.
3. Ensuring Best Management Practices (BMPs) are being used in the agricultural land within the Spring Lake watershed will help reduce nutrient loads to the lake and may reduce algae levels.

Aquatic Plant IDs

Exotic Plants: None

Native Plants: *Ceratophyllum demersum* (coontail)
Nymphaea sp. (white water lily)
Lemna minor (common duckweed)

Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples:

	UNITS	Reading	Scientific Classification	Regulatory Comments
TP	mg/l	0.0575	Eutrophic	Sample exceeds guidance value
TSI-TP		62.5	Eutrophic	No pertinent water quality standards
TSP	mg/l	0.007	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	0.315	Potentially high nitrate	Reading does not violate guidance
NH4	mg/l	0.045	Low ammonia	Reading does not violate guidance
TKN	mg/l	1.2	Elevated organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	57.97	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	23.5	Eutrophic	No pertinent water quality standards
TSI-CHLA		61.6	Eutrophic	No pertinent water quality standards
Alkalinity	mg/l	87.6	Moderately Buffered	No pertinent water quality standards
TCOLOR	ptu	15	Weakly Colored	No pertinent water quality standards
TOC	mg/l	8.9		No pertinent water quality standards
Ca	mg/l	28.5	Minimally Supports Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.414	Taste or odor likely	Reading violates water quality standards
Mn	mg/l	0.166		Reading does not violate water quality standards
Mg	mg/l	6.22		Reading does not violate water quality standards
K	mg/l	1.92		No pertinent water quality standards
Na	mg/l	3.35		Reading does not violate water quality standards
Cl	mg/l	6	Minor road salt runoff	Reading does not violate water quality standards
SO4	mg/l	5.9		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	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(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(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), = (TKN + NOx)*2.2/TP
> 30 suggests phosphorus limitation, < 10 suggests nitrogen limitation
CHLA = chlorophyll *a*, 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

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 25ºC, 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