

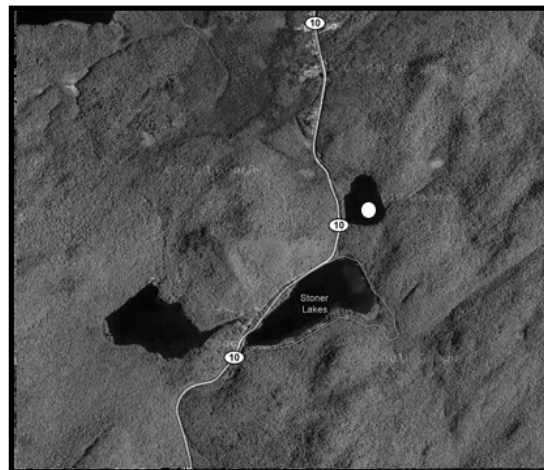
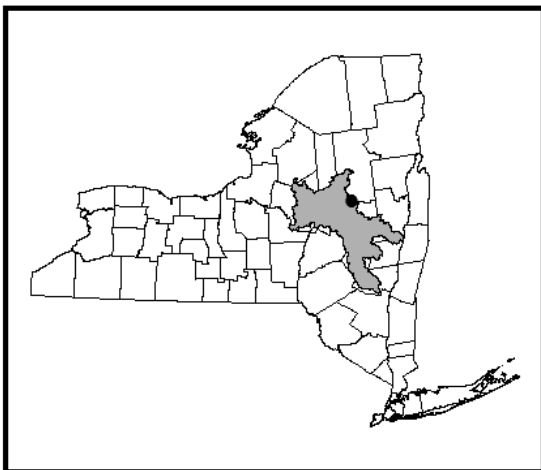
LCI Lake Water Quality Summary

General Information

Lake Name:	Middle Stoner Lake
Location:	Town of Caroga, Fulton County, NY
Basin:	Mohawk River Basin
Size:	28.5 hectares (70 acres)
Lake Origins:	Earthen and Concrete Dam (1963)
Major Tributaries:	West Stoner Lake & East Stoner Lake
Lake Tributary to?:	Canada Lake via Stoner Lakes Outlet
Water Quality Classification:	Not classified (Wholly within the NYS Forest Preserve)
Sounding Depth:	8.5 meters (28 feet)
Sampling Coordinates:	43.22855, -74.51549
Sampling Access Point:	Informal parking area east side of lake
Monitoring Program:	Lake Classification and Inventory (LCI) Survey
Sampling Date:	July 28, 2010
Samplers:	David Newman, NYSDEC Division of Water, Albany Dan Hayes, 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

Middle Stoner Lake (also referred to as East Stoner Lake and Stoner Lake) is one of three lakes that make up the Stoner Lake system. Middle Stoner Lake is part of both the Shaker Mountain Wild Forest (state land at the lake's outlet) and the Silver Lake Wilderness (state land at the northeastern side of the lake). Of the three lakes, Middle Stoner is the most developed with almost the entire shoreline being privately owned. The majority of the land owners only use their camps seasonally, although there are a few people who live at the lake year round. Adirondack Lakes Survey Corporation (ALSC) data collected in 1987 indicated approximately half of the near shoreline of the lake is forested or wetland with the remaining half being developed. The ALSC data also indicate that 90% of the greater watershed is forested with the remaining 10% being developed. The lake is used for swimming, boating (both powered and non-power) and fishing. Due to a lack of water quality data in the Division of Water's database and the lake appearing on The Mohawk River Basin Waterbody Inventory and Priority Waterbodies List (WI/PWL) (NYS DEC 2010) as an "impaired segment", Middle Stoner Lake was included in the 2010 Lake Inventory and Classification (LCI) screening program. The WI/PWL "impaired segment" listing is due to fish consumption being impaired by elevated mercury levels from atmospheric deposition. There is currently a fish consumption advisory for smallmouth bass over 15" in Middle Stoner Lake (NYS DOH 2010).

Middle Stoner Lake can be characterized as *mesoligotrophic*, or non to moderately productive. The water clarity reading taken in late July (TSI = 39, typical of *oligotrophic* lakes) was lower than expected given the total phosphorus reading (TSI = 32, typical of *oligotrophic* lakes), but higher than expected given the chlorophyll *a* reading (TSI = 46, typical *mesotrophic* waterbodies). These data indicate that baseline nutrients do not support persistent algal blooms in the lake.

In late July the water was very clear with only a slight brownish tint. Visual observation and rake tosses yielded only two native aquatic plant species: *Pontederia cordata* (pickerelweed) and *Eriocaulon septangulare* (pipewort). No exotic invasive species were observed in the lake. A more thorough plant survey may yield additional aquatic plants. A shoreline plant survey was conducted in September of 2009 by the Adirondack Invasive Aquatic Plant Volunteer Monitoring Program in which no invasive species were found (APIPP 2010).

Middle Stoner Lake exhibited 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 6 meters deep. The thermocline in the lake was at about five meters in late July. The wind probably keeps the upper four to five meters well mixed and may prevent the lake from staying stratified. In late July, the bottom two meters of the lake were hypoxic (low oxygen). These dissolved oxygen readings in the hypolimnion (bottom waters) are below the state standard to protect trout survival. The pH readings were just above 6.0 and fell below the state's guidance value of 6.5. Some aquatic life may become stressed below 6.5. Acidic waters are common in Adirondack lakes due to natural low alkalinity levels coupled with acid deposition. Conductivity readings indicate soft water, as is typical for Adirondack lakes due to the granitic nature of the watershed.

Middle Stoner Lake appears to be typical of moderately shallow, acidic Adirondack lakes. Other Adirondack lakes with similar water quality characteristics often support warmwater fisheries; however, the data collected through the LCI are not sufficient to evaluate fish habitat. Due to the reduced dissolved oxygen levels in the bottom two meters of the lake, cold water fish species may not be able to survive. As part of the 1987 ALSC survey of the lake, fish were collected and included: Chain pickerel, golden shiner, fallfish, creek chubsucker, yellow perch, brown bullhead, redbreasted sunfish, pumpkinseed sunfish, and largemouth bass. The Shaker Mountain Wild Forest Unit Management Plan (NYS DEC 2006) indicates that since the 1987 ALSC survey permits have been granted to stock brown trout, largemouth bass, and smallmouth bass; however, there has not been a more recent fish survey to determine if the stockings were successful.

The surface water sample showed no indications of water quality problems with all parameters falling below the state standards and guidance values. The deep water sampled showed iron and manganese levels above the state's standard, and both were at levels that are likely to cause taste or odor problems. Elevated deep water iron and manganese are sometimes associated with waterbodies experiencing persistent oxygen deficits in the bottom waters. Deep water ammonia and nitrogen levels were undetectable by the laboratory and would contradict the persistent oxygen deficits. All of the other parameters analyzed were below established guidance values. Most of the data collected through the LCI in 2010 was consistent with the data collected by the ALSC in 1987, and would indicate that these are typical conditions for the lake. The 2010 surface water sodium and chloride levels were both several mg/l higher than those in 1987, possibly indicating an increase in road salting and or development around the lake. A large storm water culvert that appears to empty into the lake was observed along Route 10 on the western side of the lake.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

LCI data are not sufficient to evaluate potable water use; these data suggest that deepwater withdrawals may require substantial treatment to serve as a water supply, due to elevated iron and manganese levels. It is likely that people living around the lake may use treated surface water for drinking and may cook or clean with untreated surface water.

Contact Recreation (Swimming)

Bacteria data are needed to evaluate the safety of Middle Stoner Lake for swimming; however, these data are not collected through the LCI. The water clarity reading was above the state guidance value to protect swimmers. People are known to swim in the lake during the summer months, indicating this use is supported.

Non-Contact Recreation (Boating and Fishing)

The LCI data did not indicate any threats to non-contact recreation. People are known to fish (including ice fishing) and use both powered and non powerboats on the lake, indicating that these uses are currently supported.

Aquatic Life

The hypoxic conditions observed in the bottom waters may stress some aquatic life susceptible to high summer temperatures. The Shaker Mountain Wild Forest Unit Management Plan (NYS

DEC 2006) indicates that the lake has a dominant non-native, warm-water fishery community that may be impacting the native aquatic life in the lake. Additional biological studies would be needed to fully evaluate stressors to aquatic life.

Aesthetics

Data collected through the LCI did not indicate any impacts to the aesthetics of the lake.

Additional Comments

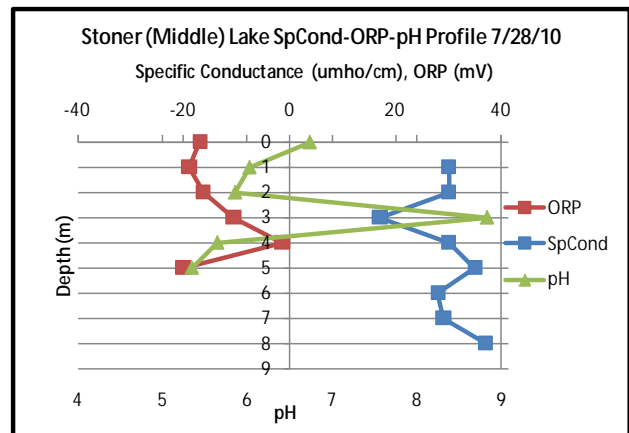
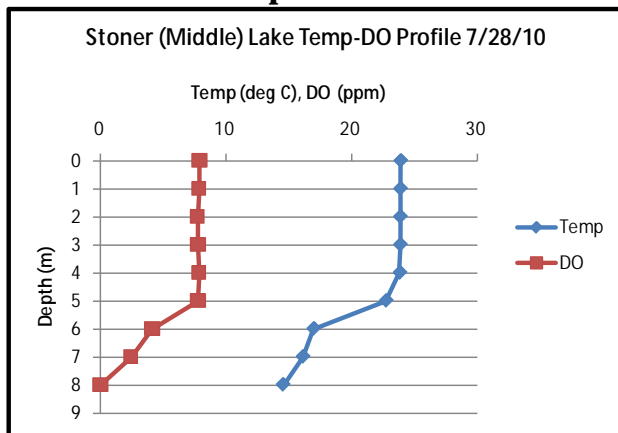
- Periodic surveillance for invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds. Educating lake shore property owner to the dangers of exotic species and what they can do to prevent them from becoming established in the lake may help cut down on the risk of unintended introductions to the lake.
- An effort should be made to complete the recommendations in the Shaker Mountain Unit Management Plan (NYS DEC 2006). These recommendations include: clarifying trespass issues related to power lines over the lake, clarifying riparian rights issues, and managing the lake as a warm water fishery.

Aquatic Plant IDs

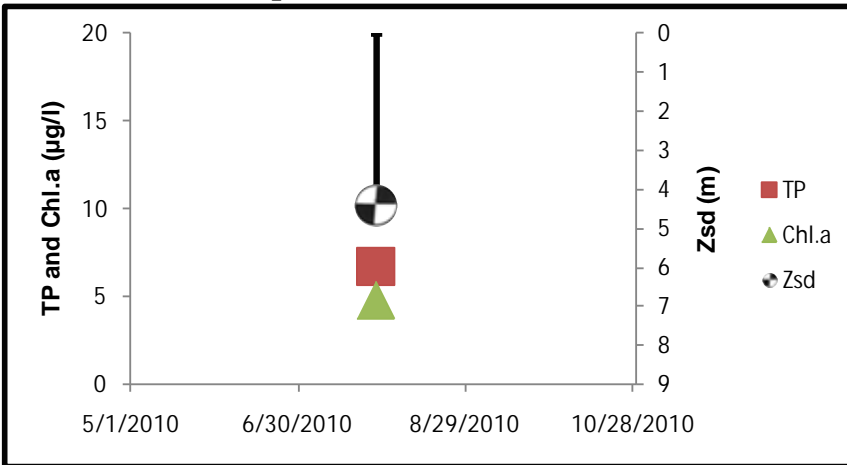
Exotic Plants: none observed

Native Plants: *Eriocaulon septangulare* (Pipewort)
Pontederia cordata (Pickerelweed)

Time Series: Depth Profiles



Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	4.4	Mesotrophic	Readings does not violate DOH guidance value
TSI-Secchi		38.7	Oligotrophic	No pertinent water quality standards
TP	mg/l	0.0067	Oligotrophic	Reading does not violate DEC guidance values
TSI-TP		31.6	Oligotrophic	No pertinent water quality standards
TSP	mg/l	0.003	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	0.0021	Low nitrate	Reading does not violate guidance
NH4	mg/l	ND	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.36	Low organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	118.90	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	4.80	Mesotrophic	No pertinent water quality standards
TSI-CHLA		46.0	Mesotrophic	No pertinent water quality standards
Alkalinity	mg/l	5.8	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	15	Weakly Colored	No pertinent water quality standards
TOC	mg/l	4.7		No pertinent water quality standards
Ca	mg/l	2.72	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.0592		Reading does not violate water quality standards
Mn	mg/l	0.0181		Reading does not violate water quality standards
Mg	mg/l	0.64		Reading does not violate water quality standards
K	mg/l	0.197		No pertinent water quality standards
Na	mg/l	6.62		Reading does not violate water quality standards
Cl	mg/l	9.2	Minor road salt runoff	Reading does not violate water quality standards
SO4	mg/l	3.2		Reading does not violate water quality standards

Bottom Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
TP-bottom	mg/l	0.0267	0.0097	
TSP-bottom	mg/l	0.0116	0.0037	High % soluble phosphorus
NOx-bottom	mg/l	ND	ND	No evidence of DO depletion
NH4-bottom	mg/l	0.285	ND	No evidence of DO depletion
TKN-bottom	mg/l	0.7	0.22	
Alk-bottom	mg/l	5	4.2	Poorly Buffered
TCOLOR-bottom	ptu	75	20	Weakly Colored
TOC-bottom	mg/l	7.1	3.6	
Ca-bottom	mg/l	3.44	2.61	Does Not Support Zebra Mussels
Fe-bottom	mg/l	1.88	0.656	Taste or odor likely
Mn-bottom	mg/l	0.148	0.313	Taste or odor likely
Mg-bottom	mg/l	0.705		Reading does not violate water quality standards
K-bottom	mg/l	0.259		No pertinent water quality standards
Na-bottom	mg/l	6.94		Reading does not violate water quality standards
Cl-bottom	mg/l	9.8		Reading does not violate water quality standards
SO4-bottom	mg/l	3.1		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	3	Plants Grow to Lake Surface	No pertinent water quality standards
Recreational Assessment	1-5, 1 best	1	Could Not Be Nicer	No pertinent water quality standards

References

- Adirondack Park Invasive Plant Program (APIPP). 2010 Aquatic Invasive Plant Project, Stoner Lake (East). Accessible at: <http://www.adkinvasives.com/Aquatic/Maps/PlantMaps.asp?pond=070723>
- NYS DEC Division of Lands and Forest. 2006. Shaker Mountain Wild Forest Unit Management Plan. Accessible at: http://www.dec.ny.gov/docs/lands_forests_pdf/smwfump.pdf.
- NYS DEC Division of Water. 2010. The Mohawk River Basin Waterbody Inventory and Priority Waterbodies List. Accessible at: http://www.dec.ny.gov/docs/water_pdf/pwlmhkw10.pdf.
- NYS DOH. 2010. Chemicals in Sportfish and Game 2010-2011 Health Advisories. Accessible at: <http://www.health.ny.gov/environmental/outdoors/fish/docs/fish.pdf>.

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 ($\mu\text{g/l}$) 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
SO ₄	= 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 (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