

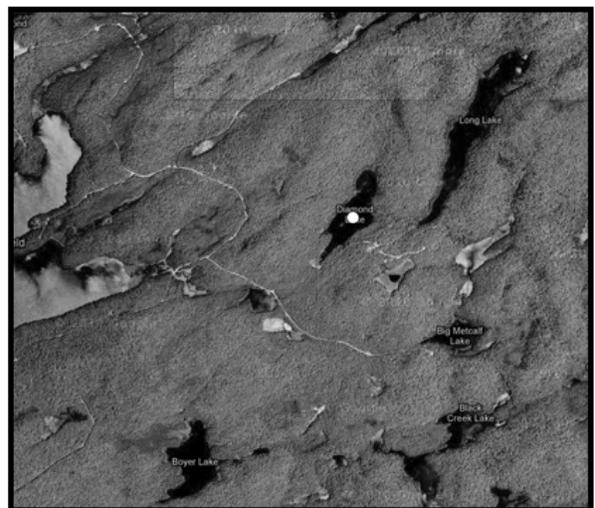
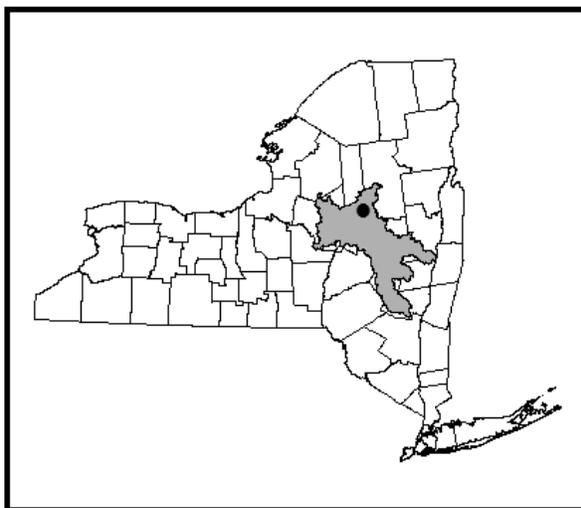
LCI Lake Water Quality Summary

General Information

Lake Name:	Diamond Lake
Location:	Town of Morehouse, Hamilton County, NY
Basin:	Mohawk River Basin
Size:	10.4 hectares (26 acres)
Lake Origins:	natural
Major Tributaries:	Long Lake
Lake Tributary to?:	Jerseyfield Lake via Mill Creek
Water Quality Classification:	C(T) (best intended use: secondary contact recreation) (T) waters should be suitable for trout survival
Sounding Depth:	3.5 meters (11.5 feet)
Sampling Coordinates:	43.30721, -74.72993
Sampling Access Point:	Private land (Jerseyfield Preserve)
Monitoring Program:	Lake Classification and Inventory (LCI) Survey
Sampling Date:	August 25, 2010
Samplers:	David Newman, NYSDEC Division of Water, Albany Ben Sears, 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

Diamond Lake is an approximately 25 acre lake in the town of Morehouse, in the southern portion of the Adirondack Park. The lake is part of what is known as the Jerseyfield Preserve, an inholding of private property completely within the Ferris Lake Wild Forest Area. The shoreline of the lake is completely forested, with wetlands at the outlet and a small four wheel drive dirt road leading to the outlet. The eastern shoreline of the lake has many dead and downed trees; it is not known if this was a consequence of the effects of acid rain. The greater watershed is completely forested except for a few man-made structures, ATV/snowmobile trails, and hiking trails. The watershed lies within either the Jerseyfield Preserve or the Ferris Lake Wild Forest Area. The inlet to the lake is on the eastern side where water flows in from Long Lake. Water then flows into Jerseyfield Lake. Due to a lack of fish, the lake is rarely used by members of the Jerseyfield Preserve. There is no public access to Diamond Lake or the Jerseyfield Preserve.

Diamond Lake was screened (single sample) through the NYSDEC Division of Water's Lake Classification and Inventory (LCI) program in the summer of 2010, due to a lack of water quality data in the Division of Water's database. In addition, *The 2002 Mohawk River Basin Waterbody Inventory and Priority Waterbodies List* (NYSDEC, 2003), identifies the "Lakes tributary to Jerseyfield Lake (which includes Diamond Lake)" as having "Impaired" aquatic life due to atmospheric deposition (acid rain) causing the lakes to have low pH values (in some cases less 5.0). Due to the acidic condition found in Diamond Lake, an additional visit to the lake in the summer of 2011 may be warranted to confirm the pH readings.

Based on data from the single sampling event in late August 2010, Diamond Lake can generally be characterized as an *oligotrophic*, or unproductive. The water clarity reading (TSI < 41, typical of *mesoligotrophic* lakes) was in the expected range given the chlorophyll *a* reading (below the laboratories detection limit, typical of *oligotrophic* lakes), and the phosphorus reading (TSI = 25.5, typical of *oligotrophic* lakes). These data indicate that baseline nutrient levels do not support regular or persistent algal blooms in the lake. The water clarity was indeterminate; the Secchi disk was visible on the bottom of the deepest part of the lake. It is also possible that the water clarity may have been lower than what is typical for the lake due to heavy rain in the days leading up to the sampling date.

The lake bottom was observed to be covered with *Utricularia purpurea* (purple bladderwort), a plant that is typically found in soft acidic waters. This was the only aquatic plant observed to be occurring in the lake; the acidic nature of the lake may preclude the existence of many aquatic plant species. A more thorough plant survey would be needed to adequately assess the plant community of the lake and rule out the existence of any invasive species.

Like most shallow lakes, Diamond Lake did not exhibit thermal stratification, in which depth zones (warm water on top, cold water on the bottom during the summer) are established at the time of sampling. Temperature and dissolved oxygen readings were comparable throughout the water column. pH readings were below 4.5 from top to bottom, a range that will stress most aquatic life. Conductivity readings indicate soft water, typical for Adirondack lakes due to the type of underlying soil and rock.

Diamond Lake appears to be typical of acidic, soft water, uncolored Adirondack lakes. Other waterbodies with similar water quality characteristics often do not support a wide variety of fish and plant life due to the low pH, although fisheries habitat cannot be fully evaluated through this monitoring program. Temperatures in the lake were at the upper end of the optimal range for coldwater fisheries. A fisheries survey would need to be conducted to look at the impacts of low pH and other acidic compounds (such as aluminum, not measured in the LCI) on the survival of fish in the lake. The caretaker of the Jerseyfield Preserve indicated that there were no fish in Diamond Lake, but occasionally they can be found in the outlet stream between Diamond Lake and Jerseyfield Lake.

Chloride levels were below the laboratory detection limit, indicating little to no impact from road salting and runoff through developed areas. This is typical of waterbodies with highly forested watersheds. The alkalinity levels were also below the laboratory detection limit, indicating the lake has little to no buffering capacity to acidic inputs to the lake; this is also common to many Adirondack lakes controlled by organic acids rather than the carbonate equilibria. None of the other parameters measured indicate any water quality problems.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Diamond 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 indicate that water from the lake would require increasing the pH to prevent the corrosion of plumbing.

Contact Recreation (Swimming)

Diamond Lake is not classified for swimming. Due to the remote location of the lake it is doubtful that anyone swims in the lake. Bacteria data are needed to evaluate the safety of Diamond Lake for swimming; these are not collected through the LCI. Data collected through the LCI indicate that swimming should be supported in the lake. The water clarity was above the State Department of Health's guidance value of 1.2 meters to protect the safety of swimmers.

Non-Contact Recreation (Boating and Fishing)

Diamond Lake is classified for non-contact recreation including boating and fishing. The lack of fish and the remote location of the lake probably deter any recreation activity on the lake. Besides the low pH, these data did not indicate any stressors to boating or fishing.

Aquatic Life

The low pH levels in the lake are not conducive to aquatic life. A biological survey of the lake would be needed to fully evaluate the impacts of low pH and any other stressors to aquatic life.

Aesthetics

These data did not indicate any stressors to the aesthetics of the lake.

Additional Comments

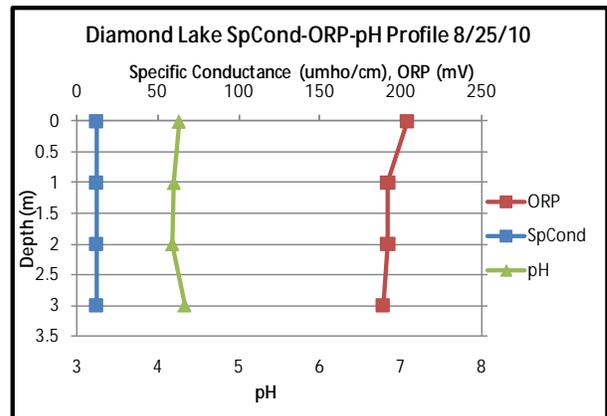
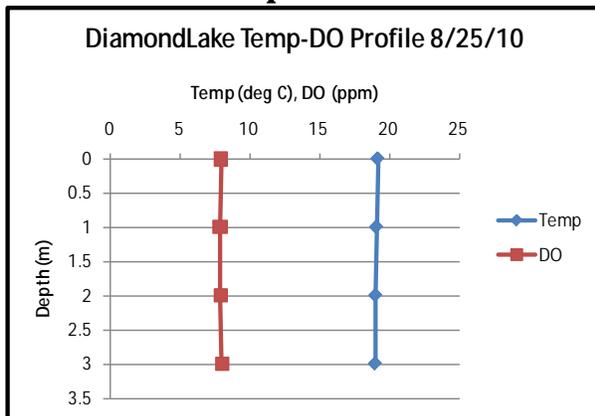
- Periodic surveillance for invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds.
- The acidic nature of the lake found during the 2010 sampling event corroborates the “Impaired Segment” listing in the 2010 writing of *The Mohawk River Basin Waterbody Inventory and Priority Waterbodies List* (DEC 2010). In addition, these data indicate little improvement of the acidic nature of the lake compared to a 1975 survey of the lake.
- “Efforts are underway on a national level to address problems caused by acid rain by reducing pollutant emissions, as required by the Clean Air Act. New York State (and other northeastern states) ha[s] taken legal action against USEPA to accelerate implementation of controls. Monitoring of these waters (waterbodies impacted by acid deposition) will continue, in order to assess changes in water quality resulting from implementation of the Clean Air Act. However, these changes are expected to occur only slowly over time (DEC 2003)”.

Aquatic Plant IDs

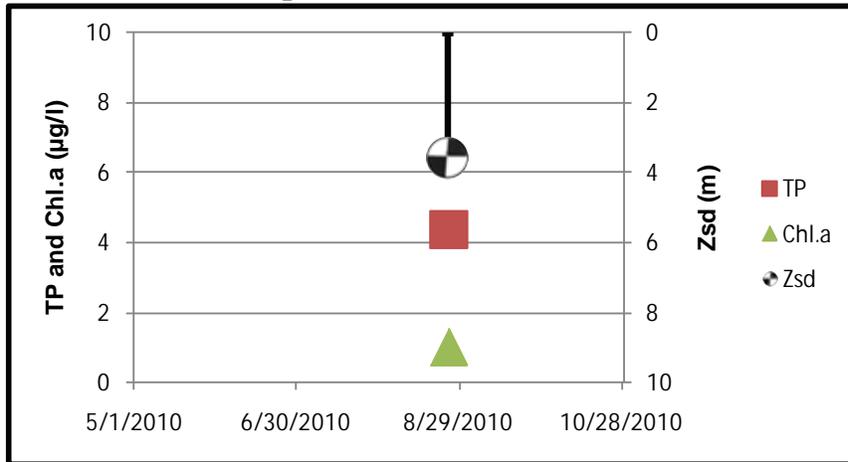
Exotic Plants: none observed

Native Plants: *Utricularia purpurea* (Purple Bladderwort)

Time Series: Depth Profiles



Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	> 3.55	Mesotrophic	Readings does not violate DOH guidance value
TSI-Secchi		< 41.7	Mesotrophic	No pertinent water quality standards
TP	mg/l	0.0044	Oligotrophic	Reading does not violate DEC guidance values
TSI-TP		25.5	Oligotrophic	No pertinent water quality standards
TSP	mg/l	ND	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	0.0833	Low nitrate	Reading does not violate guidance
NH4	mg/l	0.02	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.37	Low organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	226.65	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	ND	Oligotrophic	No pertinent water quality standards
TSI-CHLA		30.6*	Oligotrophic	No pertinent water quality standards
Alkalinity	mg/l	ND	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	10	Uncolored	No pertinent water quality standards
TOC	mg/l	3		No pertinent water quality standards
Ca	mg/l	0.719	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.0563		Reading does not violate water quality standards
Mn	mg/l	0.0245		Reading does not violate water quality standards
Mg	mg/l	0.159		Reading does not violate water quality standards
K	mg/l	0.117		No pertinent water quality standards
Na	mg/l	0.37		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	3.3		Reading does not violate water quality standards

*TSI-CHLA was calculated using half of the laboratory detection limit for CHLA

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	2	Plants Visible Below Surface	No pertinent water quality standards
Recreational Assessment	1-5, 1 best	1	Could Not Be Nicer	No pertinent water quality standards

Literature Cited

- NYSDEC. 2003. The 2002 Mohawk River Basin Waterbody Inventory and Priority Waterbodies List. Albany, NY. NYSDEC. 370 p.
- NYSDEC. 2010. The Mohawk River Basin Waterbody Inventory and Priority Waterbodies List. Available online at http://www.dec.ny.gov/docs/water_pdf/pwlmhwk10.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 *a*, 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 = 1.0 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