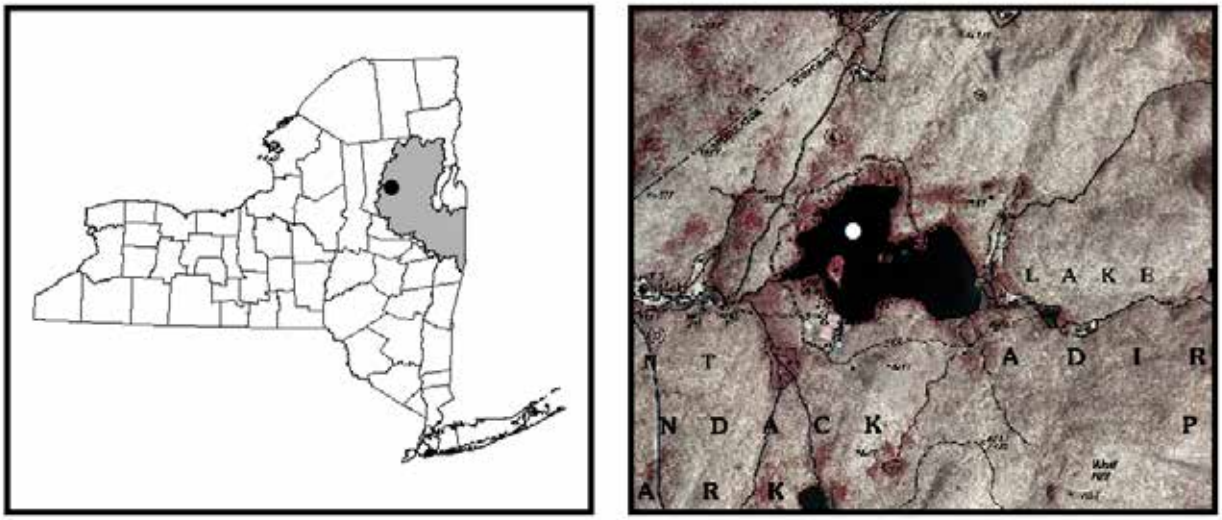
LCI Lake Water Quality Summary

General Information

Lake Name:	**Whitaker Lake**
Location:	Town of Lake Pleasant, Hamilton County, NY
Basin:	Upper Hudson River Basin
Size:	63 hectares (155 acres)
Lake Origins:	unknown
Major Tributaries:	Minor unnamed tributaries
Watershed Area:	2.9 Square Miles
Lake Tributary to:	Jessup River via Whitaker Lake Outlet
Water Quality Classification:	B (best intended use: primary contact recreation)
Sounding Depth:	6 meters (20 feet)
Monitoring Program:	Lake Classification and Inventory (LCI) Survey
Sampling Date:	August 20, 2011
Samplers:	Peter Tobiessen, Biology Department at Union College
Contact Information:	David Newman, NYSDEC Division of Water djnewman@gw.dec.state.ny.usH; 518-402-8201

Lake Map

(sampling location marked with a circle)



Background and Lake Assessment

Whitaker Lake is a moderate sized (155 acre) lake, just north of the town of Speculator, in the central Adirondacks. All of the land surrounding the lake is private and there are no public access sites to the lake. Much of the private land surrounding the lake is owned by Deerfoot Lodge Boy's Camp (hereafter Deerfoot Lodge), an all boys Christian wilderness camp, which has been located on the lake since 1933. There are a small number of other private properties along the lake's shoreline although many of these are owned by individuals associated with the camp. The lake is used by campers and other land owners for swimming, bathing, fishing and non-mechanically powered boating. An analysis of aerial photography shows that there is a roughly 15 acre area on the southwestern side of the lake that is developed with a handful of buildings, maintained grass fields, and a small beach. There are also a small number of mostly seasonal homes along the northwestern shoreline of the lake. In addition there are about a dozen boat docks and swimming platforms scattered around the lake shore.

The lake's watershed is almost completely forested except for Deerfoot Lodge and the few other homes that have been built near the lake's shore. A majority of the watershed lies within what is known as the Speculator Tree Farm Easement, a roughly 40,000 acre conservation easement on what was once land owned by International Paper Company. This easement, established in 2005, restricts development on much of the 40,000 acres and provides the public with the opportunities for outdoor recreation.

The NYSDEC Division of Water's lake water quality database had no previous data for Whitaker Lake, and thus efforts were made to include the lake in the 2011 Lake Classification and Inventory (LCI) screening program. At the request of Deerfoot Lodge the LCI monitoring was conducted by Peter Tobiessen, of Union College's Biology Department, whom had conducted previous work on the lake. Standard methods were used to collect water samples, which were then sent to the analytical laboratory that process all of the other LCI water samples.

Whitaker Lake can be characterized as *oligotrophic*, or unproductive. The water clarity reading taken in late July (TSI = 38, typical of *oligotrophic* waterbodies) was in the expected range given the total phosphorus reading (TSI = 31, typical of *oligotrophic* waterbodies) and the chlorophyll *a* reading (TSI = 38, typical of *oligotrophic* waterbodies). These data indicate that baseline nutrients are low, and do not support high levels of primary production, in the form of algae.

In late August of 2011, the Lake's water was described as having a tan color. This tannic color is typical of lakes in the Adirondacks, and comes from natural tannic acids entering the lake from the watershed. An aquatic plant survey was not conducted, but it was noted that no aquatic invasive plant species were observed to be occurring in the lake. This is consistent with the findings of volunteers working with the Adirondack Park Invasive Plant Program (APIPP), who have monitored the lake since at least 2004. The APIPP surveys, including those conducted in 2011 and 2012, have not observed any invasive aquatic plants in the lake. The remoteness and limited accessibility of the lake limits the risk of invasive species being introduced to the lake. There have been no reports regarding what if any native aquatic plants may occur in the lake.

Whitaker Lake was not thermally stratified, in which depth zones (warm water on top, cold water on the bottom during the summer) are established, at the time the lake was sampled. Both

temperature and dissolved oxygen were consistent from the surface to the bottom of the lake. Based on these data, from late August, and the relatively shallow depth of the lake, it is unlikely that the lake ever becomes thermally stratifies. pH taken at the laboratory was 6.8, or slightly acidic. DEC data from other similar sized lakes in the area also had pH values ranging from slightly acidic to slightly basic.

Whitaker Lake appears typical of weakly colored, slightly acidic waterbodies in the Southern Adirondacks. Other water bodies with similar water quality characteristics often support warmwater fish species, although summer water temperatures may not be supportive of coldwater fish species. However, fisheries habitat cannot be fully evaluated by the LCI. A fisheries specific survey would need to be conducted to further evaluate the fisheries of the lake.

Most of the parameters that were analyzed for, through the LCI, were either low or were below the laboratories detection limit. This was to be expected of a lake in a remote relatively undeveloped watershed.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Whitaker Lake is not classified for use as a potable water supply. It is unknown if Deerfoot Lodge or other individuals with property on the lake withdrawal water from the lake for consumption. The data collected through the LCI are not sufficient to evaluate the use of the lake as a potable water supply. Although, these data did not indicate any impacts that would prevent treated water from the lake being consumed.

Contact Recreation (Swimming)

Whitaker Lake is classified for primary contact recreation including swimming and bathing. Bacteria data are needed to evaluate the safety of Whitaker Lake for swimming—these are not collected through the LCI. It is unknown if bacteriological samples are collected by Deerfoot Lodge, at their swimming beach. The data collected through the LCI showed that the water was sufficiently clear to be below the assessment threshold for contact recreational use. In addition, both the chlorophyll *a* and total phosphorus readings were below the assessment threshold for contact recreational use. None of the other parameters analyzed through the LCI indicate stressors to swimming in the lake.

Non-Contact Recreation (Boating and Fishing)

There were no water quality indicators that suggest impacts to fishing or boating on the lake.

Aquatic Life

Dissolved oxygen levels are sufficient throughout the water column to support aquatic life; however summer water temperatures may not be supportive of coldwater fish species. None of the other parameters analyzed through the LCI suggest any impacts to the aquatic life in the lake. Additional biological studies would need to be conducted to further evaluate impacts to aquatic life.

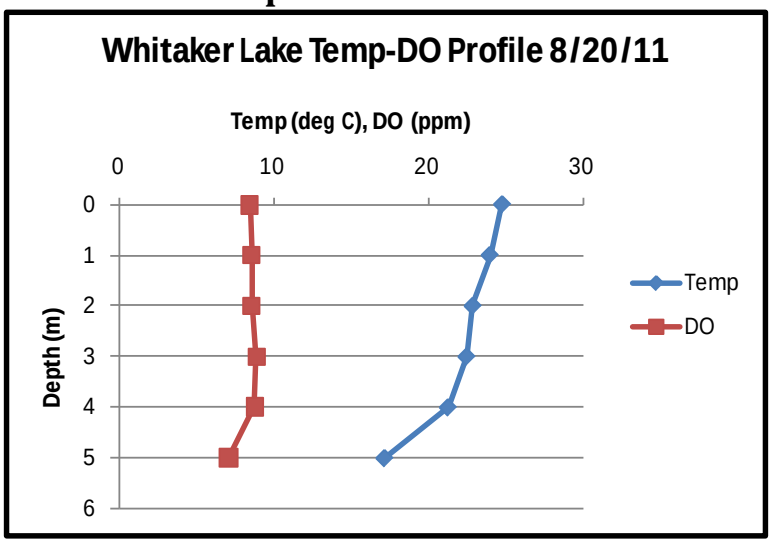
Aesthetics
These data indicate that aesthetics should be fully supported

Additional Comments

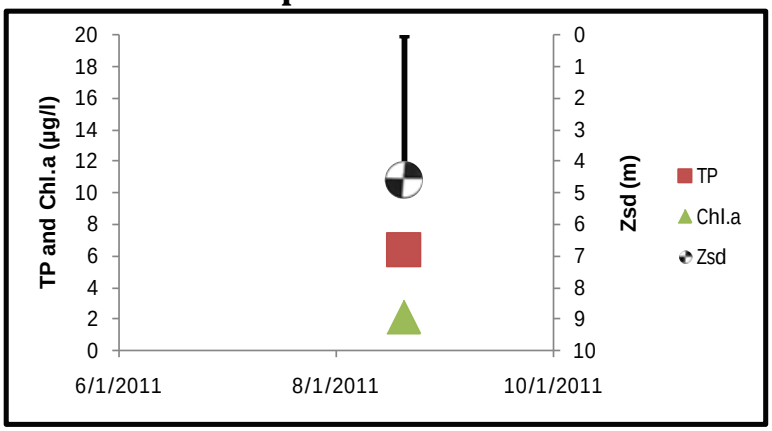
- Continuing to have the lake monitored by APIPP for invasive aquatic plant species will help to detect the presence and the establishment of invasive aquatic plants in the lake.
- Restricting the use of boating and fishing equipment to equipment that is only used at Whitaker Lake can reduce the risk of the inadvertent introduction of an invasive species.

Aquatic Plant IDs
No invasive aquatic plant species were observed during the sampling event. In addition the lake has been monitored for the presence of invasive plants species by volunteers from the Adirondack Park Invasive Plant Program (APIPP) every year since at least 2004, and no aquatic invasive plant species have been observed (APIPP Annual Reports 2004-2012).

Time Series: Depth Profiles



Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	4.6	Mesotrophic	Readings does not violate DOH guidance value
TSI-Secchi		38.0	Oligotrophic	No pertinent water quality standards
TP	mg/l	0.0064	Oligotrophic	Reading does not violate DEC guidance values
TSI-TP		30.9	Oligotrophic	No pertinent water quality standards
TSP	mg/l	0.0044	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	0.004	Low nitrate	Reading does not violate guidance
NH4	mg/l	ND	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.19	Low organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	66.69	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	2.10	Mesotrophic	No pertinent water quality standards
TSI-CHLA		37.9	Oligotrophic	No pertinent water quality standards
Alkalinity	mg/l	5.2	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	20	Weakly Colored	No pertinent water quality standards
TOC	mg/l	5.6		No pertinent water quality standards
Ca	mg/l	2.73	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.018		Reading does not violate water quality standards
Mn	mg/l	0.0161		Reading does not violate water quality standards
Mg	mg/l	0.587		Reading does not violate water quality standards
K	mg/l	ND		No pertinent water quality standards
Na	mg/l	0.295		Reading does not violate water guidance value
Cl	mg/l	ND	Little impact from road salt	Reading does not violate water quality standards
SO4	mg/l	ND		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

References

APIPP. 2004-2012. Annual Reports. Available at <http://www.adkinvasives.com/publications.html>

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(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

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