

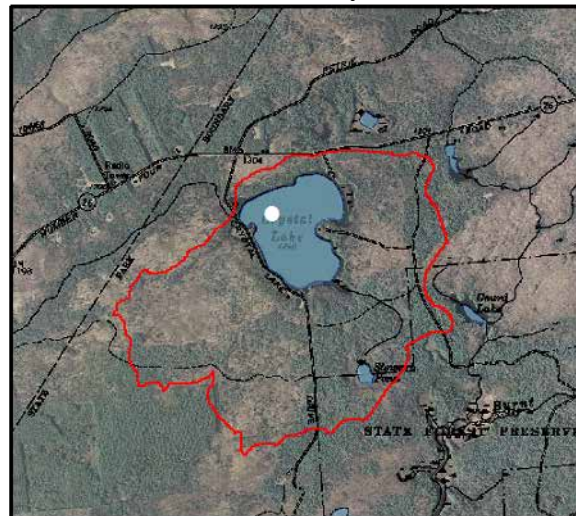
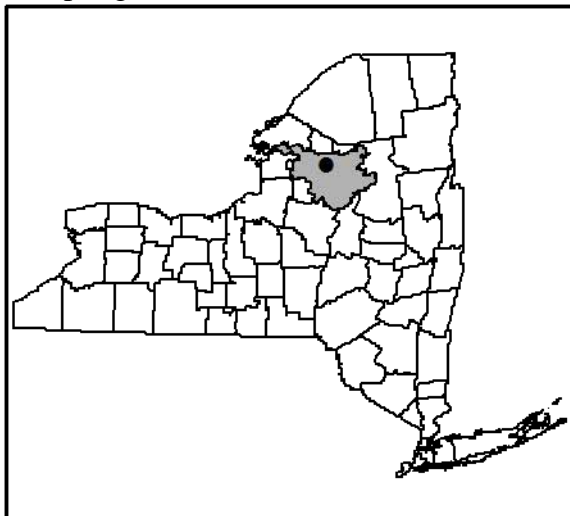
# LCI Lake Water Quality Summary

## General Information

<b>Lake Name:</b>	<b>Crystal Lake</b>
<b>Location:</b>	Town of Watson, Lewis County
<b>Basin:</b>	Black River
<b>Size:</b>	30 hectares (75 acres)
<b>Lake Origins:</b>	Earthen Dam
<b>Tributaries:</b>	Stewart Pond via Crystal Creek
<b>Watershed Area:</b>	200 hectares (490 acres)
<b>Lake Tributary to:</b>	Crystal Creek
<b>Water Quality Classification:</b>	C (best intended use: secondary contact recreation)
<b>Sounding Depth:</b>	13 meters (42 feet)
<b>Sampling Coordinates:</b>	43.84009, -75.27648
<b>Sampling Access Point:</b>	Private land
<b>Monitoring Program:</b>	Lake Classification and Inventory (LCI) Survey
<b>Sampling Date:</b>	August 14, 2012
<b>Samplers:</b>	David Newman, NYSDEC Division of Water, Albany Brad Wenskoski, NYSDEC Division of Water, Albany
<b>Contact Information:</b>	David Newman, NYSDEC Division of Water <a href="mailto:djnewman@gw.dec.state.ny.us">djnewman@gw.dec.state.ny.us</a> ; 518-402-8201

## Lake Map

(sampling location marked with a circle, red line shows watershed boundary)



## Background and Lake Assessment

Crystal Lake is an approximately 75 acre private lake, just outside the northwestern boundary of the Independence River Wild Forest, and just inside the western boundary of the Adirondack Park. There are six camps around the shoreline of the lake with most having only seasonal homes on them with only a few year round residents. A few of these camps have docks on the lake and there is a small private beach area at the southern end of the lake. The private land owners use the lake for swimming, fishing and boating. The lake's larger watershed is also prominently forested, with development limited to these residential properties.

The NYSDEC Division of Water's lake water quality database had no recent water quality data for the lake, and thus the lake was included in the 2012 Lake Classification and Inventory (LCI) screening program. Based on data from the single sampling event, in late September of 2012, Crystal Lake can be characterized as *oligotrophic*, or unproductive. The water clarity reading (TSI = 30, typical of *oligotrophic* lakes) was in the expected range given the phosphorus (TSI = 29, typical of *oligotrophic* lakes) reading and the chlorophyll *a* reading (TSI = 31, typical of *oligotrophic* lakes). The low phosphorus levels indicate the lake is unlikely to support high levels of primary production, in the form of algae, allowing for high water clarity.

Crystal 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 epilimnion (warm surface waters) went to a depth of about 6 meters. The metalimnion (transitional zone between the upper and lower waters) ranged from the epilimnion to 10.5 meters. This layer was comprised of oxygen rich cold waters that would support cold water fish species such as trout. The hypolimnion or bottom waters began around 11 meters, at which point dissolved oxygen levels began to decline to levels that would not be supportive of cold water fish species. pH readings were circumneutral throughout the epilimnion and metalimnion but dropped to being acidic (below 6) in the hypolimnion. Conductivity readings indicate softwater, which is typical of lakes in the Adirondacks, and is related to the underlying soil and rock layers found in this part of the state.

Crystal Lake appears typical of circumneutral, soft water, uncolored lakes in the Adirondacks. Other waterbodies, with similar water quality and depth characteristics, often support a two story fishery, supporting both cold and warm water fish species, although the 1985 Adirondack Lake Survey Cooperation (ALSC) survey only found warm water fish species, including rock bass (*Ambloplites rupestris*), smallmouth bass (*Micropterus dolomieu*) and yellow perch (*Perca flavescens*). A fisheries specific survey would need to be conducted, at Crystal Lake, to fully evaluate the current fish community, of the lake.

Chloride levels were below the laboratory detection limit, which would be expected, due to the limited development within the lake's watershed. The alkalinity levels were also low, indicating the lake has little to no buffering capacity to acidic inputs. This is also common to many Adirondack Lakes, due to low levels of carbonates in the underlying soil. None of the other parameters evaluated through the LCI were found at levels of concern.

## **Evaluation of Lake Condition Impacts to Lake Uses**

### ***Potable Water (Drinking Water)***

Crystal Lake is not classified for use as a potable water supply. It is unknown if any of the private landowners withdrawal water from the lake for personal consumption. Although, the data collected through the LCI are not sufficient to evaluate the use of the lake as a potable water source, there were no indications of water quality impairment that would prevent treated water from the lake being consumed.

### ***Contact Recreation (Swimming)***

Crystal is not classified for swimming. The New York State Water Quality Classification of *Class C* states that “water quality shall be suitable for primary contact recreation, although other factors may limit the use for this purpose”. The private landowners swim and participate in other contact recreational activities in the lake. Bacteria data are needed to evaluate the safety of Crystal Lake for swimming; these are not collected through the LCI. Data collected though the LCI, indicate that swimming should be supported in the lake. The water clarity was well 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)***

Crystal Lake is classified for non-contact recreation including boating and fishing. The private land owners fish and boat on the lake. The data collected through the LCI indicate no-known impacts to boating and fishing on the lake.

### ***Aquatic Life***

These data did not indicate any stressors to the aquatic plant and animal communities within the lake.

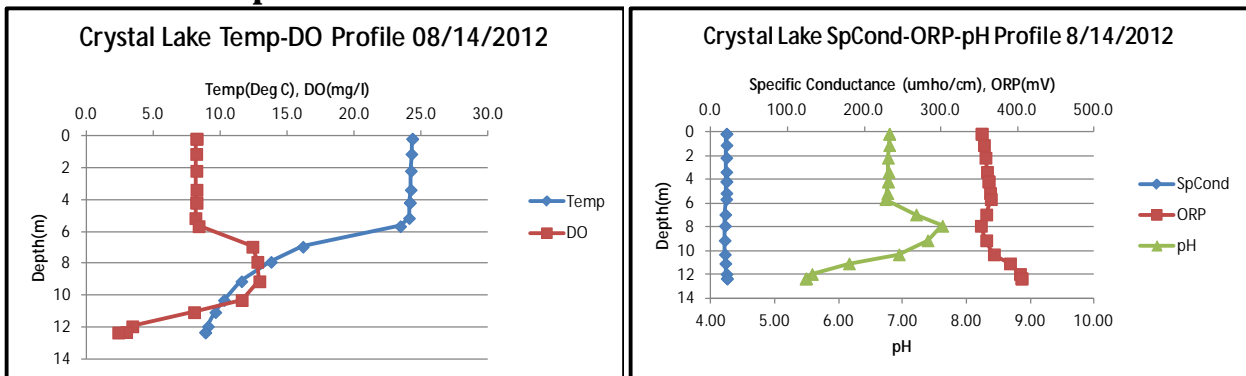
### ***Aesthetics***

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

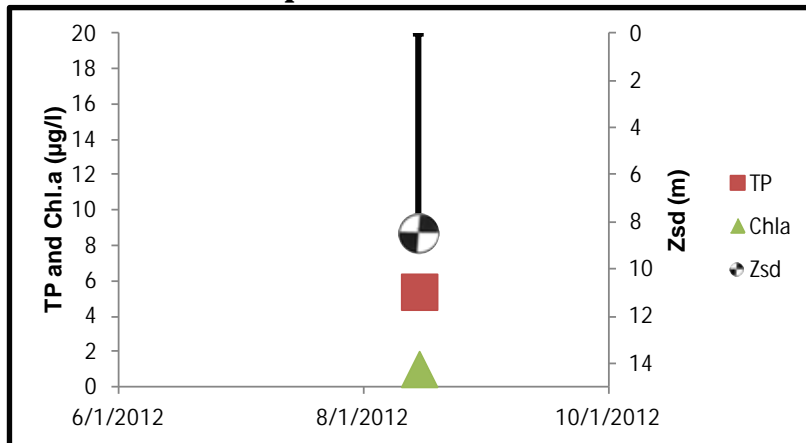
## Additional Comments

- The limited development on the lake's shore and within the greater watershed have help protect Crystal Lake from environmental degradation. This should be kept in mind if future development is considered on the lake shore or within the lake's watershed.
- Any boats or other equipment that is brought to the lake should be cleaned and allowed adequate drying time to prevent the introduction of aquatic invasive species.
- 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 species.

## Time Series: Depth Profiles



## Time Series: Trophic Indicators



## WQ Sampling Results

### Surface Samples

	UNITS	Reading	ALSC*	Scientific Classification	Regulatory Comments
SECCHI	meters	8.5		Oligotrophic	Readings does not violate DOH guidance value
TSI-Secchi		29.2		Oligotrophic	No pertinent water quality standards
TP	mg/l	0.0054	0.004	Oligotrophic	Reading does not violate DEC guidance values
TSI-TP		28.5		Oligotrophic	No pertinent water quality standards
NOx	mg/l	0.0057		Low nitrate	Reading does not violate guidance
NH4	mg/l	ND	0.01	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.12		Low organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	51.21		Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	1.03		Oligotrophic	No pertinent water quality standards
TSI-CHLA		30.89		Oligotrophic	No pertinent water quality standards
Alkalinity	mg/l	3.7		Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	8	5	Uncolored	No pertinent water quality standards
Ca	mg/l	2.38	2.39	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.0272	0.012		Reading does not violate water quality standards
Mn	mg/l	0.0021	0.001		Reading does not violate water quality standards
Mg	mg/l	0.431	0.47		Reading does not violate water quality standards
K	mg/l	0.633	0.49		No pertinent water quality standards
Na	mg/l	0.787	0.74		Reading does not violate water guidance value
Cl	mg/l	ND	0.32	Little impact from road salt	Reading does not violate water quality standards
SO4	mg/l	3	5.91		Reading does not violate water quality standards
Si	mg/l	0.565			No pertinent water quality standards

\*ALSC: Data collected by the Adirondack Lake Survey Corporation on July 29, 1985 at a depth of 1.5 meters. Full data available at <http://www.adirondacklakesurvey.org/alscrt.inc.php?alscpond=040595>

### **Bottom Samples**

	<b>UNITS</b>	<b>Reading</b>	<b>Scientific Classification</b>	<b>Regulatory Comments</b>
TP-bottom	mg/l	0.0113		No pertinent water quality standards
TSP-bottom	mg/l	0.0113	High % soluble phosphorus	No pertinent water quality standards
NO <sub>x</sub> -bottom	mg/l	0.004	No evidence of DO depletion	No readings violate water quality standards
NH <sub>4</sub> -bottom	mg/l	0.01	No evidence of DO depletion	No readings violate water quality standards
TKN-bottom	mg/l	0.2		No pertinent water quality standards
Alk-bottom	mg/l	3.2	Poorly Buffered	No pertinent water quality standards
TCOLOR-bottom	ptu	12	Uncolored	No pertinent water quality standards
TOC-bottom	mg/l	2.2		No pertinent water quality standards
Ca-bottom	mg/l	2.43	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe-bottom	mg/l	0.0542		No readings violate water quality standards
Mn-bottom	mg/l	0.0076		No readings violate water quality standards
Mg-bottom	mg/l	0.411		No readings violate water quality standards
K-bottom	mg/l	0.425		No pertinent water quality standards
Na-bottom	mg/l	0.686		No readings violate water quality standards
Cl-bottom	mg/l	2		No readings violate water quality standards
SO <sub>4</sub> -bottom	mg/l	3.4		No readings violate water quality standards
Si-bottom	mg/l	0.48		No pertinent water quality standards

### **Lake Perception**

	<b>UNITS</b>	<b>Reading</b>	<b>Scientific Classification</b>	<b>Regulatory Comments</b>
WQ Assessment	1-5, 1 best	1	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

### **References**

Adirondack Lake Survey Cooperation. 2013. Available online at <http://www.adirondacklakessurvey.org>.

## 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 = 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
SO4	= sulfate, mg/l Detection limit = 2 mg/l; NYS standard = 250 mg/l
Si	= dissolved silica, mg/l Detection limit = 0.01 mg/l; no NYS standard or guidance value
As	= arsenic, mg/l Detection limit = 0.001 mg/l; NYS standard = 0.01 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	= <b>water quality assessment</b> , 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	= <b>weed coverage/density assessment</b> , 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	= <b>swimming/aesthetic assessment</b> , 5 point scale; 1 = could not be nicer, 2 = excellent, 3= slightly impaired, 4 = substantially impaired, 5 = lake not usable