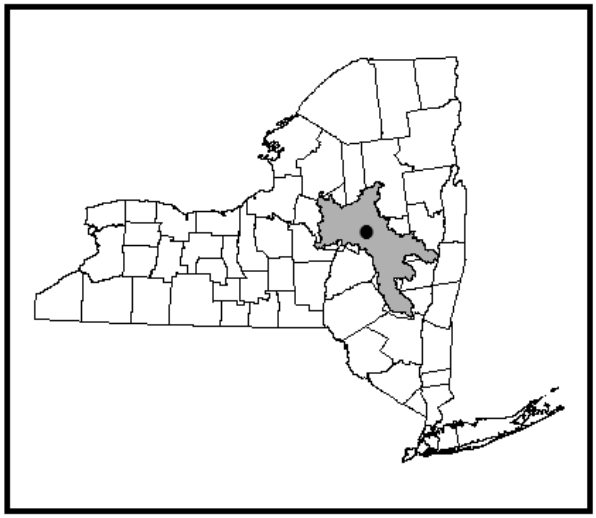
LCI Lake Water Quality Summary

General Information

Lake Name:	**Kyser Lake**
Location:	Town of Manheim, Herkimer County & Oppenheim, Fulton County, NY
Basin:	Mohawk River Basin
Size:	70 hectares (173 acres)
Lake Origins:	Concrete Hydroelectric dam (ca 1911)
Major Tributaries:	Ransom Creek, East Canada Creek
Lake Tributary to?:	East Canada Creek
Water Quality Classification:	B (best intended use: primary contact recreation)
Sounding Depth:	28 meters (93 feet)
Sampling Coordinates:	43.0633, -74.76705
Sampling Access Point:	Private land north end of lake (Dan Gazin)
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

Kyser Lake is a large (175 acres), Class C impoundment on East Canada Creek that straddles the Fulton/Herkimer County line just south of the City of Dolgeville. The dam is owned by Brookfield Renewable, which generates hydroelectricity. There are approximately 100 camps between the northern and western shorelines. There is a steep slope down to the water on the eastern shoreline, with a few homes and camps high above the lake. The lake has a large watershed that begins in the Ferris Lake Wilderness Area of the Adirondack Park. South of the Adirondack Park boundary the watershed is made up of a patchwork of small towns, rural development, agricultural lands and forested lands. There are no public access points to the lake. Lake shore property owners swim, fish, and boat (both non-powered and powered) on the lake.

Kyser Lake was included in the 2010 Lake Classicization and Inventory Survey (LCI) screening program, run by the NYS DEC Division of Water. Inclusion in the LCI was based on an *Unassessed* listing in The Mohawk River Basin Waterbody Inventory and Priority Waterbodies List (WI/PWL) (NYS DEC 2010), due to a lack of water quality data in the Division of Water's database. As a result of slightly elevated phosphorus levels, reduced water clarity, and the finding of an exotic invasive plant species, the lake additional monitoring of the lake will be conducted during the summer of 2011.

Kyser Lake can be characterized as *mesotrophic* or moderately productive. The water clarity reading taken in late August (TSI = 53, typical of *eutrophic* waterbodies) was lower than expected given the total phosphorus reading (TSI = 46, typical of *mesotrophic* waterbodies) and the non-detectable chlorophyll *a* reading (typical of *oligotrophic* waterbodies). These data indicated that baseline nutrient levels do not support persistent algal blooms, although chlorophyll *a* (algae) levels may become elevated during the summer months. These data indicate that highly colored water, rather than nutrients, is controlling chlorophyll *a* levels and water transparency in the lake.

In late July the lake had a very brown appearance with a water clarity reading of less than 2 meters. The exotic invasive species *Potamogeton crispus* (curlyleaf pondweed) was the only aquatic plant species observed in the lake. Curlyleaf pondweed is an early season aquatic plant, peaking in early summer and dying back by midsummer. It is not yet known if the low densities observed reflected little plant growth or dieback of extensive beds. Lakeshore residents did report that "sea weed" grew to almost nuisance levels earlier in the year. A large rain event the week before the sampling may have flushed much of the curlyleaf pondweed and other plants out of the lake. A more thorough plant specific survey of the lake may yield additional native and invasive species in the lake.

Kyser 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 in depth. The thermocline in Kyser Lake was at a depth of 10 to 12 meters. Dissolved oxygen readings below 15 meters were hypoxic (low oxygen levels), and indicative of anoxic (devoid of oxygen) conditions at a depth of 19 and 20 meters. It is likely that dissolved oxygen levels below 20 meters were also anoxic—depth profiles in the lake were limited by a 20 meter cable. These reduced oxygen levels are below the levels necessary to protect organisms susceptible to high

summer temperatures, such as trout. A surface pH reading was slightly acidic and conductivity readings indicate softwater (low ionic strength0, typical for lakes in the area.

Kyser Lake appears to be typical of deep, softwater, highly colored, acidic lakes. Other lakes with similar water quality characteristics may support warmwater fisheries; however, fisheries habitat cannot be fully evaluated through this monitoring program. Coldwater fisheries may be stressed due to the low dissolved oxygen levels in the hypolimnion (bottom waters), although there may be a zone between the thermocline and the onset of hypoxia that supports salmonids. It is not known if coldwater fish have historically been supported in the lake.

Nutrient (nitrogen and phosphorus) levels in the surfaces water sample were in the intermediate range. The surface true color reading was among the highest surface values seen statewide in 2010 and is probably impacting water clarity. Chloride levels were low, indicating little impact from road salting and runoff through developed areas. The hypolimnion exhibited elevated nitrogen levels, which are often seen in waterbodies experiencing persistent oxygen deficits in the bottom waters. In addition, deepwater manganese levels were above water quality standards and may cause taste or odor problems. All other parameters analyzed were below water quality standards and guidance values.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Kyser Lake is not classified to be used for potable water. Although the LCI data are not sufficient to evaluate potable water use, these data suggest that surface water withdrawals would be impacted by color. Deepwater withdrawals would be impacted by the elevated manganese levels.

Contact Recreation (Swimming)

Kyser Lake is classified for contact recreation. Lake shore property owners were observed to be swimming in the lake at the time of the sampling. Bacteria data are needed to evaluate the safety of Kyser Lake for swimming; however, these data are not collected through the LCI. The data collected through the LCI indicate that the water clarity reading was above the 1.2 meter standard set by the New York State Department of Health to protect swimmers. Lake shore residence did mention that at time “sea weed” grew at densities that at times discouraged them from swimming.

Non-Contact Recreation (Boating and Fishing)

It was evident that lake shore property owners do fish and boat (both powered and no powered) on the lake. The samplers were told by a lake shore resident that several species of fish were present in the lake and include: bullhead, perch, carp, rockbass, pickerel, smallmouth bass, and trout. Summer plant densities may be high enough to impede boating and access to open water.

Aquatic Life

The hypoxic and anoxic conditions of the hypolimnion may stress aquatic life susceptible to high summer water temperatures. Additional biological studies would be needed to fully evaluate impacts to aquatic life.

Aesthetics
These data indicate that the highly colored water may detract from aesthetic enjoyment of the lake.

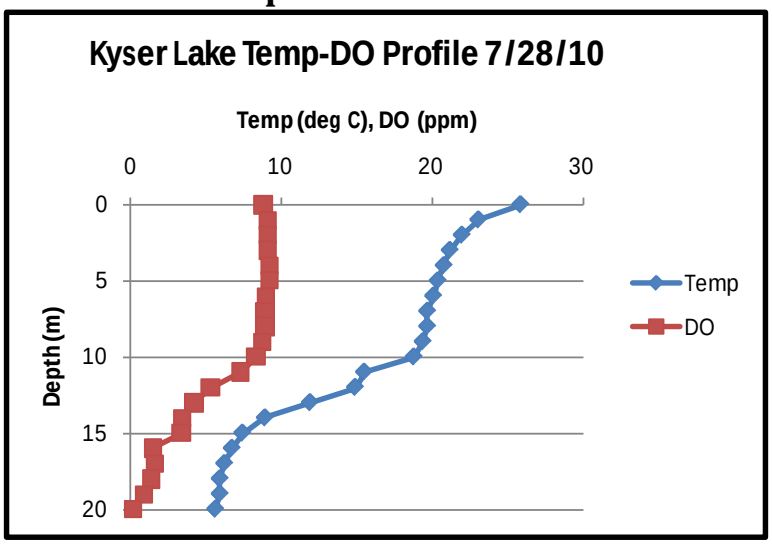
Additional Comments

- 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. Ensuring that boats are cleaned and dried before being brought from other waterbodies will help limit the potential of inadvertent introductions.
- Conducting a plant survey earlier in the summer may help evaluate plant densities and would be needed to make any management recommendations regarding aquatic plants in the lake.
- Lake shore residence did mention that in the past dyes from upstream industrial effluent were seen in East Canada Creek/the upstream reaches of Kyser Lake. The Mohawk River Basin WI/PWL repots dye from Gehring Tricot passing through the Dolgeville Waste Water Treatment Plant (less than two miles upstream of the lake) and discoloring the East Canada Creek (NYS DEC 2010). Upgrades at the Dolgeviile Waste Water Treatment Plant were completed in 2007 to address this problem. If discolored water is observed in East Canada Creek, this should be reported to the DEC Region 6 office in Utica.
- Lake shore property owners indicated that they believe that there may be improperly cited septic systems and/or other unregulated discharges to the lake. Additional monitoring may help indicate if this is the case and what if any impact it may be having on the lake.

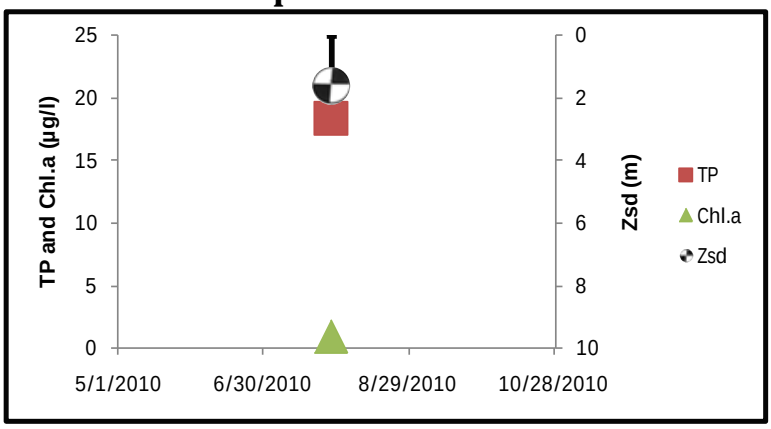
Aquatic Plant IDs

Exotic Plants:	*Potamogeton crispus* (curlyleaf pondweed)
Native Plants:	None observed

Time Series: Depth Profiles



Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	1.6	Eutrophic	Readings does not violate DOH guidance value
TSI-Secchi		53.2	Eutrophic	No pertinent water quality standards
TP	mg/l	0.0184	Mesotrophic	Reading does not violate DEC guidance values
TSI-TP		46.1	Mesotrophic	No pertinent water quality standards
TSP	mg/l	0.0116	High % soluble Phosphorus	No pertinent water quality standards
NOx	mg/l	0.0377	Low nitrate	Reading does not violate guidance
NH4	mg/l	0.029	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.56	Intermediate organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	71.46	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	20.5	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	100	Highly Colored	No pertinent water quality standards
TOC	mg/l	11.7		No pertinent water quality standards
Ca	mg/l	8.01	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.432	Taste or odor likely	Reading violates water quality standards
Mn	mg/l	0.0258		Reading does not violate water quality standards
Mg	mg/l	1.58		Reading does not violate water quality standards
K	mg/l	0.413		No pertinent water quality standards
Na	mg/l	3.31		Reading does not violate water quality standards
Cl	mg/l	4.5	Minor road salt runoff	Reading does not violate water quality standards
SO4	mg/l	3		Reading does not violate water quality standards

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

Bottom Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
TP-bottom	mg/l	0.0216		No pertinent water quality standards
TSP-bottom	mg/l	0.0123	High % soluble phosphorus	No pertinent water quality standards
NOx-bottom	mg/l	0.317	Evidence of DO depletion	Reading does not violate water quality standards
NH4-bottom	mg/l	0.116	No evidence of DO depletion	Reading does not violate water quality standards
TKN-bottom	mg/l	0.36		No pertinent water quality standards
Alk-bottom	mg/l	46.9	Poorly Buffered	No pertinent water quality standards
TCOLOR-bottom	ptu	35	Highly Colored	No pertinent water quality standards
TOC-bottom	mg/l	4.5		No pertinent water quality standards
Ca-bottom	mg/l	17.2	Minimally Supports Zebra Mussels	No pertinent water quality standards
Fe-bottom	mg/l	0.831	Taste or odor likely	Reading does not violate water quality standards

Bottom Samples (Cont.)

	UNITS	Reading	Scientific Classification	Regulatory Comments
Mn-bottom	mg/l	0.694	Taste or odor likely	Reading violates water quality standards
Mg-bottom	mg/l	2.51		Reading does not violate water quality standards
K-bottom	mg/l	0.698		No pertinent water quality standards
Na-bottom	mg/l	4.37		Reading does not violate water quality standards
Cl-bottom	mg/l	6.5		Reading does not violate water quality standards
SO4-bottom	mg/l	3.5		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	2	Excellent for Most Uses	No pertinent water quality standards

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

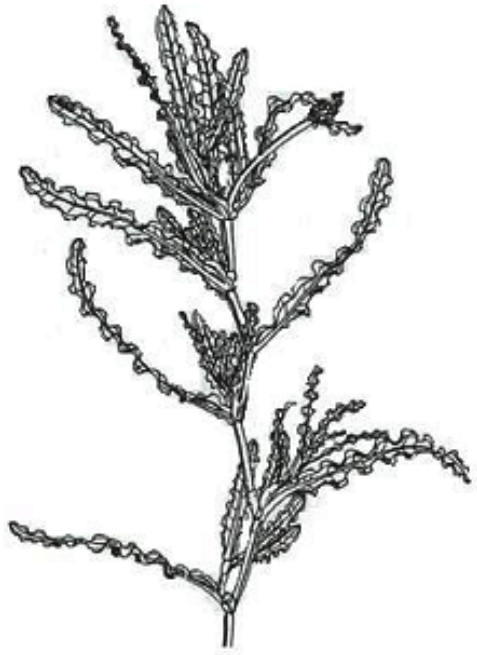
Weed Assessment **= weed coverage/density assessment**, 5 point scale, 1 = no plants visible, 2 = plants below surface, 3 = plants at surface, 4 = plants dense at surface, 5 = plants cover surface

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

SPECIES NAME: *Potamogeton crispus*

COMMON NAME: curlyleaf pondweed

ECOLOGICAL VALUE: While this is not a native plant to New York state, it has become well established in many lakes and does not disrupt the aquatic ecosystem as do other (recently-introduced) exotics, although it still can out-compete native species and dominate a macrophyte community, particularly in late spring and early summer (before the peak growing season for other native and non-native macrophytes).



DISTRIBUTION IN UNITED STATES: In hard or brackish, often polluted waters, naturalized from Europe and common in New England, western Massachusetts, with a range extending from Quebec west to Minnesota, south to Alabama and Texas, and scattered throughout the western states

DISTRIBUTION IN NEW YORK: widespread and often abundant along the Hudson River and Finger Lakes basins, with some occurrences in far western New York

DEGREE OF NUISANCE: *Potamogeton crispus* may establish easily and grow abundantly, reaching nuisance levels, although the extent of coverage and nuisance conditions is limited by the growing season (winter through early-mid summer)

COMMENTS: *Potamogeton* is a highly variable genus within the pondweed family. Species within the genus often are characterized by two leaf types- firm floating leaves and thin emersed leaves. Many mature species have flowers borne in spikes (for wind pollination), conspicuous in early summer. Identification of the individual species can be extremely difficult, particularly among the narrow-leaved pondweeds. The *Potamogeton* are distinguished from the other genus within the pondweed family by having alternate leaves (unlike the *Zanichellia* and *Najas*), and by their presence in fresh or estuarine waters (unlike the *Zostera*). There are nearly 30 species found within New York State, some quite rare and others extremely common. *P. crispus* is one of the four major non-native exotic plant species in New York state, and has served as the impetus for several lake restoration and plant management programs. However, it naturally dies out in many lakes by early to mid summer, often to be replaced by other monocultures. It is characterized by finely-toothed leaf margins and a 'lasagna'-like leaf appearance.

Line drawing- Crowe, G.E. and C.B. Hellquist. Aquatic and wetlands plants of northeastern North America. 2000