

LCI Lake Water Quality Summary

General Information

Lake Name: Sackett Lake

Location: Town of Thompson, Sullivan County, NY

Basin: Delaware River Basin

Size: 49.2 hectares (=121.5 acres)

Lake Origins: natural

Major Tributaries: minor unnamed tributary

Lake Tributary to?: Swing Bridge Reservoir/ Mongaup River via a minor tributary

Water Quality Classification: B (best intended use: primary contact recreation)

Sounding Depth: 10.3 meters (= 34 feet)

Sampling Coordinates: Latitude: 41.62627, Longitude: -74.73879

Sampling Access Point: Fireman's Camp (Monticello Fire Department)

Monitoring Program: Lake Classification and Inventory (LCI) Survey

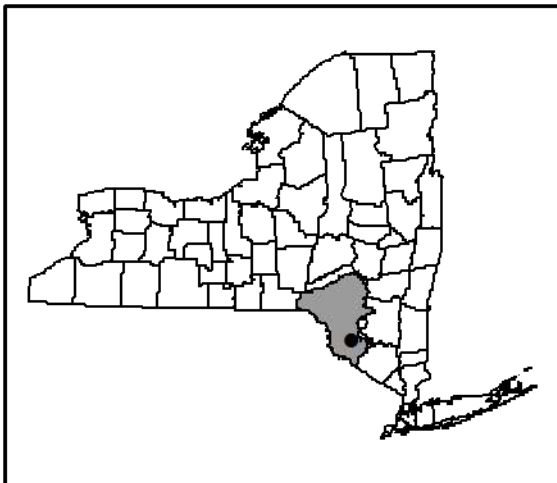
Sampling Date: July 28, 2009

Samplers: David Newman, NYSDEC Division of Water, Albany
Steven Finnemore, NYSDEC Division of Water, Albany

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Lake Map

(sampling location marked with a circle)



Background and Lake Assessment

Sackett Lake is one of many lakes in the area just south and west of Monticello, New York. The lake is a private waterbody with residential development along the southern and western shorelines. The eastern shoreline is mostly forested, with a small parcel managed by the Monticello Fire Department, including a small beach, boat launch and a few structures. The northern shoreline was the site of the Laurels Hotel and Country Club, which closed in the 1970's. Most of the buildings were removed in the 1980's and that land remains largely undeveloped. The lake's watershed is a combination of forest, agricultural lands and residential developments. The lake is currently used by local residents and summer camps for swimming, fishing and boating.

Sackett Lake was among the largest waterbodies within the Delaware River drainage basin not previously sampled though the New York State DEC Division of Water's Lake Classification and Inventory Survey (LCI), and thus was included in the 2009 screening program. Due to slightly elevated chlorophyll *a* (algae) and elevated phosphorus levels the lake is a candidate for more intensive (monthly) monitoring in the summer of 2010.

The lake can be generally characterized a *mesoeutrophic*, or moderately to highly productive. The water clarity reading (TSI = 48, typical of *mesoeutrophic* lakes) was in the expected range given the phosphorus reading (TSI = 49, typical of *mesoeutrophic* lakes) and the chlorophyll *a* reading (TSI = 50, typical of *mesoeutrophic* lakes). These data indicate that baseline nutrient levels may support algal blooms in the lake.

During the late July sampling effort the lake had a slight green color, which is probably due to the slightly elevated chlorophyll *a* (algae) levels. The only aquatic plant noted during the survey was the native submergent plant *Elodea canadensis* (common waterweed). No invasive species were observed during the sampling effort; however, a more intensive plant specific survey would be needed to completely rule these out.

Sackett Lake exhibits 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 four to five meters in late July. The entire hypolimnion (bottom waters) was anoxic (devoid of oxygen) at depths below five meters. pH readings indicate alkaline surface water, with the pH decreasing as depth increases. This is typical for lakes that have elevated chlorophyll *a* readings. Conductivity readings indicate moderately soft water (low ionic strength). Both indicators are atypical of other lakes sampled in the Delaware River Basin, which tend to have neutral pH readings and very soft water. The oxygen reduction potential (ORP) readings were well below zero in the hypolimnion, indicating persistent oxygen deficits.

The lake appears to be typical of moderately softwater, uncolored, slightly alkaline lakes. Other lakes with similar water quality characteristics often support warmwater fisheries, although fisheries habitat cannot be fully evaluated through this monitoring program. Coldwater fisheries are unlikely to be supported, given the lack of cold water and high oxygen refugia necessary to protect any salmonids or aquatic life susceptible to high summer temperatures. Deepwater

fisheries may also be affected by elevated deepwater ammonia readings. It is not known if these coldwater fish have historically been supported in the lake.

Phosphorus ammonia, iron, manganese, and sulfate levels were elevated in the bottom waters, typical of lakes that have persistent anoxic conditions. Chloride levels were also high, which is typical of lakes in developed watersheds that have roads that are heavily salted in the winter and/or lakes that receive high levels of runoff through developed areas.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Sackett 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 suggest that the lake water would require substantial treatment to serve as a potable water supply. Deepwater intake quality would be compromised by elevated ammonia, iron, manganese and sulfate levels.

Contact Recreation (Swimming)

Sackett Lake is classified for contact recreation and this use is currently supported. Bacteria data are needed to evaluate the safety to Sackett Lake for swimming-these are not collected though the LCI. The data collected through the LCI do not indicate any issues that would prevent the lake from being used for swimming. The water clarity is well above the DOH guidance value of 1.2 meters.

Non-Contact Recreation (Boating and Fishing)

Boating is presently supported on the lake. Angling should also continue to be a supported use.

Aquatic Life

The anoxic conditions and elevated ammonia levels in the bottom waters will stress some aquatic life. Additional biological studies would be needed to evaluate any other aquatic life impacts.

Aesthetics

Algal blooms may periodically detract from 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.
- Algae identification would determine if the lake may suffer from harmful algal blooms (HABs) and/or the production of algal toxins. This may be conducted in the future through the LCI.

Aquatic Plant IDs

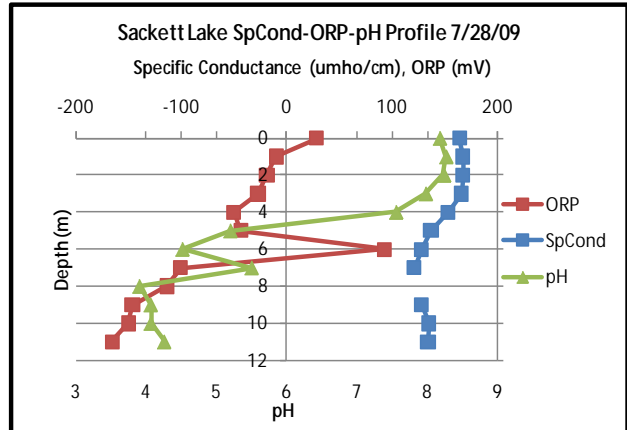
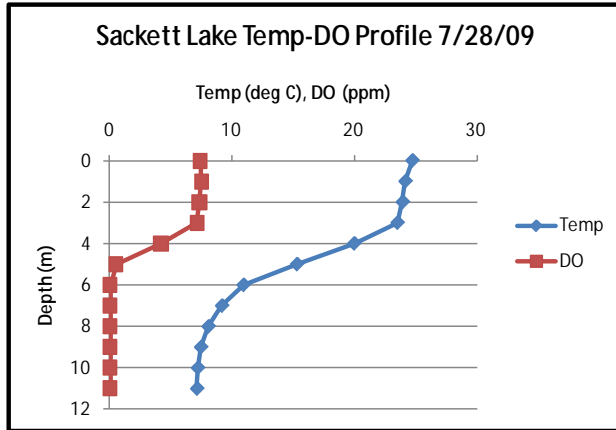
Exotic Plants:

None

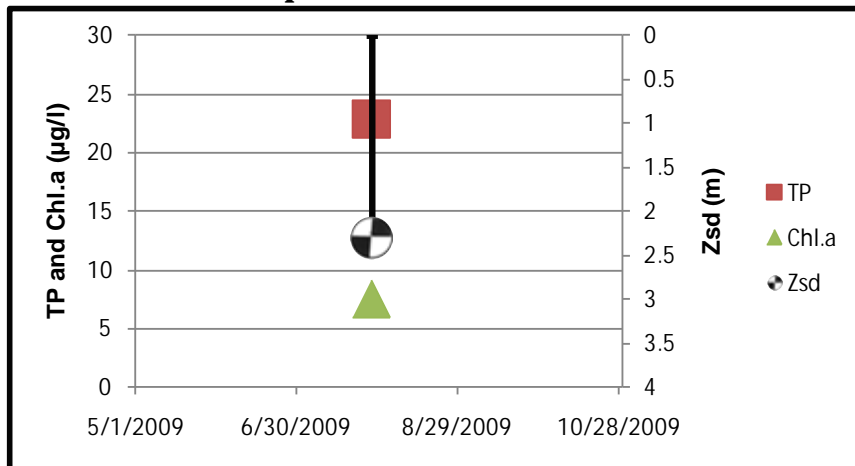
Native Plants:

Elodea canadensis (common waterweed)

Time Series: Depth Profiles



Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	2.3	Mesotrophic	Readings does not violate DOH guidance value
TSI-Secchi		48.0	Mesotrophic	No pertinent water quality standards
TP	mg/l	0.0229	Eutrophic	Sample exceeds guidance value
TSI-TP		49.3	Mesotrophic	No pertinent water quality standards
TSP	mg/l	0.0059	High % soluble Phosphorus	No pertinent water quality standards
NOx	mg/l	0.004	Low nitrate	Reading does not violate guidance
NH4	mg/l	0.027	Low ammonia	Reading does not violate guidance
TKN	mg/l	0.42	Low organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	40.73	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	7.5	Mesotrophic	No pertinent water quality standards
TSI-CHLA		50.4	Eutrophic	No pertinent water quality standards
Alkalinity	mg/l	10.1	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	5	Uncolored	No pertinent water quality standards
TOC	mg/l	5.1		No pertinent water quality standards
Ca	mg/l	8.2	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.0624		Reading does not violate water quality standards
Mn	mg/l	0.0391		Reading does not violate water quality standards
Mg	mg/l	1.51		Reading does not violate water quality standards
K	mg/l	1.03		No pertinent water quality standards
Na	mg/l	21.4		Reading violates water quality standards
Cl	mg/l	40.5	Significant road salt runoff	Reading does not violate water quality standards
SO4	mg/l	5.1		Reading does not violate water quality standards

Bottom Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
TP-bottom	mg/l	0.143	Elevated deepwater phosphorus	No pertinent water quality standards
TSP-bottom	mg/l	0.0915	High % soluble phosphorus	No pertinent water quality standards
NOx-bottom	mg/l	0.0043	No evidence of DO depletion	Reading does not violate water quality standards
NH4-bottom	mg/l	0.57	Evidence of DO depletion	Reading does not violate water quality standards
TKN-bottom	mg/l	0.94		No pertinent water quality standards
Alk-bottom	mg/l	20.1	Poorly Buffered	No pertinent water quality standards
TCOLOR-bottom	ptu	35	Highly Colored	No pertinent water quality standards
TOC-bottom	mg/l	5		No pertinent water quality standards
Ca-bottom	mg/l	8.27	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe-bottom	mg/l	2.49	Taste or odor likely	Reading violates water quality standards

Bottom Samples (continued)

	UNITS	Reading	Scientific Classification	Regulatory Comments
Mn-bottom	mg/l	2.71	Taste or odor likely	Reading violates water quality standards
Mg-bottom	mg/l	1.43		Reading does not violate water quality standards
K-bottom	mg/l	1.22		
Na-bottom	mg/l	22.1		Reading violates water quality standards
Cl-bottom	mg/l	40.9		Reading does not violate water quality standards
SO4-bottom	mg/l	4.2	May have rotten egg odor	Reading does not violate water quality standards
As-bottom	mg/l	ND	No evidence of potable water threats	No reading violate guidance values

Lake Perception

	UNITS	Reading	Scientific Classification	Regulatory Comments
WQ Assessment	1-5, 1 best	3	Definite Algal Greenness	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	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, = $60 - 14.41 * \ln(\text{Secchi})$

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), = $(\text{TKN} + \text{NOx}) * 2.2 / \text{TP}$

CHLA	> 30 suggests phosphorus limitation, < 10 suggests nitrogen limitation = 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
SO4	= sulfate, mg/l Detection limit = 2 mg/l; NYS standard = 250 mg/l
As	=arsenic, mg/l Detection limit = 3.2 mg/l; NYS standard = 10 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	= 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