

# LCI Lake Water Quality Summary

## General Information

**Lake Name:**

**Parker Pond**

**Location:**

Town of Cato, Cayuga County, NY

**Basin:**

Seneca-Oneida-Oswego Rivers

**Size:**

75 hectares (185 acres)

**Lake Origins:**

Natural

**Major Tributaries:**

Otter Lake and other minor tributaries

**Watershed Area:**

12 Square Miles

**Lake Tributary to:**

Muskrat Creek

**Water Quality Classification:**

C (best intended use: secondary contact recreation)

**Sounding Depth:**

3 meters (9.5 feet)

**Sampling Coordinates:**

43.16005, -76.55776

**Sampling Access Point:**

Private land (Fadden)

**Monitoring Program:**

Lake Classification and Inventory (LCI) Survey

**Sampling Date:**

7/27/2011 & 6/12, 7/18, 8/14, 9/20/2012

**Samplers:**

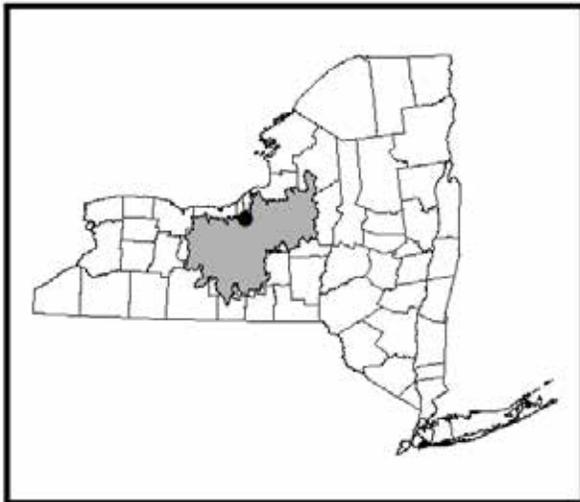
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## Lake Map

(sampling location marked with a circle)



## Background and Lake Assessment

Parker Pond, formerly known as Forest Lake, is a ~75 hectare (185 acre) shallow pond in the town of Cato in Cayuga County. The pond was historically used for ice harvesting and is now used for fishing, boating and hunting (Town of Cato 2007). A local gun shop with shoreline property allows the public to access the pond for a nominal fee. The Town of Cato does own a small parcel on the western shoreline of the pond, but there is not boat access to the pond from this parcel. The majority of the near shore area around the pond is composed of forested and emergent wetlands. The greater watershed is a mix of other wetland and ponded areas, agricultural fields, and a few developed areas like the villages of Cato and Meridian.

The NYSDEC Division of Water's lake water quality database had no previous data for the pond, and thus the pond was included in the 2011 Lake Classification and Inventory (LCI) screening program. Due to finding elevated nutrient levels and high chlorophyll *a* levels, additional monitoring was conducted during the summer of 2012 to better assess the conditions of the pond.

Parker Pond can be characterized as *eutrophic*, or highly productive. The average water clarity reading from the sampling dates in 2011 and 2012 (TSI = 69, typical of *eutrophic* waterbodies) was in the expected range given the total phosphorus reading (TSI = 65, typical of *eutrophic* waterbodies) and the chlorophyll *a* reading (TSI = 68, typical of *eutrophic* waterbodies). These data indicate that baseline nutrient levels may support persistent algal blooms in the pond.

On all sampling dates the water color was described by the samplers as green or green/brown, with an average water clarity reading of 0.5 meters (1.6 feet). All of the water clarity readings fell below the minimum of 1.2 meters needed to support safe swimming. Several native aquatic plant species were found in the pond. In addition, two invasive species, *Myriophyllum spicatum* (Eurasian watermilfoil) and *Potamogeton crispus* (curlyleaf pondweed), were also found growing in the pond. These plant species are able to outcompete many of the native aquatic plants species and grow at very high densities, although dense stands of these plants were not observed. It is likely that plant growth in the lake is limited by the very low water clarity and reduced light transmission to the bottom of the lake. A more thorough plant specific survey may yield additional aquatic plant species.

Like most shallow water bodies, Parker Pond does not exhibited thermal stratification, in which depth zones (warm water on top, cold water on the bottom occur during the summer) are established. Temperature and dissolved oxygen levels were comparable throughout the water column. The conductivity readings indicated hard water (high ionic strength) and pH readings indicated alkaline conditions. The pH readings were slightly above the state's water quality standard of 8.5 and may *stress* aquatic life in the pond. Both the pH and conductivity readings were similar to those seen at other shallow lakes and ponds in the northern portion of the Seneca-Oneida-Oswego Rivers Drainage Basin.

Parker Pond appears typical of other shallow, hard water, highly colored, alkaline lakes. Other waterbodies with similar water quality characteristics support a variety of warmwater fish species. As the pond is not deep enough to thermal stratify, summer water temperatures are outside the optimum range for many of the cool/cold water fish species. However, fisheries

habitat cannot be fully evaluated by the LCI. A website for Cayuga County indicates that Parker Pond supports pike, small and large mouth bass and bullheads (all warmwater species).

Total phosphorus levels were elevated above the state's guidance value on all occasions. High phosphorus levels typically correlate with high levels of algae production, and result in a green coloration, as was seen in Parker Pond. The water clarity in the pond was found to be below the State Health Department's minimum for the operation of swimming beaches. In addition, sodium and chloride levels were elevated, which can be associated with runoff from developed areas and/or road winter road salting.

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

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

Parker Pond 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 indicate that low water clarity/high turbidity and algae levels would *stress* the ability of the pond to serve as a potable water supply.

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

Parker Pond is not classified for primary contact recreation, although some swimming and bathing may occur. Bacteria data are needed to evaluate the safety of Parker Pond for swimming—these are not collected through the LCI. The data collected through the LCI indicated that contact recreational use of the pond may be *impaired* by elevated algae levels and low water clarity and *threatened* by high phosphorus levels. In addition, high densities of aquatic plants may make swimming difficult in certain areas of the pond.

### ***Non-Contact Recreation (Boating and Fishing)***

Parker Pond is classified for boating and fishing. The Town of Cato's website indicates that the people can and do used the pond for fishing and non-powered boating. The data collected through the LCI indicate that the use of the pond for boating and fishing may be *threatened* by the occurrence of the invasive species Eurasian watermilfoil and curlyleaf pondweed, which can grow at high densities and may impact boating and fishing.

### ***Aquatic Life***

Aquatic life in the pond may be *threatened* by the occurrence of Eurasian watermilfoil and curlyleaf pondweed, which are known to outcompete native aquatic plant species. In addition, aquatic life may be *stressed* by high pH levels and elevated sodium and chloride levels.

### ***Aesthetics***

The aesthetics of the pond may be *stressed* by high algal greenness and high densities of native and invasive aquatic plant species.

## **Additional Comments**

- The water quality conditions found in Parker Pond were very similar to those seen in Otter Lake. This is expected as the water bodies are hydrologically connected. Otter Lake

has higher levels of iron and manganese while Parker Pond had higher levels of sodium and chloride. The higher levels of sodium and chloride may be related to Parker Pond having a larger and more developed watershed.

- 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 document “A Primer on Aquatic Plant Management in New York State” available at [http://www.dec.ny.gov/docs/water\\_pdf/ch6apr05.pdf](http://www.dec.ny.gov/docs/water_pdf/ch6apr05.pdf) covers some management techniques for aquatic plants.

## Aquatic Plant IDs

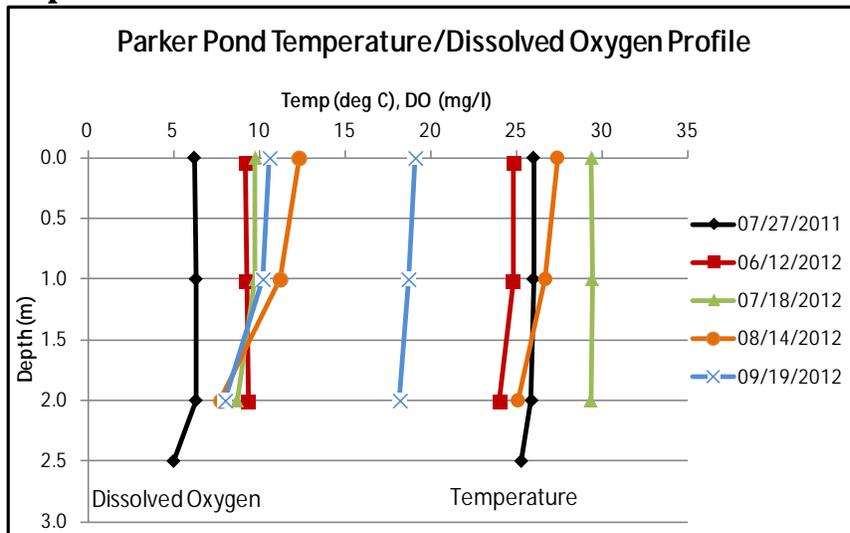
Exotic Plants:

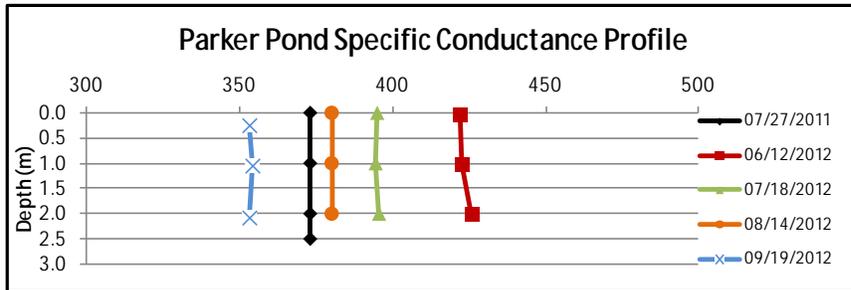
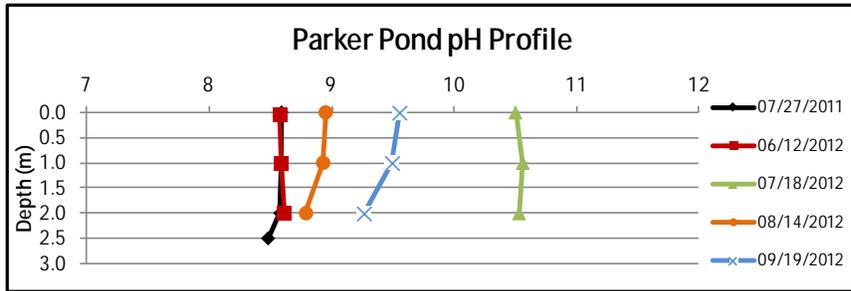
*Myriophyllum spicatum* (Eurasian watermilfoil)  
*Potamogeton crispus* (curlleaf pondweed)

Native Plants:

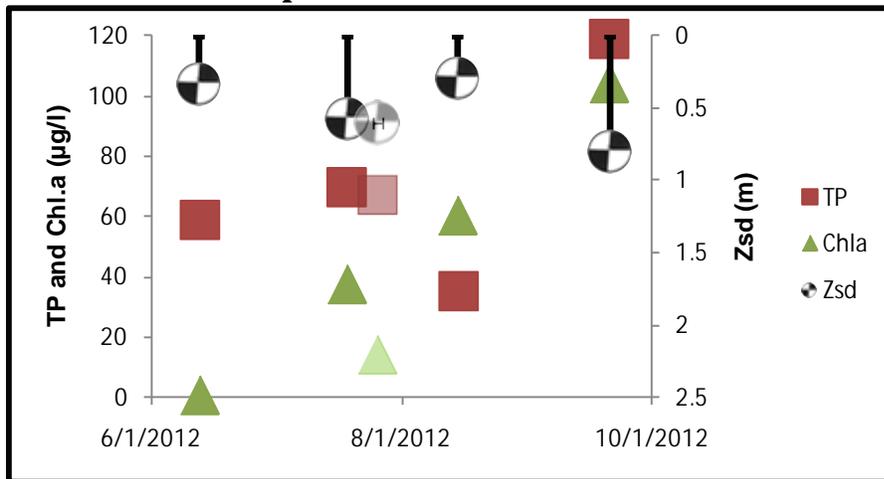
*Ceratophyllum demersum* (coontail)  
*Polygonum amphibium* (water knotweed)  
*Pontederia cordata* (pickerelweed)  
*Potamogeton foliosus* (leafy pondweed)  
*Stuckenia pectinatus* (Sago pondweed)  
*Wolffia sp.* (watermeal)

## Depth Profiles





## Time Series: Trophic Indicators



\*Transparent Markers represent the July 27, 2011 values

# Water Quality Sampling Results

## Surface Samples

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
SECCHI	meters	5	0.3	0.52	0.8	Eutrophic	<b>100% of readings violate DOH guidelines</b>
TSI-Secchi			77.3	69.4	63.2	Eutrophic	No pertinent water quality standards
TP	mg/l	5	0.0353	0.07	0.119	Eutrophic	<b>100% of readings violate water quality guidance values</b>
TSI-TP			55.5	65.4	73.0	Eutrophic	No pertinent water quality standards
TSP	mg/l	4	0.0072	0.01425	0.0302	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	5	0.0024	0.00434	0.0077	Low nitrate	No readings violate water quality standards
NH4	mg/l	5	0.01	0.017	0.035	Low ammonia	No readings violate water quality standards
TKN	mg/l	5	0.77	1.346	2.39	Elevated organic nitrogen	No pertinent water quality standards
TN/TP	mg/l		36.17	42.70	48.47	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	5	0.62	43.324	104	Eutrophic	No pertinent water quality standards
TSI-CHLA			25.9	67.6	76.2	Eutrophic	No pertinent water quality standards
Alkalinity	mg/l	5	65.1	111.02	143	Moderately Buffered	No pertinent water quality standards
TCOLOR	ptu	5	17	34.2	48	Highly Colored	No pertinent water quality standards
TOC	mg/l	5	7.9	9.76	12.4		No pertinent water quality standards
Ca	mg/l	5	22.8	32.46	44	Strongly Supports Zebra Mussels	No pertinent water quality standards
Fe	mg/l	5	0.0449	0.0876	0.122		No readings violate water quality standards
Mn	mg/l	5	0.084	0.099	0.14		No readings violate water quality standards
Mg	mg/l	5	11.5	14	15.8		No readings violate water quality standards
K	mg/l	5	1.54	1.746	1.99		No pertinent water quality standards
Na	mg/l	5	9.17	22.73	29.2		<b>80% of readings violate water quality guidance values</b>
Cl	mg/l	5	21.8	46.48	61.9	Significant road salt runoff	No readings violate water quality standards
SO4	mg/l	5	ND	4.3	7.5		No readings violate water quality standards
Si	mg/l	5	0.161	5.3202	17.9		No pertinent water quality standards

## Lake Perception

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
Water Clarity Assessment	1-5, 1 best	5	3	3.8	4	High Algae Levels	No pertinent water quality standards
Weed Assessment	1-5, 1 best	5	2	2.6	3	Plants Grow to Lake Surface	No pertinent water quality standards
Recreational Assessment	1-5, 1 best	5	3	3.6	4	Substantially Impaired	No pertinent water quality standards

## References

Town of Cato. 2007. "Town of Cato History". Assessed at <http://co.cayuga.ny.us/townofcato/history.htm>

## 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 = 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
Si	= Dissolved silica, mg/l Detection limit = 0.01 mg/l; no NYS standard or guidance value

### ***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