

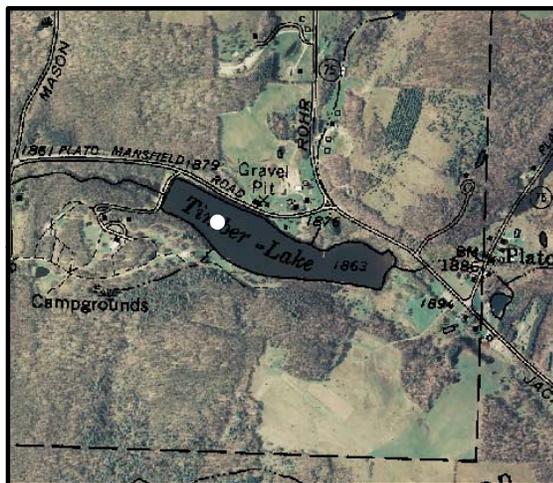
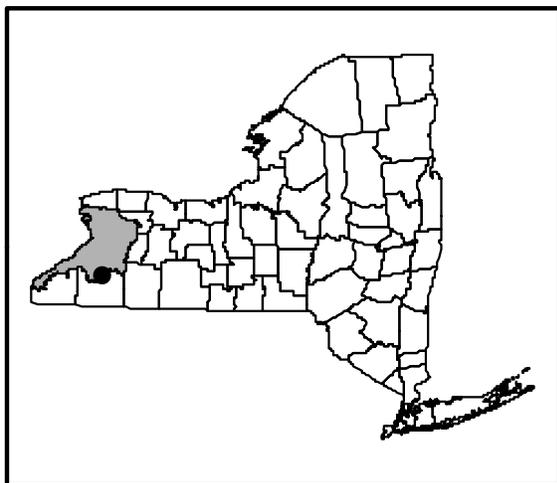
LCI Lake Water Quality Summary

General Information

Lake Name:	Timber Lake
Location:	Town of East Otto, Cattaraugus County, NY
Basin:	Lake Erie
Size:	10.5 hectares (26 acres)
Lake Origins:	Earthen dam built in 1961- last modified in 2009
Major Tributaries:	East Otto Creek
Watershed Area:	1.2 Square Miles
Lake Tributary to:	East Otto Creek/South Branch Cattaraugus Creek
Water Quality Classification:	C(T) (best intended use: primary contact recreation) (T) waters shall be suitable for trout survival
Sounding Depth:	3.0 meters (10 feet)
Sampling Coordinates:	42.35346898, -78.68132003
Sampling Access Point:	Private land (Mitchell)
Monitoring Program:	Lake Classification and Inventory (LCI) Survey
Sampling Date:	6/8, 7/7, 8/4 & 9/14/2011
Samplers:	David Newman & Scott Kishbaugh NYSDEC Division of Water, Albany Bill Murray, Brian Hourigan, Richard Rink & Tom Wantuck NYSDEC Division of Water, Buffalo
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

Timber Lake is a 25 acre impoundment at the headwaters of East Otto Creek near East Otto, Cattaraugus County, NY. The land surrounding the lake is owned by a small number of private land owners and there is no formal public access to the lake. The near shore area of the lake is covered by a mix of forest and grassy areas as well a road with an unpaved surface. The greater watershed includes a small number of homes, agricultural lands and forest. The lake is currently used for recreational purposes by the surrounding land owners. These land owners use the lake for swimming, boating, fishing, and the use of personal watercraft.

Timber Lake was included in the 2011 NYS DEC Division of Water's Lake Classification and Inventory Survey (LCI) intensive monitoring program. Inclusion in the LCI was based on a *Minor Impacts* listing in The Niagara River/Lake Erie Basin Waterbody Inventory and Priority Waterbodies List (WIPWL) (NYS DEC 2010), due to high nutrient levels, algal growth and reduced clarity. Sources of nutrients and silt/sediment are thought to be nonpoint runoff from agricultural activities in the surrounding area and streambank erosion within the watershed. Timber Lake had previously been sampled by the Division of Water in May of 2005.

Timber Lake can be characterized as *eutrophic*, or highly productive. The average water clarity reading (TSI = 57, typical of *eutrophic* waterbodies) was in the expected range given the average total phosphorus reading (TSI = 63, typical of *eutrophic* waterbodies), and the average chlorophyll *a* reading (TSI = 57, typical of *eutrophic* waterbodies). These data indicate that nutrient levels are sufficient enough to produce algal blooms during the summer months. As in many lakes, phosphorus and chlorophyll *a* levels were at the highest in August and September, leading to reduced water clarity. The 2005 water clarity, total phosphorus and chlorophyll *a* readings were all within the range of values measured in 2011.

Throughout the summer the lake's water was described as being slightly green to brownish in color with the water clarity ranging from just under 1 meter to just under 2 meters. The August and September water clarity readings fall below the State Department of Health's minimum standard for safe swimming. Three native aquatic plant species were found to be occurring in the lake and included: *Potamogeton vaseyi* (Vasey's pondweed), *Potamogeton epihydrus* (ribbon leaf pondweed) and *Najas flexilis* (slender naiad). In 2005, *Elodea canadensis* (common waterweed), another native plant, was observed. A more thorough plant specific survey of the lake may yield additional aquatic plants species in the lake.

Like most shallow lakes, Timber Lake does not exhibit thermal stratification, in which depth zones (warm water on top, cold water on the bottom) are established during the summer. Temperature and dissolved oxygen levels were comparable throughout the water column. pH readings indicate alkaline waters with conductivity readings indicate moderately hard water (high ionic strength). pH levels were similar to those seen in nearby Rainbow Lake, with conductivity readings being slightly higher than those in Rainbow Lake.

Timber Lake appears to be typical of shallow, moderately hard water, weakly colored, alkaline lakes. Other lakes with similar water quality characteristics often support warmwater fisheries a local land owner indicated that bass and perch can be caught from the lake. Summer water temperatures in the lake are outside the optimum range for coldwater fish like trout and therefore

the lake is unlikely to support sustainable populations of coldwater fish species. However, fisheries habitat cannot be fully evaluated through this monitoring program.

Total phosphorus levels in the lake were above the state's guidance value during all four monitoring events. Iron levels in 3 of the 4 samples were found to be above the state's drinking water standard and may result in taste or odor issues. All of the other water quality parameters analyzed through the LCI were within water quality standards and/or guidance values, and do not indicate any water quality problems.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Timber 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 "unofficial" surface water withdrawals may be *impaired* by elevated iron levels and *stressed* by elevated manganese levels.

Contact Recreation (Swimming)

Timber Lake is not classified for contact recreation, although there were indications that the individuals do swim in the lake as well as operate personal watercraft on the lake. 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". Bacteria data are needed to evaluate the safety of Timber Lake for swimming; however, these are not collected through the LCI. The data collected through the LCI indicate that reduced water clarity levels *impair* the ability of the lake to be used safely for primary contact recreation during certain portions of the year. Total phosphorus levels also *threaten* the use of the lake for primary contact recreation.

Non-Contact Recreation (Boating and Fishing)

Timber Lake is classified for non-contact recreational uses, including boating and fishing. The lake is currently used by lakeshore property owners and their guests for boating and fishing. Sampling staff on 3 of the 4 trips assessed the recreational potential of the lake as "excellent for most uses"; however, reduced water clarity and high nutrient levels may *threaten* the use of the lake for non-contact recreation.

Aquatic Life

Summer water temperatures in the lake are outside the optimum range for coldwater fish like trout; therefore, the lake is unlikely to support sustainable populations of coldwater fish species.

Aesthetics

These data indicate that the high chlorophyll *a* levels may *stress* the aesthetics of the lake.

Additional Comments

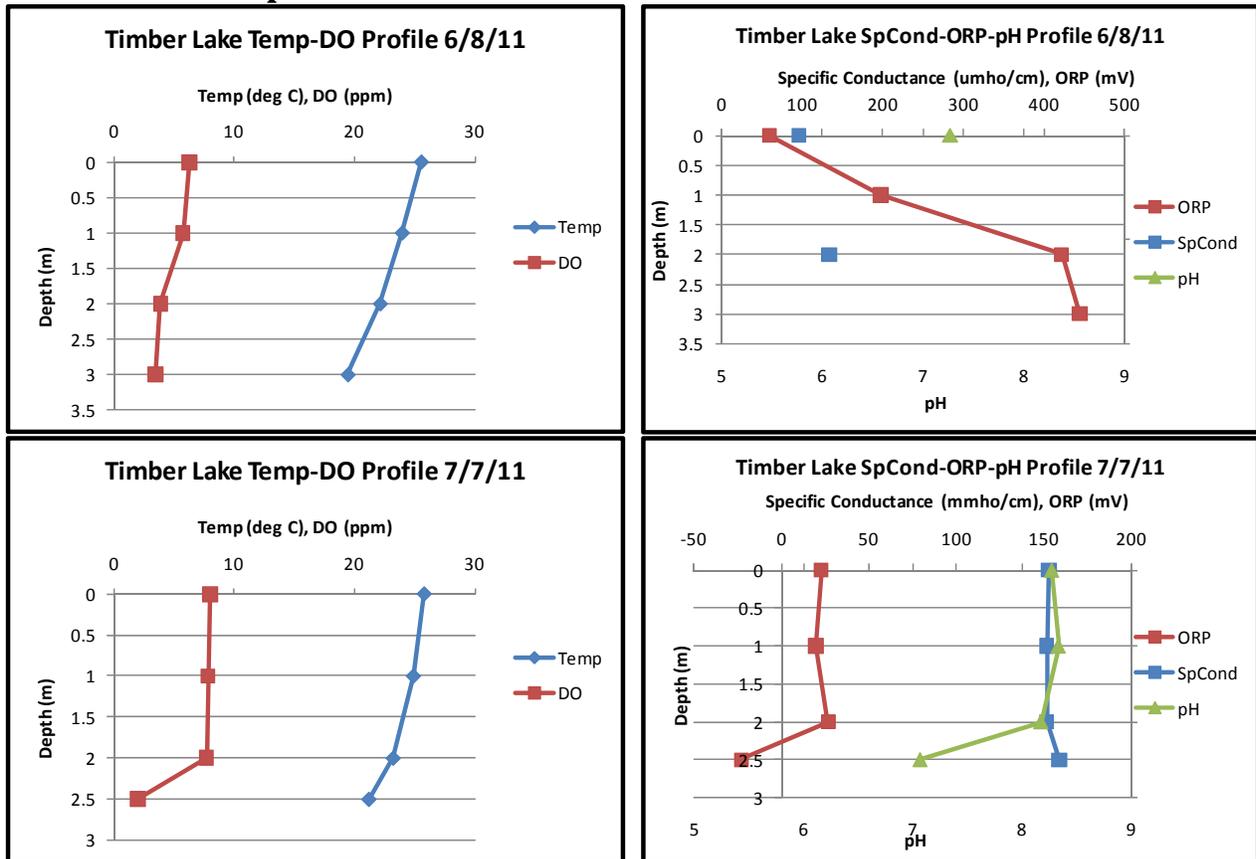
- Periodic surveillance for invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds. Assuring that boats and personal watercraft are cleaned and dried before being brought from other waterbodies will help limit the potential of inadvertent introductions.

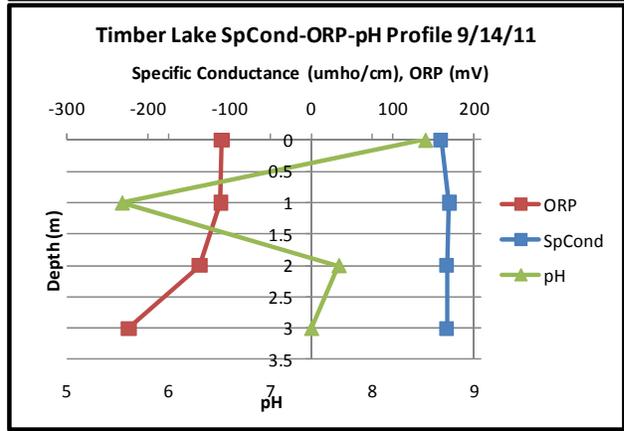
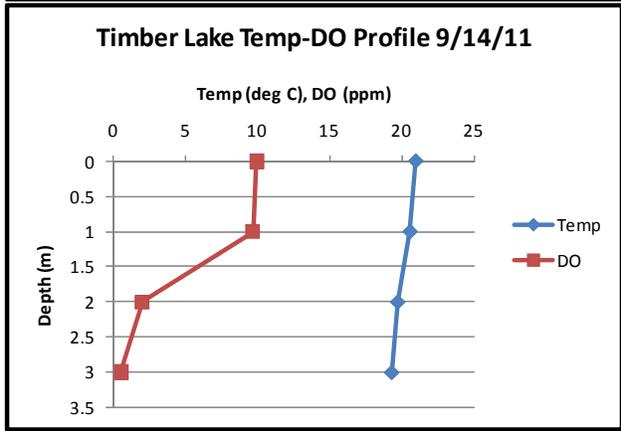
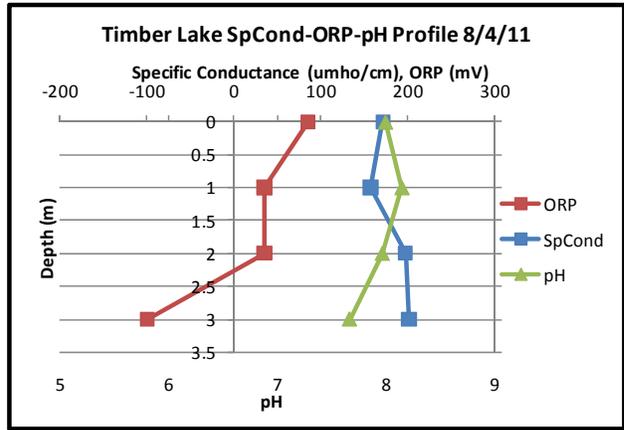
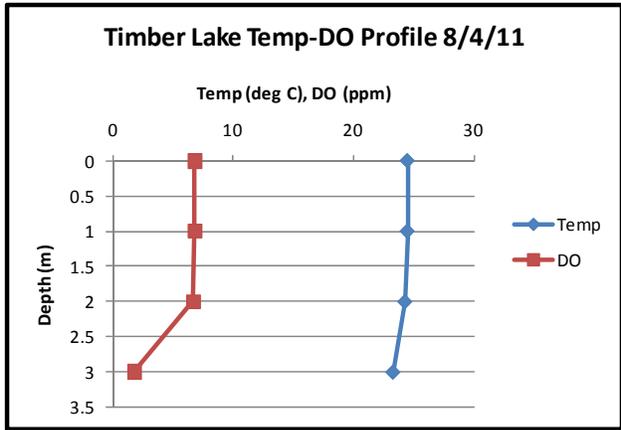
Aquatic Plant IDs

Exotic Plants: None observed

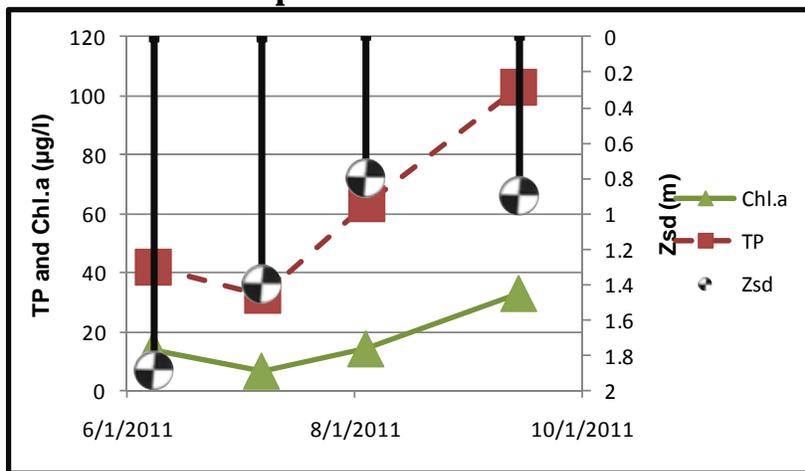
Native Plants: *Potamogeton vaseyi* (Vasey's pondweed)
Potamogeton epihydrus (ribbon leaf pondweed)
Najas flexilis (slender naiad)

Time Series: Depth Profiles





Time Series: Trophic Indicators



Surface Samples

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
SECCHI	meters	4	0.8	1.25	1.88	Eutrophic	50% of readings violate DOH guidelines
TSI-Secchi			63.2	56.8	50.9	Eutrophic	No pertinent water quality standards
TP	mg/l	4	0.0324	0.06	0.103	Eutrophic	100% of readings violate water quality standards
TSI-TP			54.3	63.2	70.9	Eutrophic	No pertinent water quality standards
TSP	mg/l	4	0.0066	0.0144	0.0298	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	4	ND	0.00415*	0.0072	Low nitrate	No readings violate water quality standards
NH4	mg/l	4	ND	0.008*	0.012	Low ammonia	No readings violate water quality standards
TKN	mg/l	4	0.35	0.68	1.03	Intermediate organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	4	22.06	26.03	34.59	Nutrient Limitation Unclear	No pertinent water quality standards
CHLA	ug/l	4	6.9	17.08	33.1	Eutrophic	No pertinent water quality standards
TSI-CHLA			49.5	56.9	64.9	Eutrophic	No pertinent water quality standards
Alkalinity	mg/l	4	43	53.7	60	Moderately Buffered	No pertinent water quality standards
TCOLOR	ptu	3	17	24	29	Weakly Colored	No pertinent water quality standards
TOC	mg/l	4	3.6	4.8	6.5		No pertinent water quality standards
Ca	mg/l	4	14.1	18.5	20.9	Minimally Supports Zebra Mussels	No pertinent water quality standards
Fe	mg/l	4	0.284	0.49	0.703	Taste or odor likely	75% of readings violate water quality standards
Mn	mg/l	4	0.0855	0.1759	0.26		No readings violate water quality standards
Mg	mg/l	4	2.13	2.72	3.06		No readings violate water quality standards
K	mg/l	4	0.61	0.77	0.98		No pertinent water quality standards
Na	mg/l	4	7.46	8.18	8.83		No readings violate water quality standards
Cl	mg/l	4	9.2	10.45	11.5	Moderate road salt runoff	No readings violate water quality standards
SO4	mg/l	4	2.4	4.25	6.6		No readings violate water quality standards

* Non-detect (ND) values were set to half the detection limit for calculating the average

Lake Perception

	UNITS	N	MIN	AVG	MAX	Scientific Classification
WQ Assessment	1-5, 1 best	4	2	3	4	Definite Algal Greenness
Weed Assessment	1-5, 1 best	4	1	1.5	2	Plants Visible Below Surface
Recreational Assessment	1-5, 1 best	4	2	2.5	4	Slightly Impaired

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, = $14.42 \cdot \ln(\text{TP} \cdot 1000) + 4.15$
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), = $(\text{TKN} + \text{NOx}) \cdot 2.2 / \text{TP}$ > 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, = $9.81 \cdot \ln(\text{CHLA}) + 30.6$
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

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