

LCI Lake Water Quality Summary

General Information

Lake Name: Artist Lake

Location: Middle Island, town of Brookhaven, Suffolk County, NY

Basin: Atlantic Ocean/Long Island Sound Basin

Size: 10.4 hectares (26 acres)

Lake Origins: glacial kettle hole

Major Tributaries: none

Lake Tributary to?: none

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

Sounding Depth:

Sampling Coordinates: Latitude: 40.8847, Longitude: -72.93129

Sampling Access Point: Town of Brookhaven park off Middle Country Road

Monitoring Program: Lake Classification and Inventory (LCI) Survey

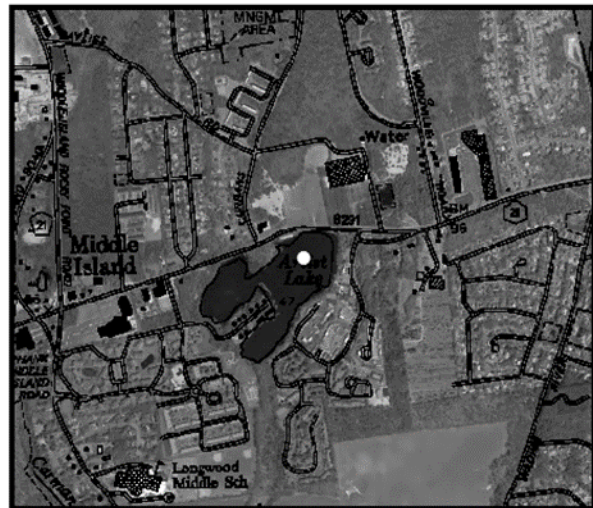
Sampling Dates: 8/26/2008, 6/23/2009, 7/20/2009, 8/19/2009, 9/22/2009

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Lake Map

(sampling location marked with a circle)



Background and Lake Assessment

Artist Lake is a small glacial kettlehole lake located in the hamlet of Middle Island. This area of Long Island has a mix of land uses including: suburban development, agriculture, forest, sand and gravel mining, and wildlife management areas. The lake itself has a small treed buffer around most of the lake, with a few manicured lawns on the southern shoreline and Middle Country Road bordering on the northern shore. There is a small park/beach along Middle Country road that local residents use for angling at the lake. This park also acts as an informal hand carry boat launch. More background information on the lake is available through the DEC website (see references below).

The lake was among the largest lakes in the Atlantic Ocean/Long Island Sound Drainage Basin not previously sampled the NYSDEC Division of Water's Lake Classification and Inventory Survey (LCI), and thus was included in the 2008 LCI screening program. The lake was also included in a joint DEC and Nature Conservancy plant survey of Suffolk County Lakes in 2006. Due to elevated phosphorus levels and the observation of *Cabomba caroliniana* (fanwort), the lake was also included in the 2009 intensive survey to provide a more detailed look at water quality in the lake.

Artist Lake can be characterized as *eutrophic*, or highly productive. The water clarity reading (TSI = 52, typical of *eutrophic* lakes) was expected given the phosphorus reading (TSI = 56, typical of *eutrophic* lakes) but was slightly more favorable than expected given the chlorophyll *a* reading (TSI = 48, typical of *mesoeutrophic* lakes). These data indicate that during the peak of the summer, algal blooms may occur given the high chlorophyll *a* readings in July and August. Nutrient levels are supportive of persistent algal blooms. The late August 2008 data showed slightly higher water clarity, a phosphorus reading at the high end of the range seen in 2009 and a chlorophyll *a* reading in the range of the 2009 values.

Algal greenness was probably visible to the casual observer in July and August of 2009. There were several rooted aquatic plants species found at the lake over the course of the two years of sampling, these included: the submergent species, *Cabomba caroliniana* (fanwort), *Utricularia purpurea* (purple bladderwort), *Potamogeton vaseyi* (Vasey's Pondweed), *Nitella sp.* (stonewort), and *Ceratophyllum demersum* (coontail). Fanwort is an exotic invasive species known to occur at a growing number of lakes and ponds on Long Island. The stonewort and fanwort were the most abundant submergent plants observed in the lake. It should be noted that survey was not conducted in the large lily beds in the western and southern portions of the lake.

Like most shallow lakes, Artist Lake does not exhibit thermal stratification, in which depth zones (warm water on top, cold water on the bottom during the summer) are established. Temperature and dissolved oxygen readings were comparable throughout the water column. pH readings tended to be slightly acidic to slightly alkaline, with the more alkaline readings corresponding to dates there were higher chlorophyll *a* levels. Conductivity readings indicate soft water (low ionic strength), which is common among lakes in the less developed areas of Long Island. The oxygen reduction potential (ORP) readings indicate fully oxygenated conditions have been persistent in the lake, as is typical of shallow lakes.

Artist Lake appears to be typical of softwater, weakly colored, circumneutral lakes. Other lakes with similar water quality characteristics often support warmwater fisheries, although fisheries habitat cannot be fully evaluated through the monitoring program. A fishery survey was conducted in 1993 by the NYS DEC Division of Fish Wildlife and Marine Resources which

found the lake to support an excellent fish population. It is unknown if a more recent survey has been conducted. Iron levels were elevated above the New York State Department of Health's (NYSDOH) drinking water standard both in 2008 and 2009. Total phosphorus levels also were above the state guidance value in 2008 and 2009. Chloride levels were in the moderate to high range, which is typical of lakes that receive stormwater runoff from developed areas and/or areas that experience heavy road salting in the winter. Other ions and metal that exceeded water quality standards.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Artist 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 potable water supply, due to the high levels of iron and phosphorus.

Contact Recreation (Swimming)

Artist Lake is classified for contact recreation, although it is not believed that the lake is presently used for these purposes. Bacteria data are needed to evaluate the safety of Artist Lake for swimming; these are not collected through the LCI. The high numbers of waterfowl seen at the lake may cause bacteria levels to be above the state water quality standards. Data collected through the LCI indicate that swimming may be threatened by elevated algae and reduced water clarity due to elevated nutrient levels. All of the water clarity readings were above the DOH standard of 1.2 meters but the June and July values in 2009 were only slightly above this standard. Trash and other debris in the lake may also detract from individuals desire to swim in the lake.

Non-Contact Recreation (Boating and Fishing)

Boating and fishing are currently supported on the lake. Some of the shallower areas of the lake support high densities of floating leaf plant species and may make boating and fishing difficult in these areas.

Aquatic Life

Elevated levels of iron may impact certain aquatic life. Additional biological studies would need to be conducted to fully evaluate impacts to aquatic life.

Aesthetics

These data indicate that aesthetics may be threatened by elevated algae levels.

Additional Comments

1. The 2008 data were consistent with the 2009 data indicating that these conditions are typical for the lake.
2. Periodic surveillance for additional invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds on Long Island.
3. 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:

Cabomba caroliniana (fanwort)

Native Plants:

Brasenia schreberi (watershield)

Ceratophyllum demersum (coontail)

Nitella sp. (stonewort)

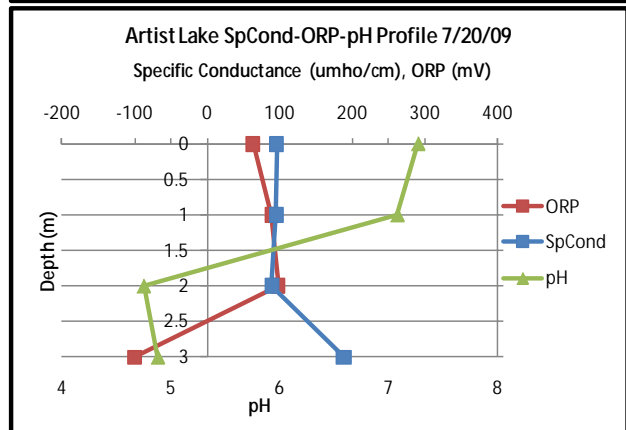
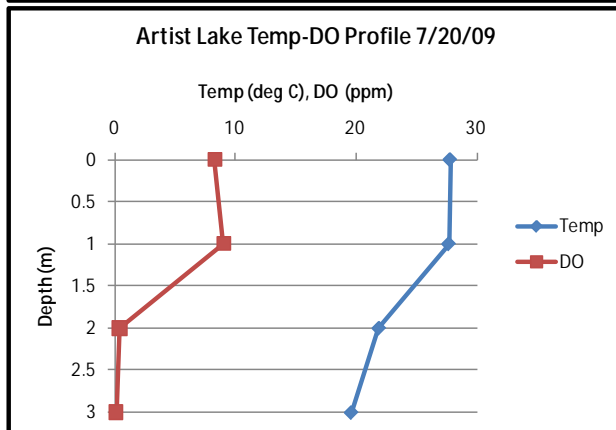
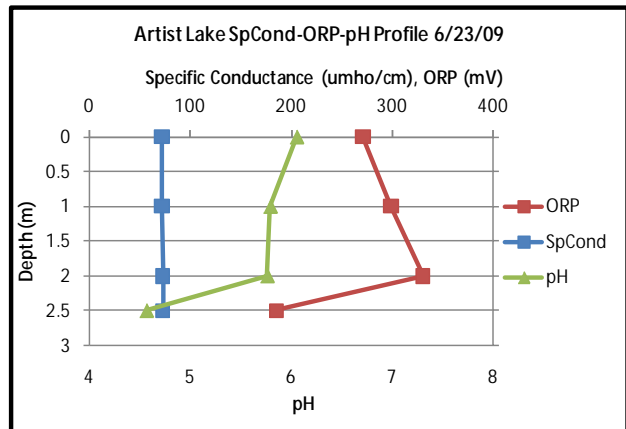
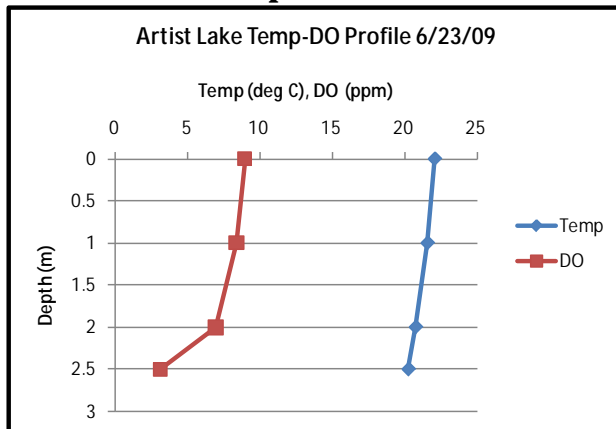
Potamogeton vaseyi (Vasey's Pondweed)

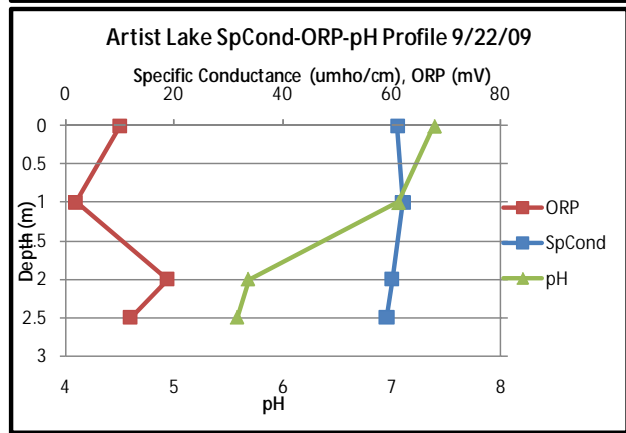
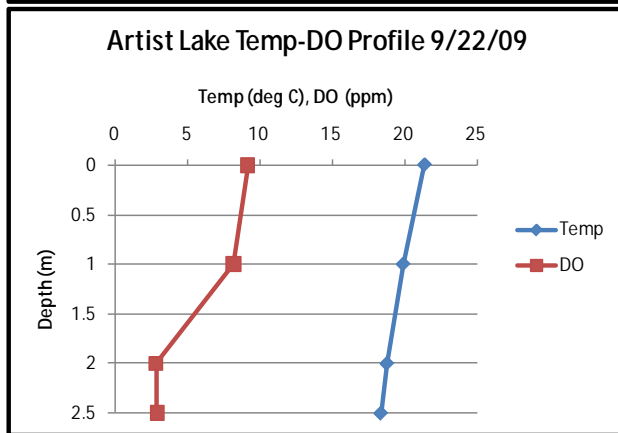
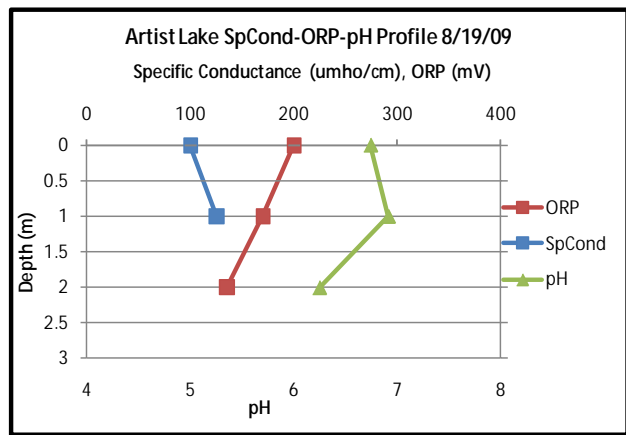
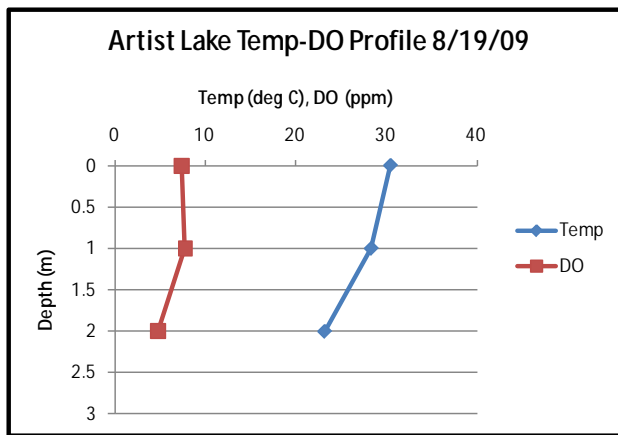
Utricularia sp. (unidentified bladderwort)

Utricularia purpurea (purple bladderwort)

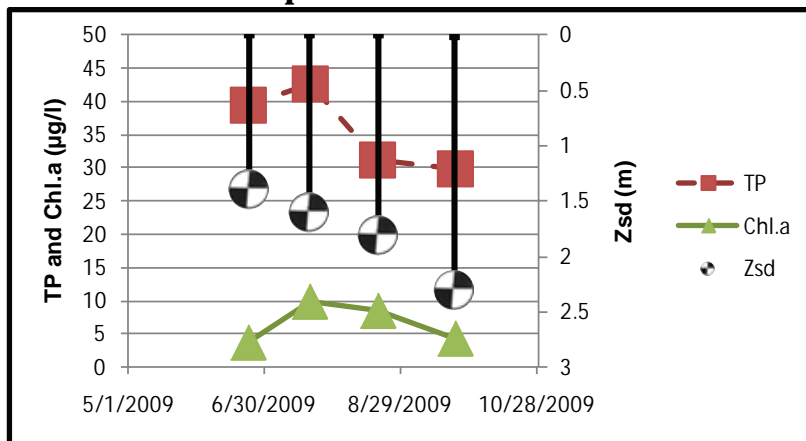
(note: the 2006 survey also found small pondweed (*Potamogeton pusillus*), leafy pondweed (*Potamogeton foliosus*), Nuttall's pondweed (*Elodea nuttallii*), and white water lily (*Nymphaea sp.*))

Time Series: Depth Profiles





Time Series: Trophic Indicators



WQ Sampling Results

2009 Surface Samples

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
SECCHI	meters	4	1.4	1.78	2.3	Eutrophic	No readings violate DOH guidance value

TSI-Secchi			55.2	51.7	48.0	Eutrophic	No pertinent water quality standards
TP	mg/l	4	0.0298	0.0357	0.0426	Eutrophic	100% of readings violate guidelines
TSI-TP			53.1	55.7	58.2	Eutrophic	No pertinent water quality standards
TSP	mg/l	4	0.0085	0.0197	0.0464	High % soluble Phosphorus	No pertinent water quality standards
NOx	mg/l	4	0.0029	0.01425	0.0102	Low nitrate	No readings violate water quality standards
NH4	mg/l	4	ND	0.014*	0.027	Low ammonia	No readings violate water quality standards
TKN	mg/l	4	0.56	0.67	0.77	Intermediate organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	4	35.57	41.77	46.39	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	4	3.7	6.6	9.9	Mesotrophic	No pertinent water quality standards
TSI-CHLA			43.4	48.3	53.1	Mesotrophic	No pertinent water quality standards
Alkalinity	mg/l	4	9.1	10	10.9	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	4	ND	21.9*	40	Weakly Colored	No pertinent water quality standards
TOC	mg/l	4	6.1	6.6	7.4		No pertinent water quality standards
Ca	mg/l	4	3.03	3.2	3.38	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	4	0.564	0.915	1.26	Taste or odor likely	100% of readings violate guidelines
Mn	mg/l	4	0.0126	0.035	0.074		No readings violate water quality standards
Mg	mg/l	4	1.08	1.14	1.2		No readings violate water quality standards
K	mg/l	4	0.272	0.5	0.784		No pertinent water quality standards
Na	mg/l	4	14.7	15.48	16.7		No readings violate water quality standards
Cl	mg/l	4	22.9	24.85	26.5	Moderate road salt runoff	No readings violate water quality standards
SO4	mg/l	4	ND	1.25*	2		No readings violate water quality standards

* Non detect values were treated as equal to half the detection limit for computing the average reading

2009 Lake Perception

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
WQ Assessment	1-5, 1 best	4	2	2.75	3	Definite Algal Greenness	No pertinent water quality standards
Weed Assessment	1-5, 1 best	4	2	3	4	Plants Grow to Lake Surface	No pertinent water quality standards
Recreational Assessment	1-5, 1 best	4	3	3.25	4	Slightly Impaired	No pertinent water quality standards

Legend Information

General Legend Information

Surface Samples = integrated sample collected in the first 2 meters of surface water
N = number of samples
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

NO _x	Detection limit = 0.003 mg/l; no NYS standard or guidance value = nitrate + nitrite nitrogen, mg/l
NH ₄	Detection limit = 0.01 mg/l; NYS WQ standard = 10 mg/l = total ammonia, mg/l
TKN	Detection limit = 0.01 mg/l; NYS WQ standard = 2 mg/l = total Kjeldahl nitrogen (= organic nitrogen + ammonia), mg/l
TN/TP	Detection limit = 0.01 mg/l; no NYS standard or guidance value = Nitrogen to Phosphorus ratio (molar ratio), = (TKN + NO _x)*2.2/TP > 30 suggests phosphorus limitation, < 10 suggests nitrogen limitation
CHLA	Detection limit = 2 µg/l; no NYS standard or guidance value = chlorophyll <i>a</i> , micrograms per liter (µg/l) or parts per billion (ppb)
TSI-CHLA	= Trophic State Index calculated from CHLA, = 9.81*ln(CHLA) + 30.6
ALKALINITY	Detection limit = 10 mg/l; no NYS standard or guidance value = total alkalinity in mg/l as calcium carbonate
TCOLOR	Detection limit = 5 ptu; no NYS standard or guidance value = true (filtered or centrifuged) color, platinum color units (ptu)
TOC	Detection limit = 1 mg/l; no NYS standard or guidance value = total organic carbon, mg/l
Ca	Detection limit = 1 mg/l; no NYS standard or guidance value = calcium, mg/l
Fe	Detection limit = 0.1 mg/l; NYS standard = 0.3 mg/l = iron, mg/l
Mn	Detection limit = 0.01 mg/l; NYS standard = 0.3 mg/l = manganese, mg/l
Mg	Detection limit = 2 mg/l; NYS standard = 35 mg/l = magnesium, mg/l
K	Detection limit = 2 mg/l; no NYS standard or guidance value = potassium, mg/l
Na	Detection limit = 2 mg/l; NYS standard = 20 mg/l = sodium, mg/l
Cl	Detection limit = 2 mg/l; NYS standard = 250 mg/l = chloride, mg/l
SO ₄	Detection limit = 2 mg/l; NYS standard = 250 mg/l = sulfate, 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 (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

References

NYSDEC. Undated. Artist Lake, Middle Island Fishing Information.
<<http://www.dec.ny.gov/outdoor/24149.html>>.