LCI Lake Water Quality Summary

General Information

Lake Name: Gibbs Pond

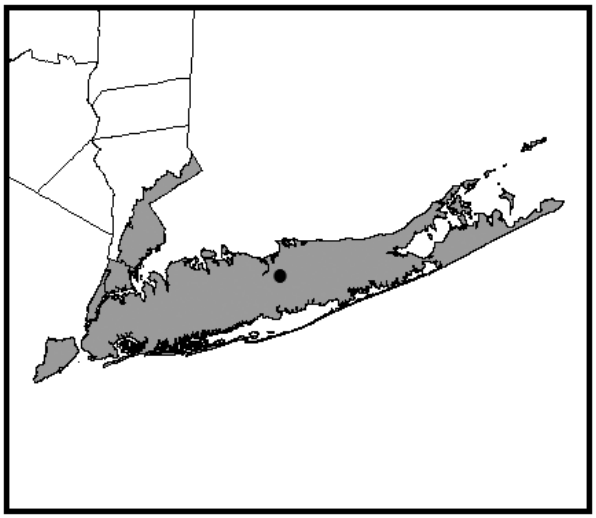
Location: Gibbs Pond Park, Nesconset, Town of Smithtown, Suffolk County, New York
Basin: Atlantic Ocean/Long Island Sound Basin
Size: 1.3 hectares (3.3 acres)
Lake Origins: natural
Major Tributaries: no known inlet (storm water)
Lake Tributary to?: no known outlet
Water Quality Classification: C (best intended use: secondary contact recreation)

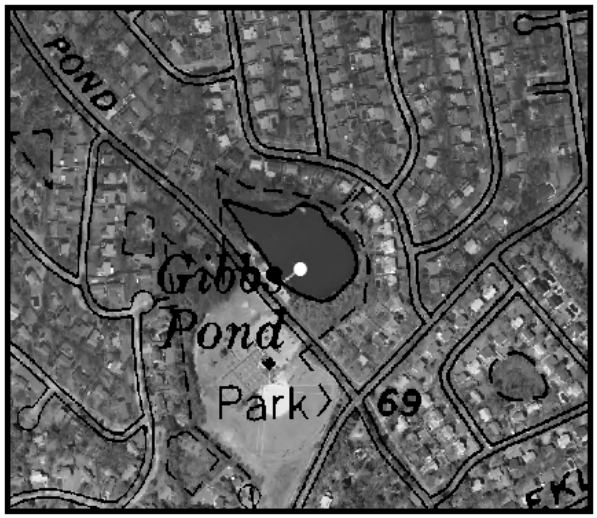
Sounding Depth: 2.5 meters (8 feet)
Sampling Coordinates: Latitude: 40.84467, Longitude: -73.13934
Sampling Access Point: Fishing pier at Gibbs Pond Park

Monitoring Program: Lake Classification and Inventory (LCI) Survey
Sampling Date: July 20, 2009
Samplers: Scott Kishbaugh, NYSDEC Division of Water
David Newman, NYSDEC Division of Water, Albany

Contact Information: Scott Kishbaugh, NYSDEC Division of Water
sakishba@gw.dec.state.ny.us; 518-402-8282

Lake Map
(sampling location marked with a circle)





Background and Lake Assessment

Gibbs Pond is a small neighborhood impoundment in the Town of Smithtown in Suffolk County. The pond is roughly three acres in size and probably no more than 10 feet in depth at its deepest point. The majority of the shoreline of the pond is treed although houses can be seen through the trees. There are approximately 20 properties that border the pond on all but the western shoreline, which is bordered by Gibbs Pond Road. There is a small public parking area and a fishing/ wildlife viewing pier that juts out into the lake from the parking area. The watershed is highly developed with single family homes. The pond currently supports limited fishing from the pier. Beyond the pier there is very limited shoreline access for fishing.

A water quality assessment of Gibbs Pond was conducted through the NYSDEC Division of Water's Lake Classification and Inventory (LCI) program in July of 2009. Gibbs Pond was included in the LCI due to a complaint received from the public regarding the poor water quality conditions at the pond.

Gibbs Pond can be characterized as *eutrophic*, or highly productive. The water clarity reading (TSI = 69, typical of *eutrophic* lakes) was higher than expected given the phosphorus reading (TSI = 82, typical of *hypereutrophic* lakes) but was worse than expected given the chlorophyll *a* reading (TSI = 47, typical of *mesoeutrophic* lakes). These data indicate that baseline nutrient levels support persistent algal blooms in the pond, however there may be other factors limiting the growth of algae in the pond. Algae levels in the pond at the time of sampling were lower than expected and may be limited by turbidity.

The water appeared to be very brown and turbid. This is typical of small ponds in highly developed areas that receive most of their water from runoff. *Nuphar sp.* (spadderdock) a rooted floating leaf aquatic plant covered large areas of the pond in late July. The highly invasive species *Eichhornia crassipes* (water hyacinth) was found in the shallow water near the parking lot. There were just a few individuals of this species in a small area of the pond, which may indicate a very recent introduction possibly from an aquarium being dumped. All specimen were removed by DEC staff. Rake tosses off the fishing pier did not yield any other native or invasive plants. A more thorough plant survey may yield additional aquatic plant species.

Like most shallow lakes, Gibbs Pond does not exhibit thermal stratification, in which depth zones (warm water on top, cold water on the bottom during the summer) are established. Dissolved oxygen levels did drop to anoxic (devoid of oxygen) levels below one meter in depth. This is probably a result of the low water clarity preventing photosynthetic organisms from being able to survive below the immediate surface waters. The small surface area and wind protected nature of the pond limits mixing. High levels of primary production in the surface water leads to high rates of decomposition on the bottom of the pond, which may also contributed to reduced dissolved oxygen levels. The oxygen reduction potential (ORP) readings indicate that the anoxic conditions below one meter have been persistent in the pond. The pH readings indicate slightly alkaline surface water, which is also common in ponds with high primary production. Conductivity readings indicate hard water (high ionic strength); this is common for ponds that receive runoff from highly developed areas. However, it is common for small urban Long Island ponds to have much higher conductivity readings than were found at Gibbs Pond.

Levels of sodium and chloride were highly elevated, which is typical of waterbodies in highly developed watersheds. Iron, manganese, and ammonia levels were also high, typical of ponds that have persistent anoxic conditions. Due to the high levels of ammonia and iron and the low levels of dissolved oxygen it is unlikely that the pond strongly supports fish or other aquatic life, although the LCI program is not adequate to fully evaluate fisheries.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Gibbs Pond is not classified for a potable water supply. Although the LCI data are not sufficient to evaluate potable water use, these data suggest that the pond water would require substantial treatment to serve as a potable water supply.

Contact Recreation (Swimming)

Gibbs Pond is not classified for contact recreation. Bacteria data are needed to evaluate the safety of Gibbs Pond for swimming, these data are not collected through the LCI. The data collected though the LCI indicate that swimming may be *impaired* by excessive algae and poor water clarity. The water clarity reading was well below the New York State Department of Health's guidance of 1.2 meters to protect the safety of swimmers. Any future use of the pond for contact recreation would probably require management of nutrient and sediment sources and a reduction of algae levels to provide safe and aesthetically acceptable swimming conditions.

Non-Contact Recreation (Boating and Fishing)

Gibbs Pond is classified for non-contact recreation. Not considering the lack of access for getting a boat onto Gibbs Pond, boating on the pond is *impaired* due to the high density of aquatic plants, and low water clarity. As stated above it is unlikely that the pond supports a large number of fish due to the low dissolved oxygen and high levels of iron and ammonia in the water column, although this cannot be evaluated through the LCI.

Aquatic Life

The low dissolved oxygen levels and high ammonia levels will stress most aquatic life. In addition, high nutrient and algae levels may also affect some aquatic organisms. Additional biological studies would need to be conducted to fully evaluate aquatic life.

Aesthetics

These data indicate that aesthetics may be threatened by excessive algae, reduced water clarity and high density of aquatic plants. In addition, water from the lake had a fishy odor to it which may also detract from the aesthetic enjoyment of the pond.

Additional Comments

1. 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 in the area. Informational signs about exotics invasive species and their impacts to aquatic ecosystems may help prevent deliberate introductions from aquaria

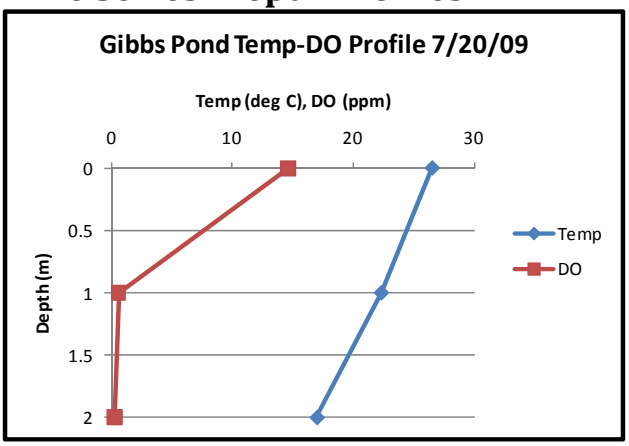
dumps. This is particularly important for Gibbs Pond, given the introduction of water hyacinth to the lake.

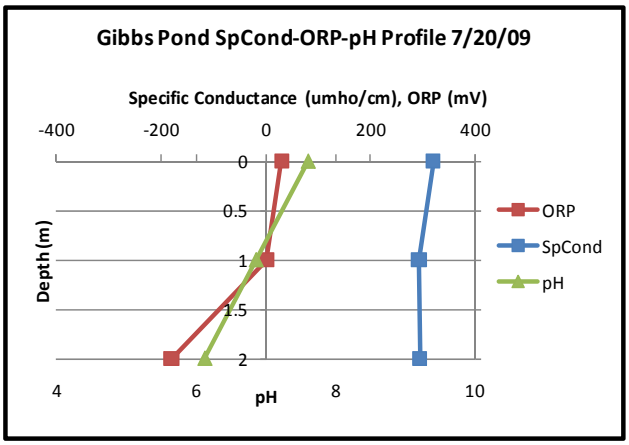
2. It is not yet clear when the active management of immediate lake watershed will result in measurable water quality improvements, since no comparable baseline water quality data are available to evaluate the late July monitoring results.
3. Continued efforts are needed to keep debris and other introduced materials, particularly sediment and nutrients, out of the lake.

Aquatic Plant IDs

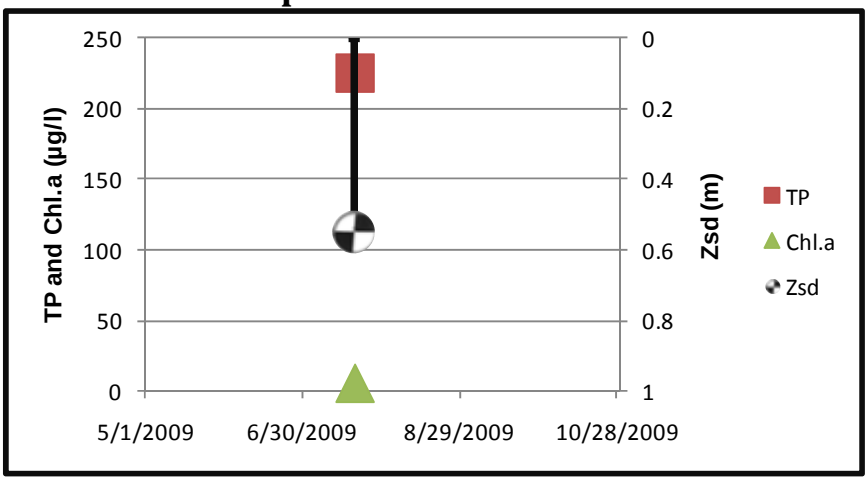
Exotic Plants: *Eichhornia crassipes* (water hyacinth)
Native Plants: *Nuphar sp.* (spadderdock)

Time Series: Depth Profiles





Time Series: Trophic Indicators



WQ Sampling Results

Surface Samples

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	0.55	Eutrophic	Reading violates DOH guidelines
TSI-Secchi		68.6	Eutrophic	No pertinent water quality standards
TP	mg/l	0.225	Eutrophic	Sample exceeds guidance value
TSI-TP		82.2	Eutrophic	No pertinent water quality standards
TSP	mg/l	0.0125	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	0.518	Elevated nitrate	Reading does not violate guidance
NH4	mg/l	0.304	Potentially high ammonia	Reading does not violate guidance
TKN	mg/l	3.06	Elevated organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	34.98	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	5.3	Mesotrophic	No pertinent water quality standards
TSI-CHLA		47.0	Mesotrophic	No pertinent water quality standards
Alkalinity	mg/l	58	Moderately Buffered	No pertinent water quality standards
TCOLOR	ptu	70	Highly Colored	No pertinent water quality standards
TOC	mg/l	14.5		No pertinent water quality standards
Ca	mg/l	20.5	Minimally Supports Zebra Mussels	No pertinent water quality standards
Fe	mg/l	0.547	Taste or odor likely	Reading violates water quality standards
Mn	mg/l	1.49	Taste or odor likely	Reading violates water quality standards
Mg	mg/l	5.81		Reading does not violate water quality standards
K	mg/l	4.39		No pertinent water quality standards
Na	mg/l	29.6		Reading violates water quality standards
Cl	mg/l	45.6	Significant road salt runoff	Reading does not violate water quality standards
SO4	mg/l	16.9		Reading does not violate water quality standards

Lake Perception

	UNITS	Reading	Scientific Classification	Regulatory Comments
WQ Assessment	1-5, 1 best	4	High Algae Levels	No pertinent water quality standards
Weed Assessment	1-5, 1 best	4	Dense Plant Growth at Lake Surface	No pertinent water quality standards
Recreational Assessment	1-5, 1 best	4	Substantially Impaired	No pertinent water quality standards

Legend Information

General Legend Information

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