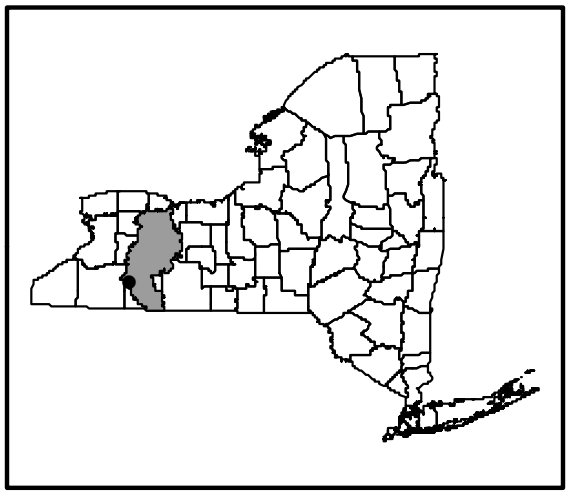
LCI Lake Water Quality Summary

General Information

Lake Name:	**Hanging Bog Pond**
Location:	Hanging Bog Wildlife Management Area, Town of New Hudson, Allegany County, NY
Basin:	Genesee River Basin
Size:	10.4 hectares (= 25.7 acres)
Lake Origins:	man-made
Major Tributaries:	none
Lake Tributary to?:	Crawford Creek
Water Quality Classification:	C (best intended use: secondary contact recreation)
Sounding Depth:	1.8 meters (6 feet)
Sampling Coordinates:	Latitude: 42.30523, Longitude: -78.24931
Sampling Access Point:	Parking area off New Hudson Road
Monitoring Program:	Lake Classification and Inventory (LCI) Survey
Sampling Date:	August 4, 2009
Samplers:	David Newman, NYSDEC Division of Water, Albany Steven Finnemore, NYSDEC Division of Water, Albany
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

Hanging Bog Pond is a small man-made lake created by the Civilian Conservation Corps in the 1930s, as stated on a plaque at the pond. The pond is named for the floating mat of vegetation that is in the center of the pond. The pond lies within the 4,571 acre Hanging Bog Wildlife Management Area (WMA) which is managed by the New York State Department of Environmental Conservation (DEC). The entire watershed for the pond lies within the WMA and is almost completely forested. The WMA supports a large variety of outdoor activities including hiking, bird watching, camping, cross-country skiing, snowshoeing, hunting and fishing. The pond itself is used as an educational opportunity for campers at DEC's Camp Rushford, an environmental education camp run by the DEC. It is suspected that the pond is also used for hunting and fishing by visitors to the wildlife management area.

Due to a lack of water quality data for Hanging Bog Pond, the pond was included in the DEC Division of Water's 2009 Lake Classification Inventory (LCI) survey in the Genesee River Basin. Hanging Bog Pond is a candidate for more intensive (monthly sampling) for 2010 due to elevated levels of phosphorus, chlorophyll *a*, and low water clarity.

Hanging Bog Pond can be generally characterized as *eutrophic*, or highly productive. The water clarity (TSI = 73, typical of *eutrophic* lakes) was expected based on the phosphorus readings (TSI = 72, typical of *eutrophic* lakes) and the chlorophyll *a* reading (TSI = 73, typical of *eutrophic* lakes). Soluble (available) phosphorus levels were low indicating that much of the phosphorus is in a form not readily available for primary production and or already tied up in primary production.

The lake water was observed to be a brownish orange color. The orange tint was much more apparent when water was placed in a sample bottle. The orange tint may come from the high iron content in the water. A similar water color was noted at Moss Lake, another bog in the Genesee River Basin. Rooted aquatic plants covered the surface of much the pond surface that was visible from the southwestern corner of the pond. The observed plant community consisted of water lilies, water shield and common bladderwort. The water lilies and water shield were also found at Moss Lake. No exotic plants were observed, however only a small portion of the pond was searched for aquatic plants. Profiles of the plant that were observed are included below.

Like most shallow lakes, Hanging Bog Pond 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 were comparable throughout the water column. Dissolved oxygen levels were low even at the surface of the pond, which may be due to the lack of open water that would allow oxygenation through wind mixing. Moss Lake with considerably more open water had higher levels of dissolved oxygen in the top meter of the water column, but similar oxygen levels to Hanging Bog Pond below 1 meter. pH readings indicate acidic water which is also a typical characteristic of northern bogs. Conductivity readings indicate soft water (low ionic strength).

Due to the acidic nature of the water and low dissolved oxygen levels the pond is not likely to support a large variety of warmwater fish. The LCI is not set up to fully assess the condition of fisheries.

Hanging Bog Pond showed elevated levels of iron and manganese; however, chloride and other ions were levels were low. Low chloride and other ion levels are typical for lakes in rural watershed that lack development.

Evaluation of Lake Condition Impacts to Lake Uses

Potable Water (Drinking Water)

Hanging Bog Pond is not classified for 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 due to high iron and manganese levels in the water column.

Contact Recreation (Swimming)

Hanging Bog Pond is not classified for contact recreation- swimming and bathing- it is unknown whether visitors to the WMA swim in the pond. Bacteria data are needed to evaluate the safety of Hanging Bog Pond for swimming, these data are not collected through the LCI. The data collected through the LCI indicate that swimming may be impaired due to poor water clarity, and high densities of aquatic plants. The water clarity reading taken in early August was well below the state DOH guidance value of 1.2 meters to protect the safety of swimmers.

Non-Contact Recreation (Boating and Fishing)

Hanging Bog Pond is currently classified for non-contact reaction (boating and fishing) being its best intended use. Due to the high density of aquatic plants boating and fishing would be difficult throughout much of the pond. In addition the low pH level may not be support a large fish population.

Aquatic Life

pH readings fall below the state minimum standard and may stress some aquatic life. However many of the plant species found at Moss Lake are adapted to the acidic conditions found at the pond. Low dissolved oxygen readings may also stress aquatic life. Additional biological studies would need to be conducted to fully evaluate aquatic life impacts from low pH and dissolved oxygen levels.

Aesthetics

These data indicate that aesthetics may be threatened by reduced water clarity and excessive aquatic plant growth.

Additional Comments

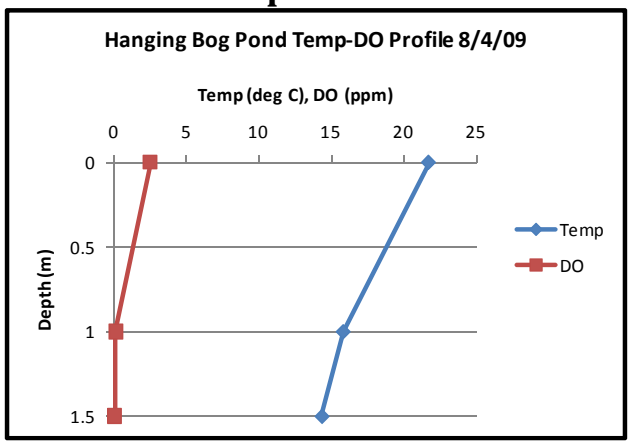
- Periodic surveillance for invasive exotic plant species may help to prevent the establishment and spread of any new invaders, given the escalating problems with exotic aquatic weeds.

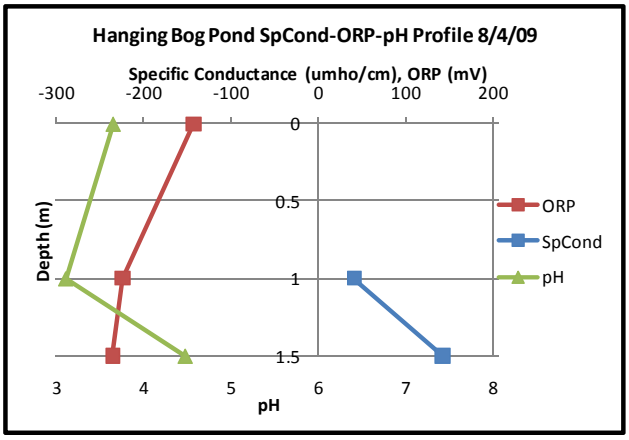
Aquatic Plant IDs

Exotic Plants: None

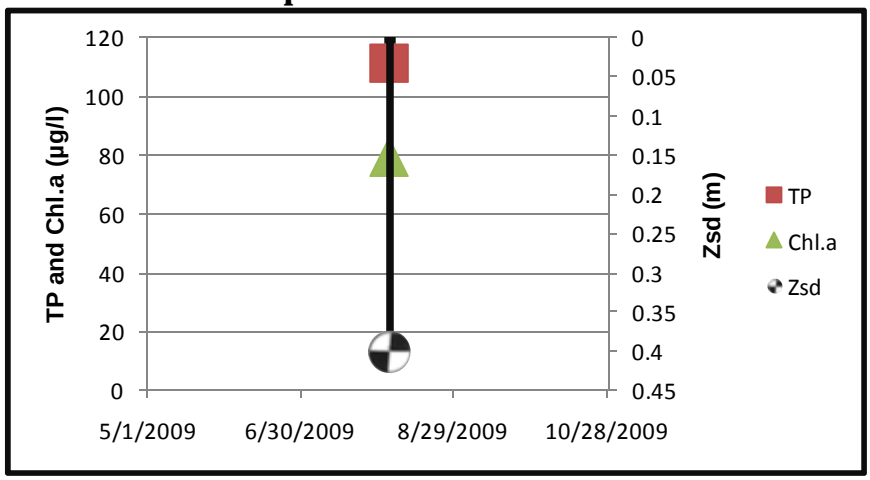
Native Plants: *Brasenia schreberi* (water shield)
Nymphaea sp. (white water lily)
Utricularia vulgaris (common bladderwort)

Time Series: Depth Profiles





Time Series: Trophic Indicators



WQ Sampling Results

Surface Sample

	UNITS	Reading	Scientific Classification	Regulatory Comments
SECCHI	meters	0.4	Eutrophic	Reading violates DOH guidelines
TSI-Secchi		73.2	Eutrophic	No pertinent water quality standards
TP	mg/l	0.111	Eutrophic	Sample exceeds guidance value
TSI-TP		72.0	Eutrophic	No pertinent water quality standards
TSP	mg/l	0.01	Little available phosphorus	No pertinent water quality standards
NOx	mg/l	ND	Low nitrate	Readings violate guidance
NH4	mg/l	0.04	Low ammonia	Reading does not violate guidance
TKN	mg/l	1.13	Elevated organic nitrogen	No pertinent water quality standards
TN/TP	mg/l	22.36	Nutrient Limitation Unclear	No pertinent water quality standards
CHLA	ug/l	79	Eutrophic	No pertinent water quality standards
TSI-CHLA		73.5	Eutrophic	No pertinent water quality standards
Alkalinity	mg/l	13.8	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	60	Highly Colored	No pertinent water quality standards
TOC	mg/l	10.4		No pertinent water quality standards
Ca	mg/l	5.71	Does Not Support Zebra Mussels	No pertinent water quality standards
Fe	mg/l	4.61	Taste or odor likely	Reading violates water quality standards
Mn	mg/l	0.364	Taste or odor likely	Reading violates water quality standards
Mg	mg/l	1.11		Reading does not violate water quality standards
K	mg/l	0.417		No pertinent water quality standards
Na	mg/l	5.26		Reading does not violate water quality standards
Cl	mg/l	9	Minor road salt runoff	Reading does not violate water quality standards
SO4	mg/l	ND		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	5	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

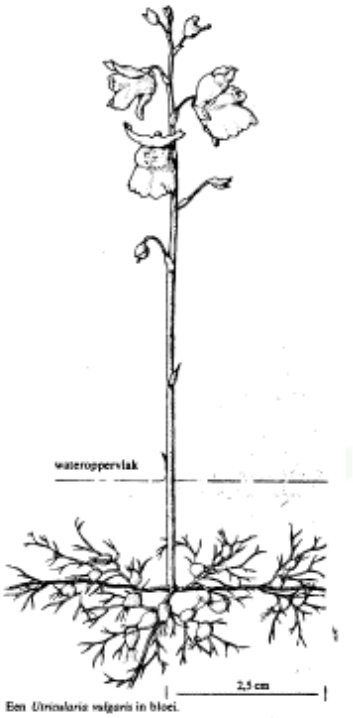
Lake Assessment

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

Aquatic Plant Profiles

SPECIES NAME: *Utricularia vulgaris*

COMMON NAME: common bladderwort



Een Utricularia vulgaris in bloei.

ECOLOGICAL VALUE: like all submergents, *Utricularia* harbors aquatic insects, provides hiding, nurseries, and spawning areas for amphibians and fish, and provides some food for waterfowl. Although it is sometimes listed as food for wildfowl and may harbor minute animal life, it generally is of little value to birds or mammals

DISTRIBUTION: common in acidic and alkaline ponds and streams from Labrador west to Alaska, south to Virginia, North Carolina, Ohio, Indiana, Missouri, Oklahoma, northern Texas, California, and Mexico

DISTRIBUTION IN NEW YORK common and often abundant in slow streams and quiet (often stagnant) lakes throughout New York State.

DEGREE OF NUISANCE: *Utricularia vulgaris* has been found growing extensively in some softwater NYS lakes. The plant moves extensively through and across lakes due to its poorly anchored root structure.

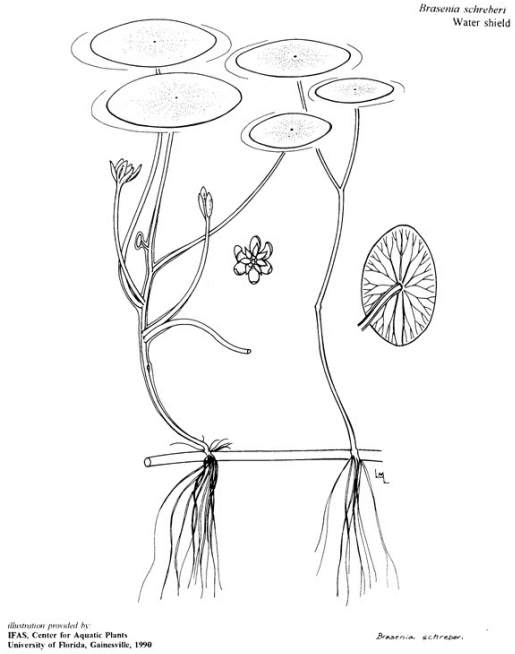
COMMENTS: *Utricularia* are essentially small herbs possessing bladders to provide ballast and to catch small animal life. Most species drift in the water, anchored only at one end, although some (primarily those with poorly developed bladders) are fully anchored in the sediment (though generally rootless). In regions with severe winters, such as New York, species with long stems and heavy foliage usually survive the cold by forming compact winter buds. The mature plants possess yellow or purple flowers. At least 13 different species are present in New York State lakes. Five species of this genus, *U. biflora* (two-flowered bladderwort), *U. fibrosa* (fibrous bladderwort), *U. geminiscapa* (hiddenfruit bladderwort), *U. juncea* (rush bladderwort), and *U. radiata* (small-floating bladderwort), are all on the NYS Rare Native Plant list. *Utricularia vulgaris* is the most common and abundant form of bladderwort in New York. Stems can grow to one meter in length in some areas. It was also once known as *Utricularia macrohiza*.

Line drawing: http://carnivoplants.fol.nl/UTRICULARIA_VOOR_IN_DE_TUIN_bestanden/image005.gif

SPECIES NAME: *Brasenia schreberi*

COMMON NAME: watershield, dollar bonnet

ECOLOGICAL VALUE: like all floating plants, *Brasenia* harbor aquatic insects. It provides food for ducks, and wildfowl eat the seeds, leaves, and underwater portions. It also provides cover for fish and small invertebrates.



DISTRIBUTION: locally distributed in slow-moving acid and alkaline ponds and lakes from Prince Edward Island west to southern Quebec, southern Ontario, and Minnesota, south to Florida and Texas, southern British Columbia and Oregon

DISTRIBUTION IN NEW YORK: common to locally abundant throughout the State in all regions, with heaviest occurrences in the Adirondacks.

DEGREE OF NUISANCE: may be frequent and common, but only occasionally is present at nuisance levels. However, it can grow abundantly along the shoreline of some lakes, and due to its floating nature, this plant may interfere with some recreational uses like swimming or fishing.

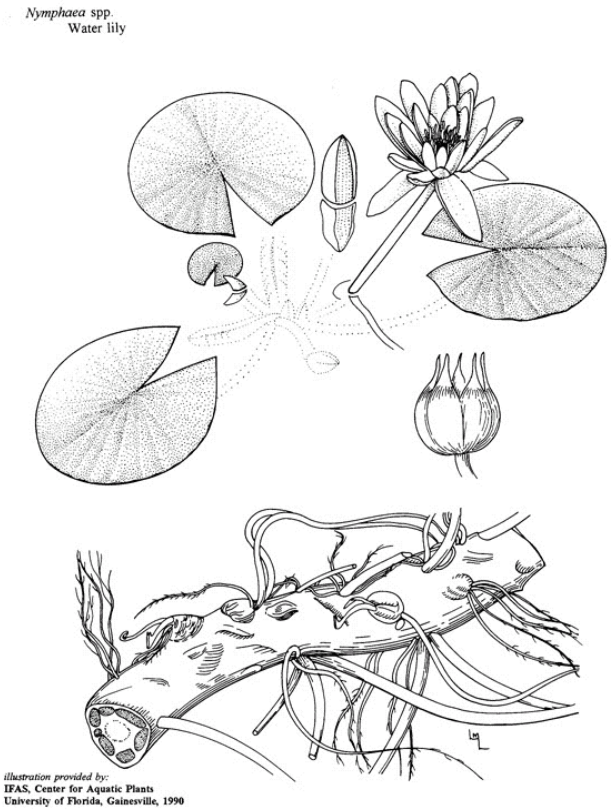
COMMENTS: the general plant structure is very similar to that for *Cabomba*, of which one species in an exotic plant in New York State. In fact, both *Cabomba* and *Brasenia* are members of the water lily (*Nymphaeaceae*) family. However, the leaves of *Cabomba* are cut in thread-like divisions, while the leaves of other genus in the water lily family are simple (generally floating leaf varieties). *Brasenia schreberi* is also native to the state. This plant frequently possesses a gelatinous slime on the underside of the floating leaves and along the upper portions of the stem.

Line Drawing: http://aquat1.ifas.ufl.edu/drawlist.html

SPECIES NAME: *Nymphaea odorata*

COMMON NAME: fragrant (white) water lily

ECOLOGICAL VALUE: Like all floating plants, *Nymphaea* harbor aquatic insects. Waterfowl eat the seeds of this plant. The seeds are adequate food for wildfowl, and are sometimes heavily eaten. This plant attracts wildfowl and marshbirds. The rootstocks and base of petioles are eaten by muskrats, and the roots eaten by deer, moose, beaver, and porcupine.



DISTRIBUTION: extremely common in ponds, lakes, and sluggish streams in highly acidic and alkaline waters from Newfoundland and southwestern Quebec, west to Ontario, Minnesota and Manitoba, south to Florida, Iowa, Nebraska, Kansas, Oklahoma, Texas, and Arizona.

DISTRIBUTION IN NEW YORK: common to locally abundant in shallow to deeper water of bog pools, sloughs, lakes, and ponds throughout the state

DEGREE OF NUISANCE: *Nymphaea odorata* may be frequent and common in the littoral zone of some lakes, but is rarely present at nuisance levels.

COMMENTS: Like *Nuphar*, which is also a member of the water lily family (*Nymphaeaceae*), *Nymphaea* also possesses thick and fleshy underground stems, but the leaf structure (round with a radial slit) and flower color (white to pink) of this genus is sufficiently different to allow easy differentiation. There are at least three species of this genus in New York. This plant is a perennial, and reproduces by seeds and by vegetative branching (rhizomes). It typically grows in waters up to 2.5 meters deep, and has a wide pH tolerance. The flowers of *N. odorata* are frequently open in the morning hours. This plant is often interchangeably identified as *N. tuberosa*. Specimens with light pink flowers are often found, with dark pink to light red flowers occurring occasionally.

Line drawing- http://aquat1.ifas.ufl.edu/nymodor.jpg