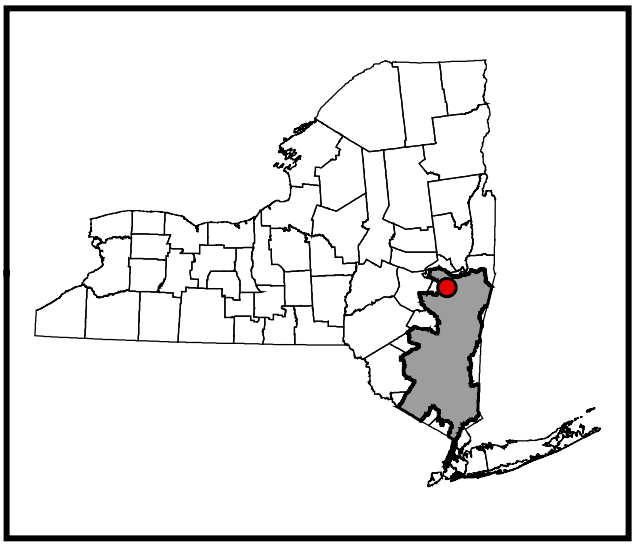
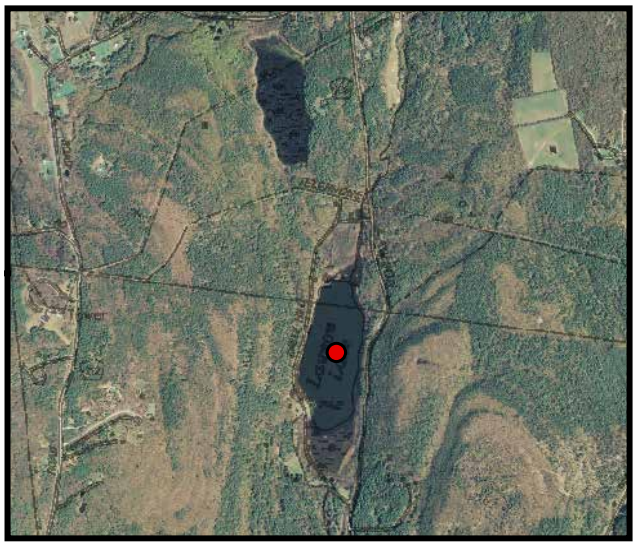
LCI 2014 Lake Water Quality Summary: Lawson Lake

General Lake Information

Location	Towns of Coeymans and New Scotland
County	Albany
Basin	Lower Hudson
Size	10 hectares (25 acres)
Lake Origins	Natural
Watershed Area	425 hectares (1,047 acres)
Retention Time	2.5 years
Maximum Depth	4.5 meters (15 feet)
Public Access?	Lawson Lake County Park with two hand carry launches
Major Tributaries	None
Lake Tributary To…	Unnamed Tributary to Onesquethaw Creek
WQ Classification	B (contact recreation = swimming)
Lake Outlet Latitude	42.5363
Lake Outlet Longitude	-73.9597
Sampling Dates	6/30, 7/28, 8/25 & 9/22/2014
2014 Sampling Staff	David Newman, Brad Wenskoski, Cliff Callinan (Albany), Carrie Buetow (R4 Schenectady)
DEC Contact	David Newman, DEC Division of Water david.newman@dec.ny.gov

Lake Map





Background
Lawson Lake is a 25 acre, class B lake located on the border of the Towns of Coeyemans and New Scotland in southeastern Albany County. The lake is part of Lawson Lake County Park which is owned and managed by Albany County. Albany County purchased the land, with the help of federal grant money, in 1979. Prior to the county purchasing the lake and the surrounding land the site was home to a children's summer camp (Camp Opportunities). The camp continued to operate under the Camp Opportunities name into the 1990's before the Boy and Girls Club of Albany took over operation. Over the past couple of years Albany County has renovated camp and improved public access to the lake.

Lake Uses
Lawson Lake is a Class B lake; this means that the best intended use for the lake is for contact recreation—swimming and bathing, non-contact recreation—boating and fishing; aesthetics and aquatic life. The lake has two public access points for hand carried boats as well as some hiking trails along the shoreline. The county does not staff the beach area with a life guard, so swimming is not permitted at this time. Historically the lake was used for swimming and the summer camp chlorinated lake water for drinking. The lake, however is not classified for use as a potable water supply and would have to be re-classified to be used in this capacity. The camp now uses a well for its water supply.

General statewide fishing regulations are applicable in Lawsons Lake.

There are no lake-specific fish consumption advisories on Lawsons Lake.

Historical Water Quality Data
Prior to the summer of 2014, there had not been any DEC directed water quality studies of the lake. A fisheries survey was conducted in 1997 which found bullhead and yellow perch to be the most abundant panfish. Only a few bass were collected, suggesting a recruitment problem, likely related to predation of eggs and fry. Pickerel, black crappie, bluegill, pumpkinseed and golden shiners were also collected during this survey.

In mid-August of 2013 the Division of Water received a report of a potential blue-green algal bloom at Lawson Lake. DEC staff visited Lawson Lake on three locations over a five week period starting in late August, and confirmed that a blue green bloom was present along the western shoreline. Sampling found blue green algae chlorophyll levels 100-500x higher than the DEC criteria for a blue green algae bloom, due to an algal community comprised entirely of blue green algae species (including *Anabaena*, *Microcystis*, and *Planktothrix*). Analysis of algal toxins found microcystin-LR (a liver toxin) levels in all three samples greatly exceeded the World Health Organization (WHO) threshold for unsafe swimming. Due to these findings, Lawson Lake was included in the 2014 Lake Classification and Inventory program for evaluation of overall water quality conditions.

None of the unnamed ephemeral tributaries to the lake, nor the outlet of the lake, have been monitored through the NYSDEC Rotating Intensive Basins (RIBS) or stream biomonitoring programs.

Summary of 2014 LCI Sampling Results

Evaluation of Eutrophication Indicators
Lawson Lake can generally be characterized as *eutrophic*, or highly productive. The average water clarity reading (TSI = 56, typical of *eutrophic* lakes) was expected given the average total phosphorus reading (TSI = 55, typical of *eutrophic* lakes), but the average water clarity reading

was higher than expected given the chlorophyll *a* reading (TSI = 71, at the low end of *hyper-eutrophic* lakes). These data indicate that the elevated total phosphorus levels may at times lead to high levels of chlorophyll *a* (algae) in the lake. These elevated algae levels can reduce the water clarity in the lake. All four of total phosphorus surface samples were above the DEC guidance value 0.02 mg/l defined to protect aesthetic quality of lakes. This is consistent with very high levels of chlorophyll a, indicating high levels of algae growth. One of the four water clarity readings fell below the DOH guidance value of 1.2 meters to protect the safety of swimmers. The June water clarity reading of 1.9 meters was the same as was observed during the fisheries survey conducted in June of 1997. This may suggest that conditions in the lake, at least early in the summer season, have remained constant over time.

Evaluation of Potable Water Indicators

Algae levels are high enough to render the lake susceptible to taste and odor compounds or elevated DBP (disinfection by product) compounds that could affect the potability of the water, and the lake is not used for drinking water. Deepwater phosphorus and ammonia readings are higher than those measured at the lake surface, indicating possible reductive sediment release of phosphorus. Other compounds such as iron, manganese and arsenic may also be present, although these were not analyzed through this program. Any of these elevated pollutants may impact any “unofficial” deepwater intake use.

Evaluation of Limnological Indicators

Alkalinity levels were low, indicating the lake is poorly buffered against acidic inputs. Color readings indicate low levels of dissolved organic matter, typical of other lakes in the area. Nitrate and ammonia levels were low in the surface water, but organic nitrogen levels are elevated. This is typical of other lakes with high algal productivity. Nitrogen to phosphorus ratios show that algae growth is controlled by phosphorus rather than nitrogen. None of the other indicators sampled through this program point to any water quality impairments.

Evaluation of Depth Profiles

Lawson Lake exhibited week thermal stratification, in which depth zones (warm water on top, cold water on the bottom during the summer) are established. At the end of June there was a distinct thermocline at about 2 meters where the temperature and dissolved oxygen levels dropped off. During the other three sampling events the lake appeared to be vertically mixed with temperature and dissolved oxygen levels remaining fairly constant throughout the water column. The shallow nature of the lake allows for wind mixing preventing stratification.

Early season pH values were elevated, but met the state water quality standards during most of the summer. Conductivity levels were low to moderate showing no indication of impacts related to runoff from impervious surfaces.

Evaluation of Biological Condition

Macrophytes were informally surveyed during the sampling trips to the lake during the summer of 2014. One invasive plant species, curlyleaf pondweed, was observed to be occurring in the lake. Five additional native plant species were observed which included both floating leaf and submerged species. A 2011 survey of the wetland area at the north end of the lake found waterchestnut to be occurring, but this was not observed in 2014 (extensive plant surveys were not conducted). In addition, the emergent invasive species purple loosestrife has been observed growing around the lake.

Evaluation of Lake Perception

An evaluation of user perception was made during each of the four sampling trips during the summer of 2014 by DEC samplers. Users’ perception of water clarity was noted as indicative of

either “algal greenness” or “high algal greenness.” Plants were observed growing to the water’s surface at all times, with the plant coverage limited mostly to the north and south end of the lake and to a lesser extent the near shore areas of the lake. The recreation was most often noted to be slightly impaired due to poor water color and clarity.

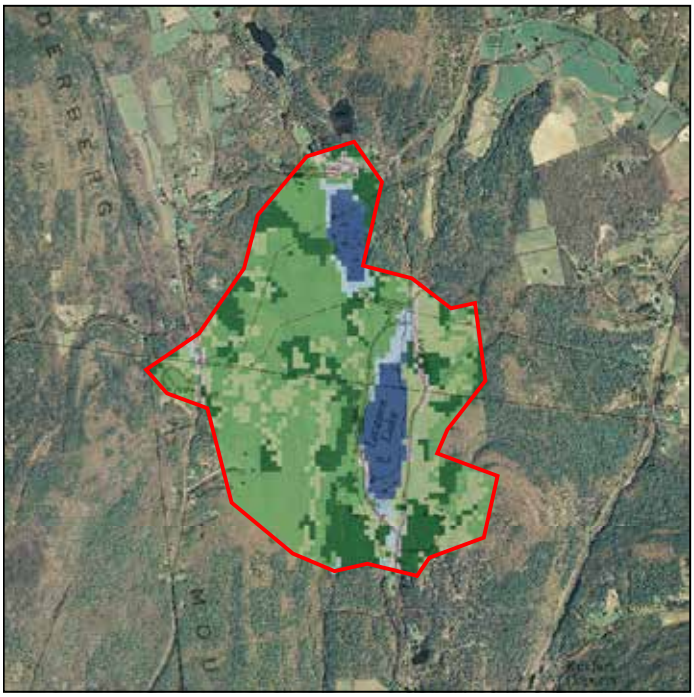
Evaluation of Algal Toxins

Algal toxin levels can vary significantly within blooms and from shoreline to lake, and the absence of toxins in a sample does not indicate safe swimming conditions. Shoreline algae blooms were observed along the western shoreline in August and September of 2013, and August and October in 2014. An analysis of algae samples in both years confirmed very high blue green algae levels- in both years, *Microcystis* dominated the algae community, although other toxin-producing blue green algae were also found. Algal toxin measurements in all samples in 2013 and in the October 2014 samples showed very high levels of microcystin-LR (a liver toxin). Anatoxin-a (a nerve toxin) levels were not detectable in any samples. However, these data show that visitors and their pets should avoid contact with shoreline blooms or discolored water, particularly along the western shore. Anyone exposed to these blooms should seek immediate medical assistance if any blue green algae exposure symptoms (nausea, vomiting, diarrhea, skin or throat irritation, allergic reactions or breathing difficulties) are experienced, and the county Department of Health should be informed of these symptoms as appropriate.

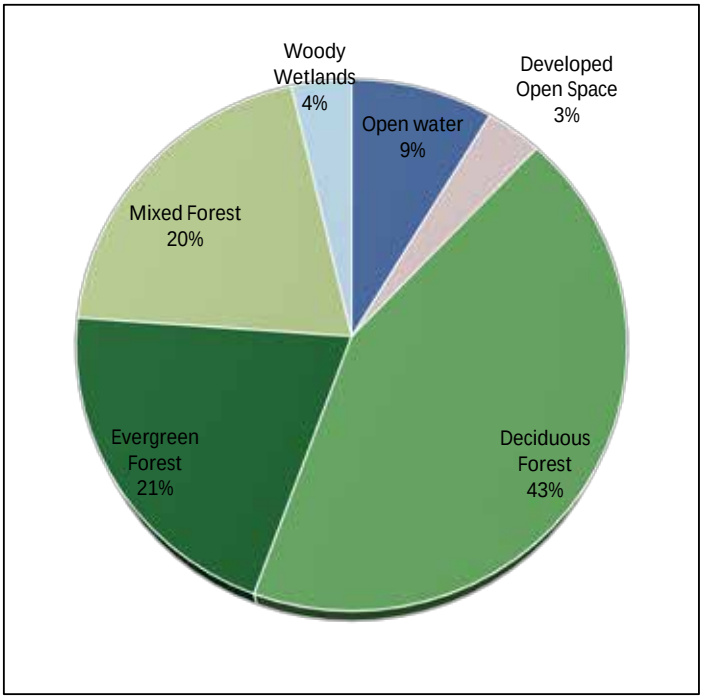
Evaluation of Lake Watershed Analysis

Lawson Lake’s watershed is ~650 acres in size. The watershed is made of mostly forested land with a low percentage of develop and agricultural lands. Historical aerial photos of the watershed show there was additional agricultural lands within the watershed. Most of these areas are now forested. The lake itself as well as 18 acre area north west of the lake are state designated wetlands. These wetland areas are protected under the state’s Freshwater Wetland Act.

Lawson Lake Watershed with 2011 Land Cover



Land Cover within the Lawson Lake Watershed



Lake Condition Summary

Evaluation of Lake Condition Impacts to Lake Uses

Lawson Lake is presently among the lakes listed on the Lower Hudson River drainage basin Priority Waterbody List (PWL) as *unassessed*. This listing will likely be updated for the 2016 federal waterbody listing cycle.

Potable Water (Drinking Water)

The LCI dataset at Lawson Lake, including water chemistry data, physical measurements, and user perception data, is inadequate to evaluate the use of the lake for potable water, and the lake is not classified nor currently used for this purpose. The high algae levels readings indicate a potential threat to any “unofficial” potable water use.

Public Bathing

The LCI dataset at Lawson Lake, including water chemistry data, physical measurements, and user perception data, suggests that public bathing is stressed due to periodic low water clarity and the occurrence of harmful algal blooms. Additional information about bacterial levels is needed to fully evaluate the safety of the water for public bathing. Currently there is no public swimming beach on the lake.

Recreation

The LCI dataset on Lawson Lake, including water chemistry data, physical measurements, and user perception data, suggest that recreation is impaired due to high chlorophyll a levels and the occurrence of harmful algae blooms.

Aquatic Life

Periodic low dissolved oxygen in the deeper portions of the lake (below 2 meters) have been noted at certain times of the year, with deep water oxygen levels at time below the state water quality standard. This may stress aquatic life in the lake, although no direct impacts have been measured or reported. A historic fisheries survey indicated that there was likely a recruitment issue impacting the bass population in the lake, it is unknown whether this problem has persisted.

Aesthetics

The LCI dataset on Lawson Lake, including water chemistry data, physical measurements, and user perception data, suggest that aesthetics are stressed due to the occurrence of blue-green algae blooms and high nutrient levels.

Habitat/Hydrology

The occurrence of multiple invasive species threatens the habitat/hydrology of Lawson Lake.

Fish Consumption

There are no fish consumption advisories posted for Lawson Lake.

Lawson Lake Data Summary

Aquatic Plant IDs

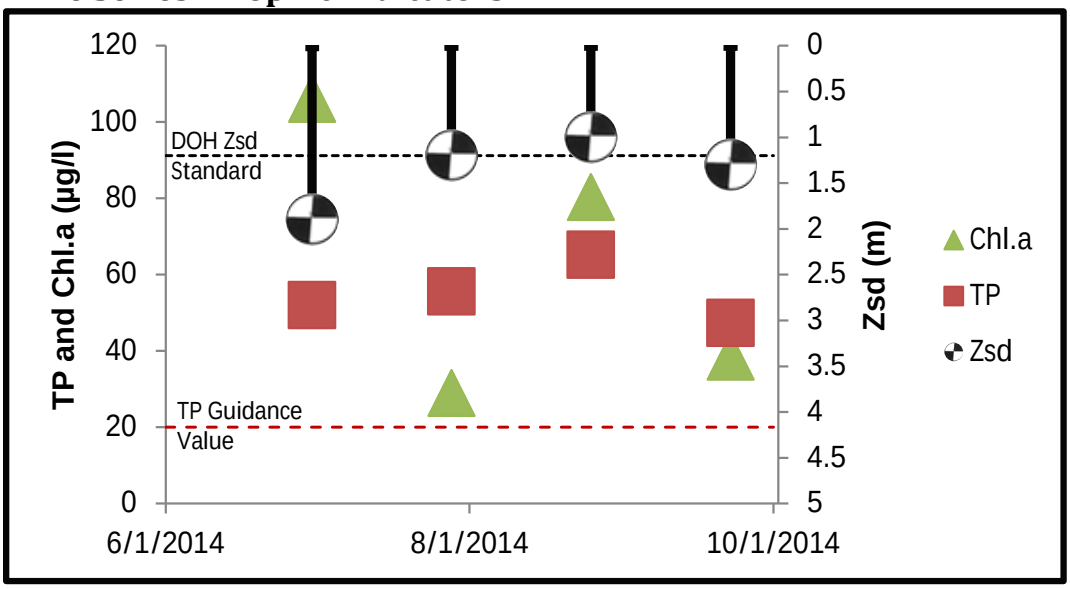
Exotic Plants:

Trapa natans (water chestnut) (2011 observation made in the northern wetland area of the lake)
Potamogeton crispus (curlyleaf pondweed)

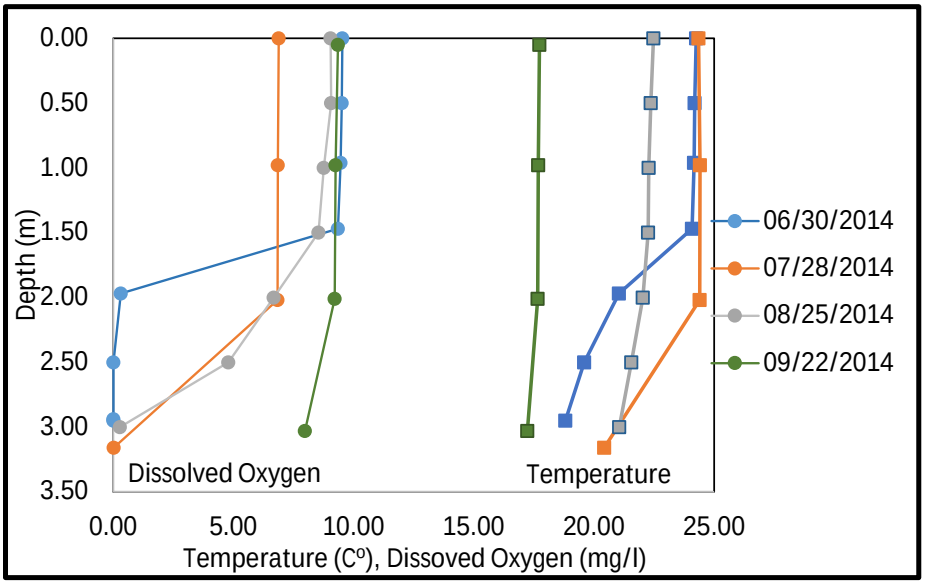
Native Plants:

Brasenia schreberi (water shield)
Nymphaea sp. (white water lily)
Nuphar sp. (yellow water lily)
Potamogeton epihydrus (ribbonleaf pondweed)
Pontederia cordata (pickerelweed)

Time Series: Trophic Indicators



Depth Profile Chart



Surface Samples

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
SECCHI	meters	4	1	1.35	1.9	Eutrophic	25% of readings violate DOH guidelines
TSI-Secchi			60.0	55.7	50.8	Eutrophic	No pertinent water quality standards
TP	mg/l	4	0.0473	0.055	0.0652	Eutrophic	100% of readings violate water quality standards
TSI-TP			59.7	61.9	64.3	Eutrophic	No pertinent water quality standards
TSP	mg/l	4	0.0082	0.0158	0.0348	High % soluble Phosphorus	No pertinent water quality standards
NOx	mg/l	4	0.0007	0.0043	0.0063	Low nitrate	No readings violate water quality standards
NH4	mg/l	4	ND	0.00675*	0.012	Low ammonia	No readings violate water quality standards
TKN	mg/l	4	0.73	0.9225	1.22	Elevated organic nitrogen	No pertinent water quality standards
TN/TP	mg/l		29.89	37.49*	51.88	Phosphorus Limited	No pertinent water quality standards
CHLA	ug/l	4	29	63.45	106	Eutrophic	No pertinent water quality standards
TSI-CHLA			63.6	71.3	76.3	Eutrophic	No pertinent water quality standards
Alkalinity	mg/l	4	16	22.83	28.6	Poorly Buffered	No pertinent water quality standards
TCOLOR	ptu	4	25	27.8	32	Weakly Colored	No pertinent water quality standards
TOC	mg/l	4	6	7.175	7.8		No pertinent water quality standards

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

Bottom Samples

	UNITS	N	MIN	AVG	MAX	Scientific Classification	Regulatory Comments
TP-bottom	mg/l	2	0.064	0.1	0.136		No pertinent water quality standards
TSP-bottom	mg/l	2	0.019	0.0443	0.0695	High % soluble phosphorus	No pertinent water quality standards
NH4-bottom	mg/l	2	ND	0.175*	0.347	Evidence of DO depletion	No readings violate water quality standards
TCOLOR-bottom	ptu	2	32	37	42	Highly Colored	No pertinent 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	3	3.5	4	High Algae Levels
Weed Assessment	1-5, 1 best	4	3	3	3	Plants Grow to Lake Surface
Recreational Assessment	1-5, 1 best	4	3	3.25	4	Slightly Impaired

Algal Bloom Samples

Category	Indicator	Min	13-14 Avg.	Max	2014 Avg.	Classification
Harmful Algal Blooms	Shoreline FP Chl.a	43	6888	15409	2881	All readings indicate very high algae levels
	Shoreline FP BG Chl.a	0	6783	15409	2696	Nearly all readings indicate very high BGA levels
	Shoreline Microcystis	<DL	129	490	164	Consistently very high shoreline bloom MC-LR
	Shoreline Anatoxin a	<DL	<DL	<DL	<DL	Shoreline bloom Anatoxin-a consistently not detectable

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(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
MC-LR	= Microcystis-LR (ug/l) Detection limit = 0.01 ug/l; 1 ug/l potable criteria, 20 ug/l swimming criteria
FP-Chl, RP-BG	= Fluoroprobe total chlorophyll, fluoroprobe blue-green chlorophyll (ug/l) Detection limit 0.1 ug/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 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

Management Options for Lawsons Lake

Each of the management options for addressing the algae blooms on Lawsons Lake are discussed at length in the DEC publication Diet for a Small Lake: An Expanded Guide to Lake and Watershed Management in New York on the DEC website (http://www.dec.ny.gov/chemical/82123.html- specifically, Chapter 7: Algae and Other Undesireables: Getting Rid of Yuck). The summary below identifies which of the short-term algae control measures could be considered for use in the lake. However, the most effective means for addressing algae blooms on the lake is to reduce nutrient loading, particularly phosphorus, from the lake. The most appropriate management options for reducing phosphorus loading to the lake are addressed in Chapter 9 of Diet for a Small Lake: Watershed Management: The Big Picture. This chapter should be consulted to evaluate which watershed management actions may be appropriate for 604b or other grant applications initiated through the Capital District Regional Planning Commission.

Short Term Measures:

Artificial circulation:

Principle: injecting compressed air from a pipe or ceramic diffuser into the lake, usually the hypolimnion, to increase flow and oxygen levels, breaking down any thermal layers in the lake. This measure will increase oxygen levels and decrease the "reductive" (anoxic, or zero oxygen, mediated) release of nutrients from bottom sediments, and decrease water temperatures by increasing water movement.

Applicability to Lawsons Lake: only limited effectiveness would be expected. Although Lawsons Lake exhibits periodic oxygen deficits in the bottom 0.5-1 meter of depth, this "anoxia" appears to be short term and (based on the ORP measurements) does not appear to be of sufficient duration to result in reductive nutrient release from bottom sediments. Oxygenating bottom waters, even if possible, would not be expected to decrease nutrient levels in the lake, and may trigger other problems. There is also little evidence that high temperatures are triggering these algae blooms.

Hypolimnetic aeration:

Principle: injecting oxygen directly into the hypolimnion or lifting deep waters to the surface, to increase oxygen levels, without breaking down any thermal layers in the lake. This measure will also increase oxygen levels and decrease the "reductive" (anoxic, or zero oxygen, mediated) release of nutrients from bottom sediments.

Applicability to Lawsons Lake: in the absence of a well defined hypolimnion due to periodic natural mixing of the entire water column, this lake management measure would not likely be effective in Lawsons Lake.

Hypolimnetic withdrawal:

Principle: installing a pipe or siphon to remove deep waters out of the lake, allowing for natural replacement of bottom waters by surface waters. This measure will selectively remove nutrient-enriched deep waters, thereby decreasing overall lake nutrient levels and decreasing migration of nutrients from deep to surface waters.

Applicability to Lawsons Lake: as noted above, Lawsons Lake does not exhibit a well defined hypolimnion due to periodic natural mixing of the entire water column. Therefore hypolimnetic withdrawal would only be useful at times when the lake is temporarily (thermally) stratified and deep sediments and releasing nutrients to the overlying waters. This could not be accurately gauged without permanent oxygen gauges (through the use of a remote underwater sensing station).

Algacides:

Principle: applying chemicals to kill algae cells, dropping them to the lake bottom. There are a number of algacides registered for use in New York State, most of which are either copper- or hydrogen peroxide- based.

Applicability to Lawsons Lake: algaecides are used in a large number of New York lakes, including those with swimming beaches or drinking water intakes. Algacides must be used with discretion since blue green algae (the dominant algae during at least part of the summer in Lawsons Lake) can produce nerve, liver, and skin toxins that can persist for a short time after the algaecides remove the algae from the water. These impacts appear to be reduced by the use of hydrogen peroxide products, which can also break up the toxins, although the effectiveness of peroxide in reducing algae blooms has not yet been well documented in New York. The algacides will also need to be reapplied when blooms return, at times as frequently as every few weeks, since the nutrients triggering these blooms are not removed by the algacides.

Process to use this tool: algacides are restricted use products that must be applied by licensed applicator and require a permit from DEC- in this case, the DEC Region 4 pesticides office in Schenectady. The expected cost for using algacides is about $15 per acre-foot; about 125 acre-feet of water would need to be treated in Lawsons Lake.

Nutrient precipitation and inactivation:

Principle: applying a non-toxic chemical to the water to precipitate algae and/or the sediment to seal nutrients into the bottom sediments. This can remove algae from the water and reduce the migration of nutrients from bottom sediments to the overlying waters. The chemicals most commonly used for nutrient precipitation and inactivation are aluminum sulfate (alum) and lanthanum.

Applicability to Lawsons Lake: it is not known how much of the nutrient loading in Lawsons Lake comes from sediment release- in some lakes, this is a substantial source of nutrients. However, as of this writing (January 2015), the use of alum and lanthanum is prohibited in New York state, despite their use in other states, due to some uncertainty about whether these products should be considered to be pesticides and the lack of a federal registration of these products as pesticides.

Biomanipulation:

Principle: stocking a biological organism- usually a fish- to alter the food web to reduce algae concentrations. This usually involves stocking a piscivorous (fish-eating) fish, such as largemouth bass, lake trout, or walleye, to consume planktivorous (plankton-eating) fish, such as bluegills or alewives that are selectively removing the large zooplankton that normally keep algae in check.

Applicability to Lawsons Lake: it is not known whether the zooplankton community is suppressed or whether the fish community in Lawsons Lake is dominated by planktivorous fish. Therefore it is not known whether stocking piscivores will restore the zooplankton community. The very high nutrient levels in the lake suggest that algae will continue to grow abundantly even if zooplankton levels are increased. However, additional studies of the lake may be warranted to evaluate whether biomanipulation- specifically, the stocking of largemouth bass (the only common piscivore likely to survive in shallow, warmwater Lawsons Lake) might decrease algae levels in the lake.

Process to use this tool: DEC regional fisheries staff in the Region 4 office in Stamford should be consulted to see if Lawsons Lake is a candidate for biomanipulation and more extensive studies of the fisheries and zooplankton community. This might also serve to improve

recreational angling opportunities at the lake. At an expected stocking rate of approximately 2500 bass fingerlings, stocking costs are estimated to be about $4k.

Barley straw:

Principle: application of bales of barley straw to reduce algae levels through a poorly understood mechanism, most likely related to some combination of zooplankton (rotifer) grazing, natural production of hydrogen peroxide, or algae adsorption onto straw cellular material. Barley straw are "stocked" at a rate of about two to five 40lb bales per acre, usually limited to portions of the waterbody with blooms.

Applicability to Lawsons Lake: the effectiveness of barley straw is not well understood, but it has been used with some (poorly documented) success to combat algae blooms in small portions of some larger New York lakes. There are some barley straw "products" marked for use as algae control agents in New York and other states- those claiming to control algae are probably illegal in New York since they are not registered as pesticides. In cases where it has been legally used in New York, lake residents have secured "unmarketed" straw directly from farmers or through county SWCD offices. Barley straw bales are usually placed into lakes at the beginning of the algae growing season or recreational season, suspended between the surface and lake bottom in loosely baled bags using floats and anchors, and removed at the end of the year. This may have some applicability for siting near the west shore of the lake, the focal area for potential algae exposure for recreational users. There is little indication that other forms (crops) of straw will work.

Process to use this tool: The Albany County SWCD may be aware of local farmers who grow barley straw- they should be contacted to secure sufficient quantities of barley straw- perhaps in 100ft increments just outside the boating access area- for use during the summer recreational season.

Summary of management options

Each of the in-lake management options discussed above can be considered for use in addressing algae blooms in Lawsons Lake. The water quality data collected through the DEC Lake Classification and Inventory (LCI) survey of the lake in 2013 and 2014 found highly elevated phosphorus levels, consistent with other lakes exhibiting regular algae blooms. Any in-lake management measures to address algae blooms will likely need to be regularly repeated until nutrient levels in the lake are decreased to the point where bloom susceptibility is substantially reduced.

Data collected by DEC and other states indicate that, for most lakes, phosphorus levels need to be less than about 20 ug/l to significantly reduce the likelihood of blooms- this is about 60% lower than the existing phosphorus levels in Lawsons Lake. Therefore most of the lake management efforts to reduce the likelihood of blooms will necessarily focus on controlling nutrient levels in the lake, and thus nutrient loading to the lake. Any in-lake measures to reduce algae blooms will address management of symptoms rather than causes of blooms.
The summary above indicates that several in-lake management options warrant further evaluation:

- Algaecides, particularly the use of hydrogen peroxide
- Biomanipulation, particularly the stocking of largemouth bass
- Barley straw, particularly applied near the western shoreline of the lake

Additional measures

Albany County Parks or other local managers should also consider instituting the following measures

1. Harmful algae bloom surveillance, reporting and signage. The 2013 and 2014 data indicate a persistent problem with potential toxic algae blooms. Staff involved with recreation and other outreach programs at the lake should be on the lookout for shoreline blooms. These can be documented through regular reporting (using field forms developed by DEC) and digital images of bloom conditions. Blooms should be reported through the DEC harmful algae bloom notification program (http://www.dec.ny.gov/chemical/83310.html) and through additional outreach (press releases, website updates, and other media) supported by the county. Park activities, including active recreational use of the water, should be limited when blooms are present. If and when persistent blooms are present, local signage might be appropriate for informing visitors about potential risks from blue green algae exposure- DEC or DOH can work with the county to develop site-specific signage, or can provide generic signs.
2. Detailed watershed analyses. This report provides an estimate of land use categories within the Lawsons Lake watershed. This analysis can be extended through the development of a desktop nutrient budget, using literature-based nutrient and sediment export coefficients based on land uses, to identify the most likely sources and quantities of nutrient loading to the lake. This process has been summarized in the "small lake TMDL" reports on the DEC web page (http://www.dec.ny.gov/chemical/23835.html#Small)- a similar approach could be used by Lawsons Lake/Albany County partner agencies or consultants to determine the most appropriate ways to reduce nutrient levels in the lake.
3. Watershed control measures. TMDL calculations can determine which watershed sources of nutrients are most significant, and these partner agencies can determine which watershed control measures might be the best candidates to reduce nutrient loading from these sources. These actions might be the best candidates for grant applications.