

October 23, 2012

Mr. William J. Buckley
Director of Economic and Community Development
Searles Building, 41 Pleasant Street
Methuen, MA 01844

Re: Survey Update - Forest Lake: Methuen, MA

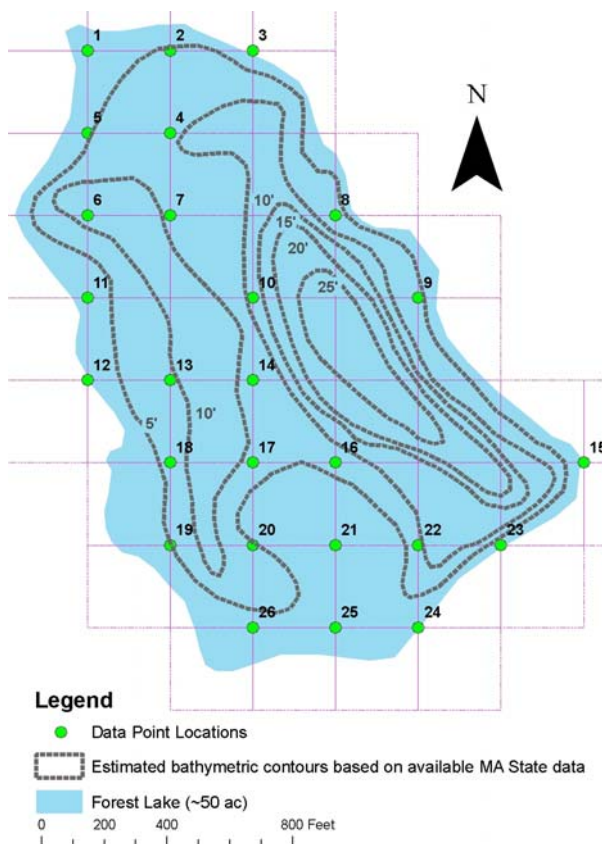
Dear Mr. Buckley:

I am writing to provide a summary of our survey findings to facilitate your discussion at the meeting scheduled for Wednesday, October 24. A more detailed report of our findings will follow.

Task 1 – Aquatic Vegetation Inventory: On September 10, Michael Lennon from Aquatic Control along with an assistant performed a detailed survey of Forest Lake to document vegetation composition and distribution in the lake. Vegetation was collected and identified with the use of a throw-rake, an underwater camera system and visual observation, where feasible. The entire littoral area of the lake (i.e. that area of the lake that receives sunlight to the bottom and supports rooted plant growth) was surveyed from a Jon Boat with an electric motor.

Quantitative survey data was also collected at 26 data collection points established by overlaying 80 meter grid over the littoral area of the lake (<15 deep). At each data point location plants were identified to genus level where possible and cover and biomass was estimated using a 1-4 scale. A cover of “1” would indicate: 1%-25% overall vegetation cover; and “2” represents 26%-50% cover and so forth. With regards to biomass a “1” represents low-growing vegetation and a “4” represents topped-out/surfacing vegetation. The use of this survey methodology allows for direct comparison of plant data in future years and between different surveyors.

At the time of the survey the vegetation composition was dominated by Richardson’s Pondweed (*Potamogeton richarsonii*) which was encountered at 40% of the surveyed data point locations. Growth of Richardson’s Pondweed was tall in most locations were found and was generally at, or within one, foot of the surface (i.e. biomass 3-4). Richardson’s Pondweed was the dominant species at 8 of the 11 data point locations where recorded, indicating dense growth where found, and could be observed in large beds of in the middle portion of the waterbody. Thinleaf pondweed (*Potamogeton pusillus*) and



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common waterweed (*Elodea canadensis*) were also well distributed and were found at approximately 27% and 15% and of the data point locations, respectively. Other aquatic plants identified during the survey included: Robbins Pondweed (*Potamogeton robbinsii*), tapegrass (*Vallisneria americana*), white waterlily (*Nymphaea odorata*), Slender spikerush (*Eleocharis tenuis*) and filamentous algae (*Chlorophyta* sp.). With the exception of the floating-leafed waterlily species most of the plant species encountered were low growing with typical biomass indices between 1-2. No invasive or non-native aquatic plants were identified in Forest Lake.

Task 2 – Water Quality Collection & Analysis: Three water samples were collected from Forest Lake. Two samples were collected near the deep-hole (surface & 7 meters); a third sample was collected by the lake outlet. Samples were packed on ice and delivered to Micorbac Laboratories in Worcester. A summary of the results follows:

Summary of Results				
Parameter	Unit	Deep Hole (Surface)	Deep Hole (7m)	Outlet (Surface)
pH	S.U.	7.25	6.33	7.31
Alkalinity	CaCO ₃ /L	21.0	31.0	23.0
Turbidity	NTU	0.600	3.10	0.630
Total Kjeldal Nitrogen	mg/L	0.200	0.900	0.500
Ammonia Nitrogen	mg/L	<0.100	<0.100	<0.100
Nitrate	mg/L	<0.100	<0.100	<0.100
Total Phosphorus	mg/L	<0.0100	0.0700	<0.0100
True Color	Pt-Co	5	ND	5
Apparent Color	Pt-Co	10	10	10
E.coli	CFU/100ml	<10	>2000	<10

Results from the water quality sampling round in Forest Lake appear quite favorable with neutral water chemistry and low nutrient levels; in most instances below laboratory detection limits. The only detectable phosphorus “hit” was found in the 7 meters deep sample. While phosphorus was fairly elevated in this sample, results like this expected in late summer and are the result of poor mixing during summer stratification. The high e.coli counts and higher Total Kjeldal Nitrogen (TKN) reported in this sample are also the result of poor mixing during stratification. Other water quality parameters tested were also favorably low. A more comprehensive breakdown of tested parameters will be included with the survey report

Temperature/Dissolved Oxygen Profile (9/10/12)		
Depth (m)	Temp (C°)	Dissolved Oxygen (mg/L)
Surface	24.2	9.07
1	24.2	8.87
2	24.2	8.72
3	24.2	8.76
4	24.2	8.80
5	23.9	8.63
6	23.9	8.62
7	17.6	1.35
8	15.1	0.75

Task 2A – Temperature-Oxygen Profiling. – Secchi Disk Water Transparency – Phytoplankton Identification:

A temperature/dissolved oxygen profile and Secchi Disk transparency (i.e. a standard measure of water clarity) was also performed at the “deep-hole” sampling location on September 10.

The water clarity in Forest Lake was good with a Secchi Disk clarity reading of 12.2 feet.

Dissolved oxygen concentrations above the thermocline (~6.5m) were good averaging 8.78 mg/L at 24.1°C or roughly 100% saturation. Below the thermocline conditions were nearly anoxic with less than 20% saturation averaging 1.05 mg/L at 16.5°C. Similar to the elevated phosphorus/e.coli/TKN levels detected in this area of the water column by the water chemistry results, low oxygen levels are expected below the thermocline in late summer as a result of poor mixing during summer stratification.

An algae sample was also collected at the deep hole location on September 10. The sample was returned to ACT and preserved with glyceraldehyde for analysis at a later date. Based on observations made during the survey we would expect that very low algae counts will be reported.

Preliminary Conclusions: Overall it appears that Forest Lake is in relatively good shape with regards to plant distribution, species present and water quality. All of the plants identified in the lake are native plants that are typically non-invasive or problem forming; more importantly no non-native, invasive plant species were identified in the lake. Tested water quality parameters were also quite favorable and did not indicate any acute issues, although more comprehensive testing would have to be performed to establish credible baseline values for the lake.

With regards to management plant management it is possible that some localized management could be warranted to curtail growth of Richardson's Pondweed or other high biomass plants in high use and/or swim areas, however, given the overall distribution and composition of aquatic plant species in the lake at the current time lake-wide management of aquatic plants is not advisable.

Continued monitoring of the lake is critical and should be performed annually so that appropriate actions can be taken if an unwanted species is identified in the lake. Given the presence of a public boat ramp it is very likely that an unwanted species (i.e. milfoil) will enter the lake and early identification and management will be paramount to their successful management.

Please let me know if you have any questions prior to your meeting.

Regards,



Michael Lennon, Biologist ACT