MORSES POND ANNUAL REPORT: 2011

PREPARED FOR THE TOWN OF WELLESLEY

BY WATER RESOURCE SERVICES, INC.

DECEMBER 2011

Contents

This report documents the implementation of the 2005 Comprehensive Morses Pond Management Plan through 2011. Primary elements include: 1) phosphorus inactivation, 2) plant harvesting, 3) low impact development demonstration, 4) education, and 5) dredging.

Phosphorus Inactivation

Operational Background

A phosphorus inactivation system was established in the spring of 2008, in the north basin of Morses Pond. After testing and initial adjustment in 2008, the system has been operated in the spring and early summer of 2009 through 2011. The chemical pump station is portable, but is stationed for the treatment period at the Town of Wellesley Dale Street Pump Station. Four sets of lines run from the pump station into the north basin, each set consisting of an air line and two chemical feed lines (Figure 1). The phosphorus inactivation chemicals used for the treatment are aluminum sulfate (alum) and sodium aluminate (aluminate). Two line sets with single diffusers and sets of chemical ports near the end of each run within the north basin to the mouth of each of Boulder Brook and Bogle Brook. This facilitates inlet treatment, generally considered the most effective means of inactivation, given mixing as the stream proceeds into the north basin. The other two line sets, each with four diffusers and corresponding chemical ports, are spaced within the north basin itself to allow treatment of water in that basin. This allows treatment if operation is not possible from the start of a storm, or if additional treatment in the basin appears necessary. However, as spring progresses, dense vegetation limits horizontal mixing and overall system efficiency.

Summarizing three years of active effort to minimize phosphorus levels in the pond during the swimming season (Table 1), alum and aluminate have been added in May through early July to achieve a target total phosphorus level in the south basin of <20 ppb and preferably close to 10 ppb near the 4th of July. Traditionally, blooms started about that time, necessitating copper treatments to regain water clarity and keep the beach open. It was thought that additional treatment during summer might not be necessary if the starting phosphorus level was low enough. No problems were noted in 2009, but algal blooms developed in August of 2010 and 2011. Responsive treatment helped, but was considered too late to prevent some loss of clarity. In 2010 the chemicals were available to respond to declining clarity in late July, but no action was taken. In 2011 the chemicals were not available when a response was deemed appropriate in late July, and it took two weeks to obtain the necessary chemicals. In 2012, it is recommended that we enter July with enough chemical on hand to respond immediately to any water clarity reduction and do so in July to early August.

Analysis of Program to Date

Detailed water chemistry results provided in past annual reports are difficult to interpret, as samples are taken in a variety of locations under a variety of weather conditions, with some pre-treatment values really representing post-treatment from a recent storm. A summary is provided here (Table 2) that should put the treatment and results in perspective. Samples are collected in the north basin where most water enters and most treatment occurs, in the “transition zone” just south of the islands, and

Figure 1. Phosphorus Inactivation System for Morses Pond.

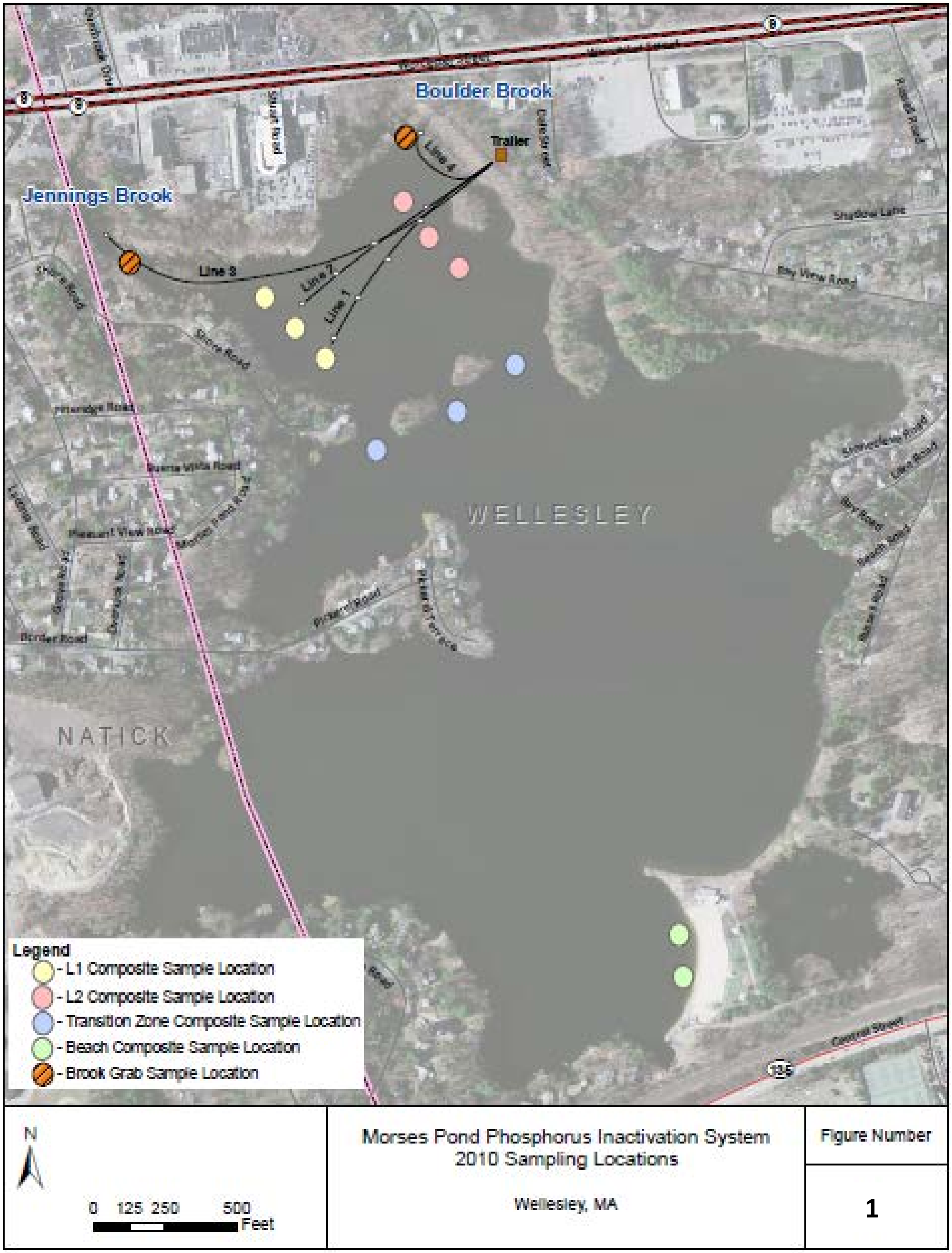


Table 1. Summary of Phosphorus Inactivation Effort, 2008-2011.

Year	Applied Alum (gal)	Applied Aluminate (gal)	Period of Application	# of Treatment Days	Notes
2008	2000	1000	6/24 to 7/23	5	Testing and adjustment phase
2009	6002	2900	5/14 to 7/9	16	Very wet spring and summer
2010	4100	2080	5/11 to 7/9 + 8/24 & 8/25	13	Average spring, leftover chemical applied in late August.
2011	5000	2475	5/15 to 7/8 + 8/10 & 8/16	14	Wet spring and summer, attempted August treatments in response to bloom

Table 2. Water Quality Testing Results Relating to the Phosphorus Inactivation System

Year	Location	Pre-Application TP (ug/L)	Early Summer TP (ug/L)	Late Summer TP (ug/L)	Algae Issues
2008	North Basin	28	18		Mats observed, some cloudiness, early summer is really July 23 at end of treatment
	Transition Zone	31	22		Some cloudiness, brownish color, early summer is really July 23 at end of treatment
	Swimming Area	21	12		Relatively clear, no blooms, early summer is really July 23 at end of treatment
2009	North Basin	35	40	63	Cloudy, some mats
	Transition Zone	35	39		Cloudy
	Swimming Area	15	10	27	Generally clear, no blooms
2010	North Basin	26	46	53	Cloudy, mats evident
	Transition Zone	28	21	32	Brownish color, minimally cloudy
	Swimming Area	19	15	43	Generally clear, no blooms until late August
2011	North Basin	53	33	130	Cloudy, mats evident
	Transition Zone	48	29	95	Slightly brownish
	Swimming Area	30	29	60	Clearest water in years in late June, but short-lived cyanobloom in early August

near the swimming area. Total phosphorus decreases in the swimming area, near the outlet of the pond in the south basin, in response to each treatment period, although little change is exhibited in 2011.

Although treatment in 2008 started late and was largely experimental, results for total phosphorus at the end of the initial treatment period for 2008, 2009 and 2010 are all <20 ug/L and approached the ideal 10 ug/L level. Total phosphorus remained somewhat elevated in early summer of 2011; we do not know if there was some lab error associated with the 2011 early summer values, but the water was the clearest it has been in many years at that time, so available phosphorus had to be very low.

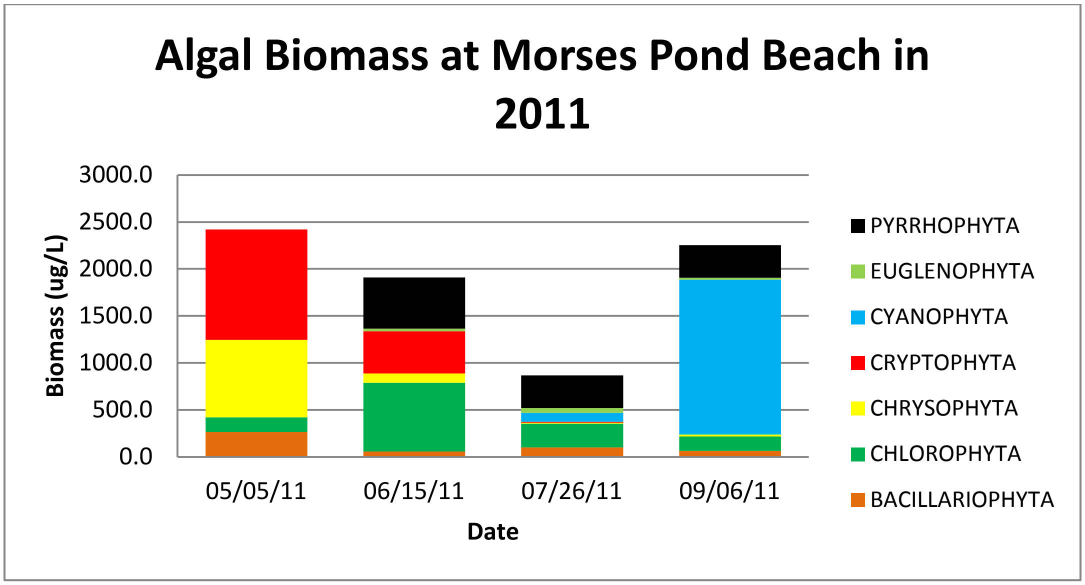
Dissolved phosphorus, summarized in previous annual reports, tends to decline more sharply than total phosphorus, a likely indication that the aluminum is effectively binding phosphorus. Dissolved aluminum concentrations have been highly variable, sometimes rather high in the north basin and measurable in the south basin, but there is no evidence of any toxicity to fish or invertebrates in Morses Pond, despite extensive observation during treatment periods.

Total phosphorus increased by late summer after cessation of treatments. Some of this phosphorus may have been released from the sediment within the deeper portion of the south basin, based on measurement of phosphorus accumulation in deeper water (>17 ft) under low oxygen conditions that have been measured there. However, the associated deep water area of the pond is very small, and it is expected that most of the phosphorus increase in the south basin is likely to have come from the inlets, through the north basin, and into the south basin with summer storms. Detention capacity of the north basin is limited by shallow depth resulting from years of sediment deposition; although reductions in phosphorus are still expected as water passes through the north basin, removal is not maximal.

Values in the south basin by late summer are adequate to support algal blooms, and attempted treatment in August of 2010 and 2011 was too late to make much difference. The nutrient-laden water had already passed into the south basin, and either flows were inadequate to move the newly treated water in the north basin to the south basin to replace the untreated water (2010), or the treatment was inadequate to handle the high nutrient load in large inflows (2011). In 2010 a copper treatment was performed in early August to reduce blue-green algae which bloomed at that time. In 2011 a similar bloom developed in early August, but treatment was limited to the swimming area itself. A tropical storm later in August 2011 added large nutrient loads, but also flushed the lake and removed all traces of the algal bloom.

Algal data for 2011 illustrates what appears to be happening in Morses Pond over the summer (Figure 2). Moderate densities of mainly coldwater forms in spring give way to lower densities more typical late spring forms such as green algae in June, with those densities further reduced and species composition further altered by the aluminum treatments, such that relatively low biomass of largely innocuous forms is observed in July. Lack of treatment allows algal densities to rebound over the rest of the summer, with blue-greens becoming dominant. Maintaining the algal assemblage features of mid-July 2011 is an appropriate goal for the phosphorus inactivation project.

Figure 2. Algal data for 2011.



It is apparent that treatment of inflows until only early July is insufficient to guarantee that phosphorus levels will remain low enough to suppress algal blooms in the south basin through August. Treatment through July appears to be necessary. It is also apparent that treatment is most effective in the inlets, and that more aluminum needs to be delivered to the combined Bogle Brook and Jennings Brook inlet than to the Boulder Brook inlet.

Repairs to the distribution lines were necessitated in 2010 by damage done while harvesting the north basin to support sampling and measurement for dredging planning. Lines were cut in several places, and new hose sections were inserted where needed. Additional repairs were made in 2011. A thorough inspection of lines will be needed in 2012 and some replacement may be necessary. It is recommended that treatment focus on the inlets to the maximum extent possible, as dense plant growths after early June inhibit lateral mixing of applied aluminum. Careful adjustment of chemical flows is also needed to be sure that Bogle/Jennings Brooks are being adequately treated, as this is the main water source and can short circuit through the north basin along the western shore.

Permitting in 2012 will change slightly, as new national regulations are in place for algaecides and related chemical treatments. The Order of Conditions under the Wetlands Protection Act is due for renewal, and filing for an annual License to Apply Chemicals will be needed. The application for the License to Apply Chemicals has been adjusted by the MA DEP to be suitable for filing with the USEPA under the NPDES program to meet the new national requirements, so this may not be much more cumbersome than in past years.

Plant Harvesting

Harvesting Strategy

The Town of Wellesley initiated the enhanced Morses Pond vegetation harvesting program in 2007. The zoned vegetation harvesting strategy originates from the 2005 pilot program and comprehensive management plan written that year. For the pilot program, Morses Pond was divided into seven zones in order to better track the harvesting process. Figure 3 shows these zones and Morses Pond bathymetry. Harvesting protocols have been adjusted through experience to maximize effectiveness and minimize undesirable impacts, such as free fragments that accumulate along shore. The refinement process was detailed in the 2010 annual report. The current approach is to harvest all areas by the end of June, sometimes using both harvesters, with a cutting order and pattern that limits fragment accumulation, especially at the town swimming beach. A second cutting occurs in August and sometimes into September.

The keys to successful harvesting include:

- Initiating harvesting by the Memorial Day weekend.
- Cutting the southwest cove (Area 6) first, then proceeding through Areas 2, 3 and 4 in order of
- Cutting with or against the wind, but not perpendicular to the wind, to aid fragment collection.
- Limiting harvesting on very windy days (a safety concern as well as fragment control measure).

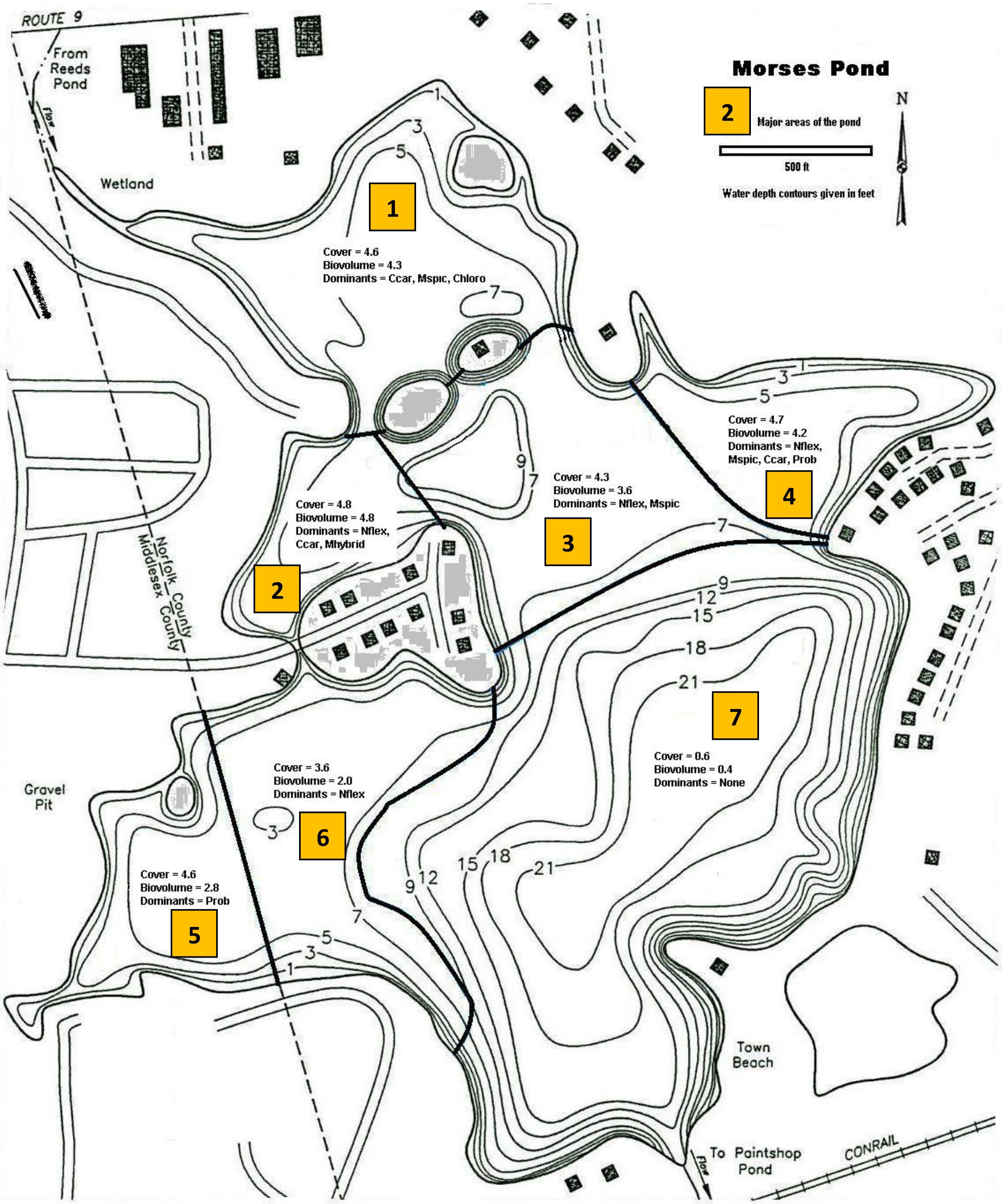
The second, older harvester has been used mainly to collect fragments released by the larger, newer harvester, and this approach has worked well.

Harvesting Record

Records provided by the Town of Wellesley indicate the harvesting effort expended on Morses Pond (Table 3). Although the record is not always complete, records have been kept since 2007. Between late May and early September, from 2007 through 2011, harvesting was conducted on a range of 43 to 61 days. This represents a range of 303 to 414 total hours devoted to some aspect of the harvesting program, and 223 to 291 hours of actual harvesting time, or an average of 5.1 to 5.5 hours per day of harvesting. Approximately another 2 hours per day are expended on hauling plants, harvester maintenance, and related tasks other than actual cutting or offloading, accounting for the larger total time commitment. The harvesting effort has resulted in the removal of 224,000 to 292,000 pounds of plants (wet weight) per year, excluding plant material removed by hydroraking.

The weight per load is fairly constant at around 2900 lbs, and the hours of cutting performed per day is also fairly consistent at slightly more than 5 hr/day, so total weights are largely a function of days spent harvesting. Even then, 2011 was a more productive year, owing to the operation of the second harvester most of the time. Plant density may also affect harvesting rates and yield, with 2011 having very dense growths. Harvesting has started a little later than desired in most years, about a week after Memorial Day instead of slightly before or right after that holiday weekend, but the goal of one complete harvest before the 4th of July weekend has been achieved in each of the last three years. Harvesting in August and September has also occurred as planned.

Figure 3. Plant Management Zones for Morses Pond.



ROUTE 9
From Reeds Pond
flow
Wetland
Morses Pond
2 Major areas of the pond
500 ft
Water depth contours given in feet
N
1
Cover = 4.6
Biovolume = 4.3
Dominants = Ccar, Mspic, Chloro
2
Cover = 4.8
Biovolume = 4.8
Dominants = Nflex, Ccar, Mhybrid
3
Cover = 4.3
Biovolume = 3.6
Dominants = Nflex, Mspic
4
Cover = 4.7
Biovolume = 4.2
Dominants = Nflex, Mspic, Ccar, Prob
5
Cover = 4.6
Biovolume = 2.8
Dominants = Prob
6
Cover = 3.6
Biovolume = 2.0
Dominants = Nflex
7
Cover = 0.6
Biovolume = 0.4
Dominants = None
Norfolk County
Middlesex County
Gravel Pit
Town Beach
To Paintshop Pond
flow
CONRAIL

Table 3. Harvesting Record for Morses Pond.

Year	Days of Harvesting per Year	Total Hours per Year	Cutting Hours per Year	Total Hr/Day	Cutting Hr/Day	Total Loads	Total Weight	Weight/ Day	Weight/ Load	Weight/ Total Hr	Weight/ Cutting Hr
	(Days)	(Hr)	(Hr)	(Hr)	(Hr)	(Load)	(Pounds)	(Pounds)	(Pounds)	(Pounds)	(Pounds)
2007	49	359	255	7.3	5.2	109	NA	NA	NA	NA	NA
2008	43	NA	NA	NA	NA	NA	270320	6287	NA	NA	NA
2009	57	390	304	6.8	5.3	78	224060	3931	2891	575	738
2010	44	303	223	6.9	5.1	78	226960	5278	2900	749	1017
2011	54	414	291	7.7	5.4	102	292000	5407	2863	706	1003
For 2009 total hours, assumes 1.5 hr/harvesting day of non-cutting time, based on values for those days with total and cutting hours.											
For 2010 total weight, assumes 202,000 pounds resulting from hydroraking, based on values for days when hydroraking occurred.											

We are missing plant weight data from 2007 and hourly activity data from 2008, and the identification of plants being targeted by harvesting is not always consistent with what has been observed by staff in the field. There have been changes in personnel and procedures, so continued training should be emphasized. There were problems with plant fragment creation and accumulation along shorelines in 2009, and while some fragment release is unavoidable, adjustments were made that greatly improved performance in 2010 and 2011. Overall, the plant harvesting program is proceeding well, achieving desirable results, and being adjusted to enhance performance as warranted.

There have been some plant controls additional to mechanical harvesting with “standard” weed cutters. A benthic barrier was installed at the swimming beach in 2008 as a pilot study, but no further application occurred. As of 2011, the original benthic barrier was still in place, but is mostly buried in the sand. Hydroraking of shallow areas was desired by many shoreline residents, and was planned for 2009. However, equipment problems precluded execution of hydroraking beyond the beach area. Hydroraking of peripheral areas was conducted in 2010, with residents paying for those services off their shoreline parcels. Hand harvesting of water chestnut is practiced each spring by a group of volunteers supported by the town. This effort has kept water chestnut in check, with only scattered plants found and removed each year.

Plant Surveys

Plant surveys were conducted in early to mid-May of 2008, 2009, and 2010 prior to plant harvesting to determine the assemblage features and facilitate recommendation of any program adjustments. These surveys have helped to identify areas supporting very dense aquatic plant growths and helps set priorities for harvesting. Shoreline surveys were also performed to guide localized plant control by shoreline residents, including proposed hydroraking. In 2011, with the harvesting program protocols generally well known to the DPW staff involved in the project, we opted to survey the plants at selected stations during the harvesting, allowing some comparison among harvested areas as a consequence of harvesting.

Methods

Surveys applied the point-intercept method, resulting in 306 survey points on Morses Pond the same as utilized during the 2005 vegetation survey that set the stage for the comprehensive plan as relates to plant control in Morses Pond. The point-intercept methodology is intended to document the spatial distribution and percent cover and biovolume of aquatic plants at specific re-locatable sites. At each point the following information is recorded:

- The GPS waypoint.
- Water depth using a metal graduated rod or a mechanical depth finder.
- Plant cover and biovolume ratings using a standardized system.
- Relative abundance of plant species.

For each plant species, staff recorded whether the species was present at trace (one or two sprigs), sparse (a handful of the plant), moderate (a few handfuls of the plant), or dense (many handfuls of the plant) levels at each site. Plant cover represents the total surface area covered in plants (2 dimensions). For cover, areas with no plants were assigned a "0," areas with approximately 1-25% cover were assigned a "1," a "2" for 26-50%, a "3" for 51-75%, a "4" for 76-99%, and a "5" for 100% cover. Like plant cover, a quartile scale was used to express plant biovolume, defined as the estimated volume of living plant material filling the water column (3 dimensions). For biovolume, 0= no plants, 1= 1-25%, 2=26-50%, 3=51-75%, 4=76-100%, and 5= 100% of plants filling the water column.

Shoreline surveys to support hydroraking were described in the 2010 annual report. No such surveys were conducted in 2011, and there was no hydroraking beyond the swimming area.

Multi-Year Results

Overall, Morses Pond exhibits moderate to dense vegetation cover and biovolume prior to harvesting each year. With the exception of the deeper southern basin (Zone 7), plant cover had an average ranking of at least 3 (>50% coverage) in each year and average biovolume for a majority of the pond was ranked between 2 to 3 (plants taking up about half of the water column). As an early season survey, this represents a plant assemblage sure to interfere with swimming and boating during summer without some form of control. Harvesting is perceived by most lake users to have improved recreational conditions, but we have yet to see any ongoing control of plants, particularly invasive species.

For the point-intercept surveys, 34 species are known from Morses Pond, with 23 plant species detected in 2005, 20 plant species encountered in the 2008 and 2009 surveys, and 24 in 2010 and 2011. The complete list is provided in Table 4. The five invasive plant species routinely encountered are:

- *Cabomba caroliniana* (Fanwort)
- *Lythrum salicaria* (Purple loosestrife)
- *Myriophyllum spicatum* (Eurasian watermilfoil)
- *Myriophyllum heterophyllum* (Variable watermilfoil)
- *Potamogeton crispus* (Curlyleaf pondweed)

Note that *Trapa natans*, water chestnut, is also known from Morses Pond, but owing to the efforts of volunteer water chestnut pullers, it has never been found in the standard survey.

Table 4. Plant Species Found in Morses Pond, 2005-2011.

		Plant Rating for Year				
Scientific Name	**Common Name**	**2005**	**2008**	**2009**	**2010**	**2011**
Callitriche sp.	Water starwort	P		P		
Cabomba caroliniana	Fanwort	A	A	A	A	A
Ceratophyllum demersum	Coontail	C	C	C	A	C
Chlorophyta	Green algae	C	C	C	A	
Cyanobacteria	Blue green algae		P		C	P
Decodon verticillatus	Swamp loosestrife	C	P		P	P
Elodea canadensis	Waterweed	C	C	C	C	C
Lemna Minor	Duckweed	P	P	P	P	P
Lythrum salicaria	Purple loosestrife	P	P	P	P	P
Myriophyllum heterophyllum	Variable watermilfoil	P	C	C	A	A
Myriophyllum spicatum	Eurasian watermilfoil	A	A	A	A	C
Najas flexilis	Common naiad	C	C	C	C	P
Nymphaea odorata	White water lily	C	C	C	C	C
Nuphar variegatum	Yellow water lily	C	P	P	P	P
Polygonum amphibium	Smartweed	P	P	P	P	P
Pontederia cordata	Pickerelweed	P		P	P	
Potamogeton amplifolius	Broadleaf pondweed	C	C	C	C	C
Potamogeton crispus	Crispy pondweed		C	C	C	P
Potamogeton epihydrus	Ribbonleaf pondweed		P	P	P	P
Potamogeton perfoliatus	Claspingleaf pondweed					P
Potamogeton pulcher	Spotted pondweed	P			P	P
Potamogeton pusillus	Thinleaf pondweed					P
Potamogeton robbinsii	Fern-leaf pondweed	C	C	C	C	P
Ranunculus sp.	Water crowfoot					
Salix sp.	Willow				P	
Sagittaria gramineus	Submerged arrowhead	P	P	P		P
Sparganium sp.	Burreed					
Spirodela polyrhiza	Big duckweed	P				P
Typha latifolia	Cattail			P		
Trapa natans	Water chestnut					
Utricularia geminiscapa	Bladderwort	P	P		P	
Utricularia gibba	Bladderwort	C				P
Valisneria americana	Water celery				P	P
Wolffia columbiana	Watermeal	P			P	
	# of Species	23	20	20	24	24
	P=Present, C=Common, A=Abundant					

Eurasian watermilfoil, variable watermilfoil, and fanwort continue to dominate the Morses Pond plant community, with variable watermilfoil having become more abundant and Eurasian watermilfoil declining somewhat in abundance over the last six years. Another invasive, curly leaf pondweed, can be a dominant in the spring, but tends to die back during summer and not create major issues for swimming and fishing during summer. An invasive wetland species, purple loosestrife, was observed on the northern basin shoreline in all survey years.

Native species are also abundant in Morses Pond. *Nymphaea odorata* (white water lily) and *Ceratophyllum demersum* (coontail) are dominants at some survey sites. Filamentous green algae mats are usually abundant in the northern basin and northeastern cove (Zones 1 and 2). *Potamogeton robbinsii* (Robbins' pondweed) is sometimes abundant in the southwestern cove (Zones 5 and 6). *Najas flexilis* (common naiad) can be abundant in Zones 3 and 6, but has recently been less common. Increased abundance of *Potamogeton robbinsii* (Robbins' pondweed) in Zones 1, 5 and 6, *Potamogeton amplifolius* (broadleaf pondweed) in Zones 3 and 4, and *Elodea canadensis* (waterweed) in Zones 4 and 6 is taken as an indication that harvesting is favoring these plants. Robbins' pondweed grows lower to the sediment and is less impacted by harvesting, while broadleaf pondweed and waterweed are seed producing annuals that tend to expand into areas opened by harvesting.

Note that the original 2005 survey was performed during summer, while the 2008-2011 surveys were conducted during spring. This shift can affect detection of some species. For example, spotted pondweed tends to bloom between June and August, limiting detection in spring surveys, while curly-leaf pondweed usually dies back by early July, limiting its detection in summer surveys.

Assessment of Harvesting Impacts

The 2011 survey was conducted during the spring harvesting effort, allowing a comparison between harvested and unharvested areas. Harvesting was only about halfway through the spring effort, but all targeted areas (zones 2, 3, 4 and 6) had received several days of effort each. Cover (Figure 4) is not greatly altered, as the harvester does not cut to the very bottom of the pond and this measure is two-dimensional. Biovolume (Figure 5) assesses the portion of the water column filled by plants in three dimensions, and shows considerable reduction between harvested and unharvested zones. It is apparent that harvesting, even just the first half of the spring effort, has a major impact on plant biovolume.

Considering only the plant species that were at least moderately abundant in 2011, frequency reductions from harvesting are observed for coontail (Figure 6), Eurasian watermilfoil (Figure 7), white water lily (Figure 8) and yellow water lily (Figure 9), while no apparent change is observed for fanwort (Figure 10), variable milfoil (Figure 11), waterweed (Figure 12) and bigleaf pondweed (Figure 13). Since harvesting does not remove the whole plant in most cases, it is not surprising that more changes are not observed. Those species that are reduced in frequency are more susceptible to harvesting; coontail is weakly rooted and is pulled out by most harvesters, while the bulk of the plant biomass is at the surface for water lilies. It is not clear why Eurasian watermilfoil is depressed while variable milfoil is not, but this has been a trend for several years in Morses Pond.

Figure 4. Cover Comparison Between Harvested and Unharvested Zones of Morses Pond.

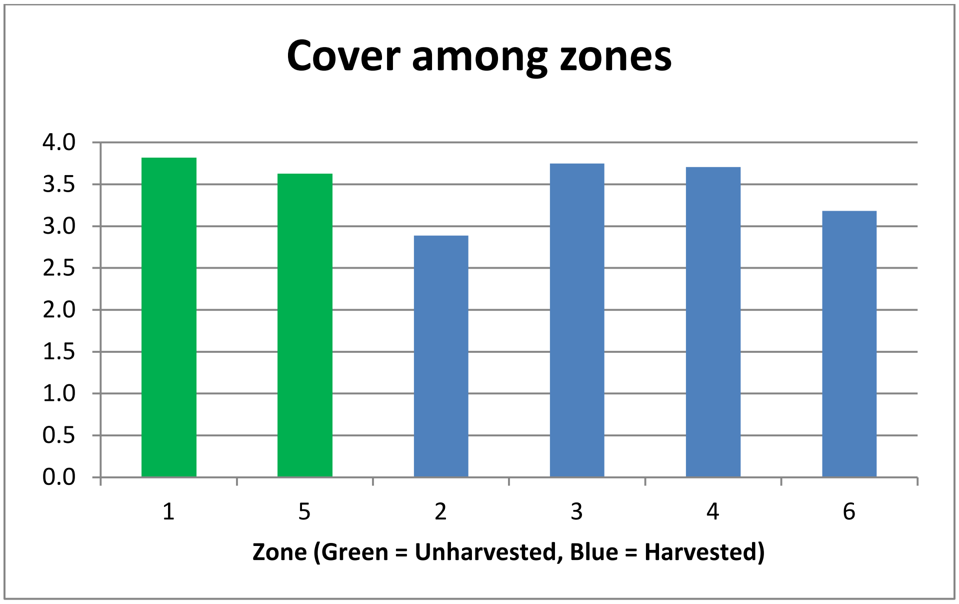


Figure 5. Biovolume Comparison Between Harvested and Unharvested Zones of Morses Pond.

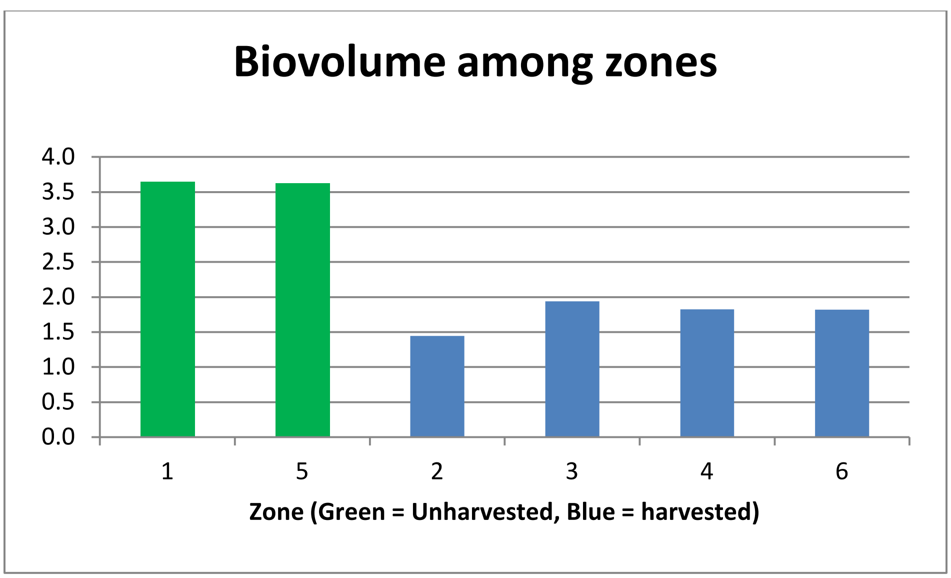


Figure 6. Comparison of Coontail Frequency Between Harvested and Unharvested Zones.

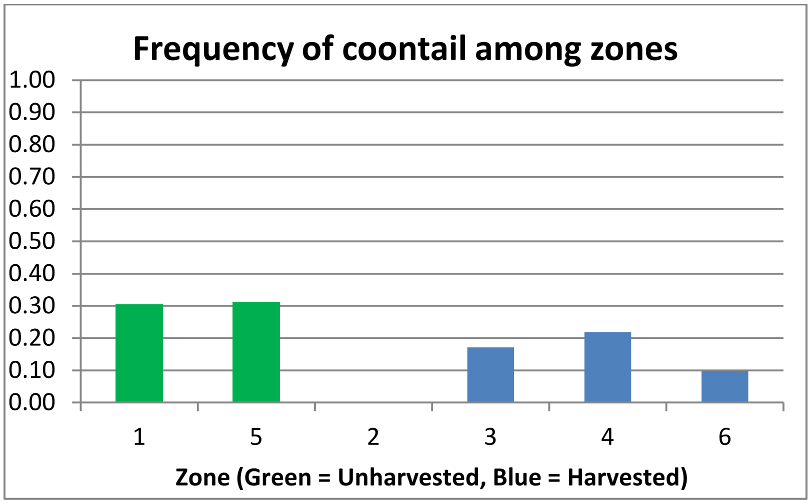


Figure 7. Comparison of Eurasian Milfoil Frequency Between Harvested and Unharvested Zones.

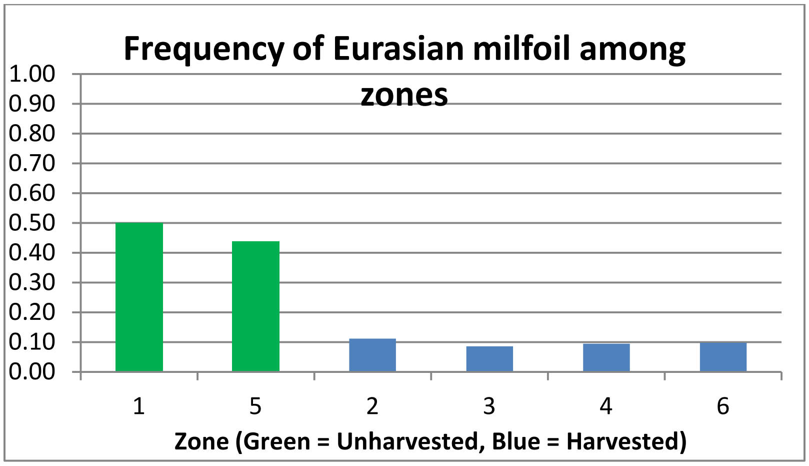


Figure 8. Comparison of White Water Lily Frequency Between Harvested and Unharvested Zones.

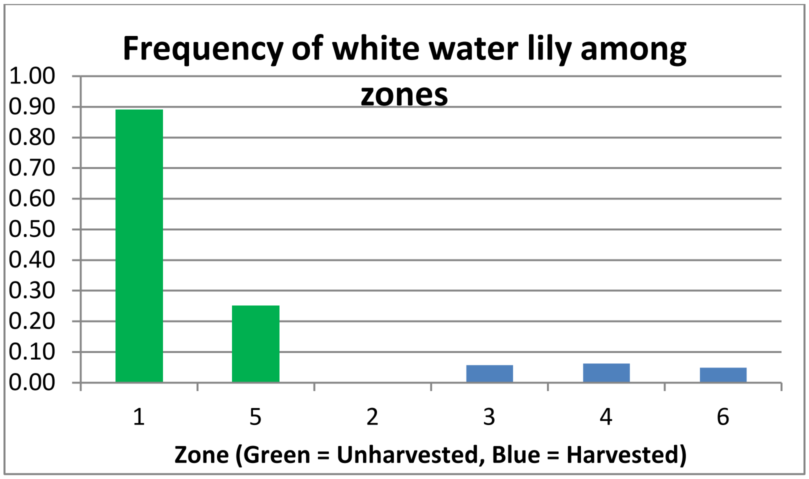


Figure 9. Comparison of Yellow Water Lily Frequency Between Harvested and Unharvested Zones.

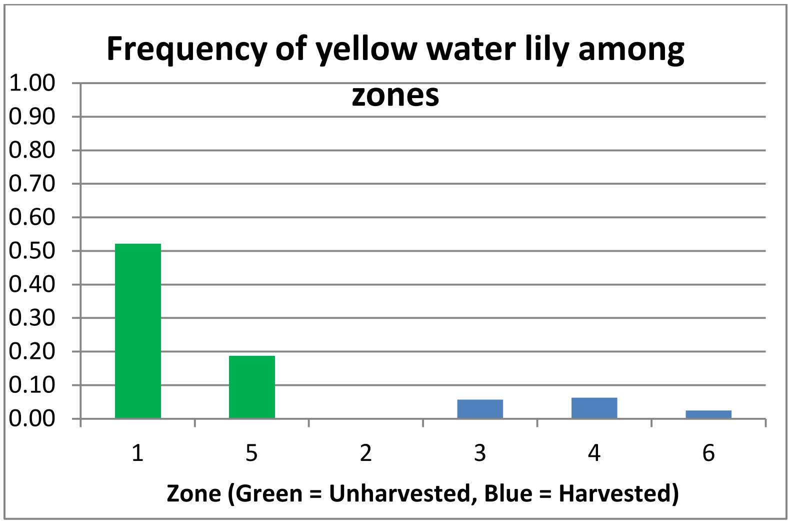


Figure 10. Comparison of Fanwort Frequency Between Harvested and Unharvested Zones.

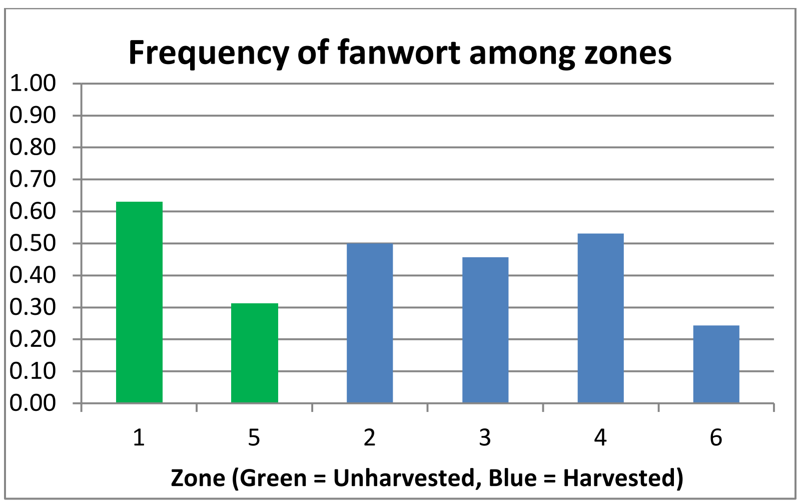


Figure 11. Comparison of Variable Milfoil Frequency Between Harvested and Unharvested Zones.

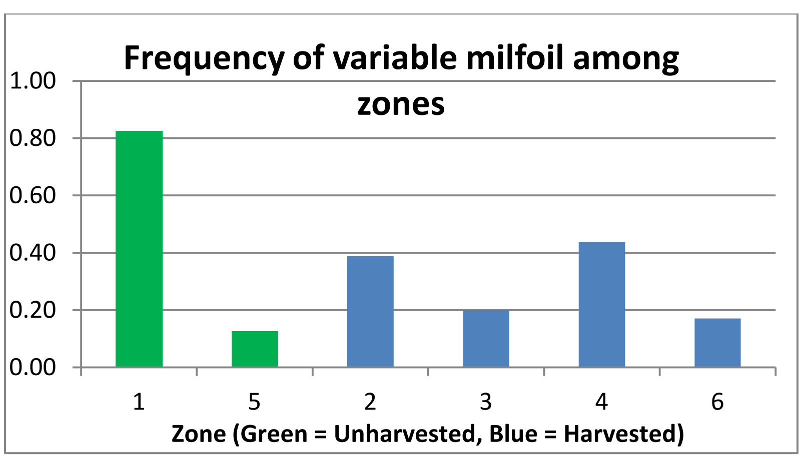


Figure 12. Comparison of Waterweed Frequency Between Harvested and Unharvested Zones.

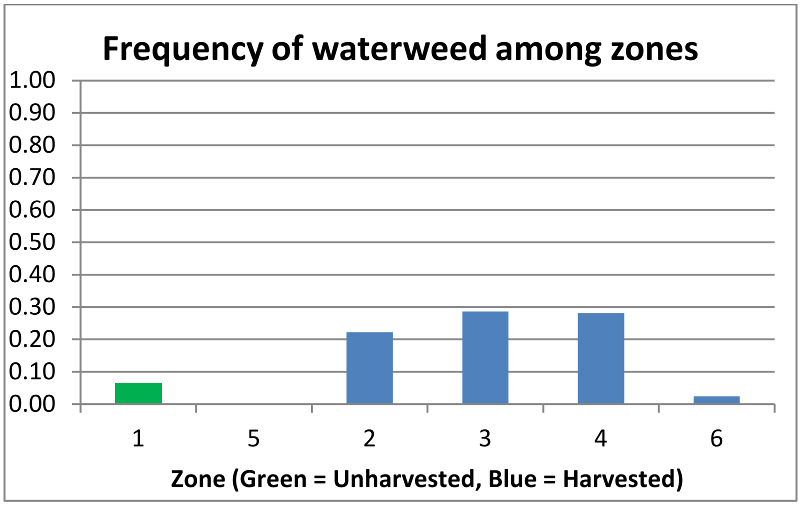
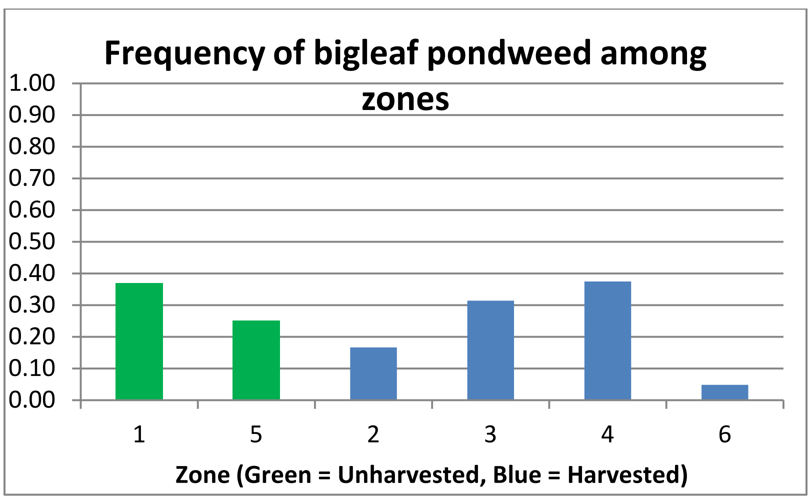


Figure 13. Comparison of Bigleaf Pondweed Frequency Between Harvested and Unharvested Zones.



Conclusions Relating to Plants

The plant community of Morses Pond is still too dense in most areas and is dominated by invasive species. Harvesting with the new harvester and an adjusted approach appears to be causing some shifts in the plant community, but no drastic changes. Harvesting keeps areas open for habitat and recreational use, greatly reducing plant biovolume, but must occur each year to maintain those gains. Harvesting effort in 2011 was at least as great as in recent years, but in September the abundance of plants, particularly fanwort, was still excessive in many areas. Harvesting is a reliable maintenance technique, but has not yet been demonstrated as a strong force in shaping the plant community in Morses Pond.

Low Impact Development Demonstration

In the spring of 2008, AECOM evaluated public sites within the Morses Pond watershed for future application of Low Impact Development (LID) techniques. A desktop analysis was conducted on the approximately 60 parcels identified. Out of the 60 parcels, 13 locations were identified for further field investigation. Based on the field investigation, the Upham Elementary School and Bates Elementary School were chosen as the best properties for a LID demonstration.

The Upham Elementary School was selected for further design, and in 2009 preliminary design plans and specifications were prepared. The design included conversion of grassed islands and a portion of the paved play yard in front of the school to a series of water quality swales with added bioretention filtration of stormwater. The design also included a larger biorentention area behind the school by the ball field parking. AECOM worked with Wellesley DPW and the Natural Resource Commission (NRC) on fine tuning the design to provide a demonstration project that would provide water quality treatment with minimal maintenance requirements. In early 2011 the plans were rejected by the school board due to impacts to trees in the area. This was a surprising turn of events, and the NRC has been working on alternative plans for the funds set aside for the LID demonstration project.

Education

The Town of Wellesley produced an informative brochure on the importance of phosphorus control many years ago, and continues to use this tool in resident education. The brochure is not outdated, but the extent of distribution and the effectiveness of this mode of education are uncertain. The Town also has bylaws relating to lawn watering and other residential activities that affect water quality in streams and lakes, including Morses Pond. The extent to which residents understand these regulations is also uncertain. The right messages are being sent, but reception and reaction have not been gauged.

In 2006 a survey was conducted by AECOM on behalf of the Town to assess resident awareness and practices. It appeared that more people handled their own lawn care than expected, and that most were anxious to learn about approaches that might have less impact on water quality. Most homeowners had little background knowledge of issues relating to fertilizer use and other residential management practices.

It was determined that a website would be a better or at least effective additional means of communicating with residents on their role in protecting water quality through desirable residential practices. Morses Pond pages were constructed to be incorporated into the Town’s website. Layout and content were adapted from existing materials and subject to review. Revision has been underway since summer of 2011 and is nearing completion as we approach the end of 2011. It is intended that the new web pages be inserted on the town website over the winter of 2012.

Dredging

The Town of Wellesley arranged for the North Basin to be dredged in the late 1970s; no dredging has been conducted since 1979, and both natural and anthropogenic sources of sediment have causes considerable infilling of the North Basin since that time. Dense growths of submergent and emergent vegetation limit recreational utility and habitat value in the North Basin, although some forms of water-dependent wildlife benefit from these conditions. While dense vegetation does provide some filtering capacity, the overall loss of depth limits detention time and facilitates resuspension during storms, threatening water quality in the main body of the pond. It was determined as part of the comprehensive planning process that the North Basin should be dredged again to restore detention capacity.

In 2009 the Town hired Apex Inc. to develop dredging plans and shepherd them through the dredging process. Sediment quantity and quality were assessed, plans were developed, and permits were secured. A number of complications arose, including the need to document yet again that Morses Pond was not a Great Pond under the laws of the Commonwealth and therefore not subject to Chapter 91, an additional regulatory process. That effort was ultimately successful.

More troublesome was the detection of metals and hydrocarbon contamination in the north basin, something not observed previously. However, dredging regulations and related contamination thresholds had changed since the previous sediment assessment in 2004, and not all the same tests were run in earlier sampling. The result was that the permitting process took longer than hoped and the cost to dispose of the sediment was considerably higher than initially expected. The targeted area was reduced to about two acres to both avoid areas of greater contamination and to attempt to keep the cost within the allocated amount.

An agreement was secured from the Catholic Diocese of Massachusetts to utilize the parking lot of the "closed" Catholic Church on Rt 9 as a dredged material processing area. However, material had to be removed by March of 2011, and delays in the permitting process caused bids to be secured for the work in September, with an anticipated starting date of early November 2010. Contractors were clearly uncertain about dredging in late autumn and achieving adequate dewatering over the winter to clear the parking area by spring. As a result, fewer contractors submitted bids, and the lowest bid was approximately twice the amount allocated for the dredging.

It was decided that no bid would be accepted and that the dredging project would be revisited in a year or two, when additional funds could be secured and when the timing of the project could be potentially made more advantageous. No further action has occurred in 2011, but additional funds to pursue dredging may be sought in the FY2013 budget.

2012 Work Plan

The phosphorus inactivation and harvesting programs should proceed as in recent years. The education and LID programs should be dovetailed and advanced via the town website and follow up public actions. Such actions could focus on rain barrels and rain gardens to minimize runoff, but some action is needed to start moving residential practices in a desirable direction. Emphasis on lawn services that will limit phosphate fertilizer use is also desirable. Fortunately, phosphate lawn fertilizers are expected to be phased out over the next five years, but it may take another decade before the residual quantities in the watershed are exhausted. The dredging will not occur in FY12 or the first half of FY13, based on the timing of any additional funding and lead time for hiring a contractor. Any dredging is unlikely to occur until fall of 2013, which would be in FY14. Dredging is the most pressing capital need, but funding for storm water improvements that complement LID approaches would be helpful as well.

To that end, the following actions are suggested:

Phosphorus Inactivation

March – Apply for permits necessary for 2012 application of aluminum to Morses Pond

April – Set up the system and test all air and chemical lines, repair and adjust as necessary.

May 15-July 30 – Run the system in response to storm events, focusing on treatment at the inlets. Extend operation until late July to avoid August algal blooms. Track phosphorus with sampling and testing at the start, in early July, and in late August. Monitor Secchi transparency weekly at the beach.

Harvesting

May – Get harvesters on the lake prior to Memorial Day if at all possible. Hold harvesting staff field meeting to discuss the approach and ensure that common species can be identified. Survey the lake for dominant species and major assemblages; adjust harvesting sequence and establish any “no harvest” areas as warranted.

May-June – Conduct spring harvesting program. Emphasize fragment minimization and maximum removal of invasive species.

Late June – Assess conditions going into the summer and adjust any priorities for the August-September harvesting effort.

August-September – Conduct summer harvesting program.

Education

Jan-Feb – Convene a group to go over the web pages and request any final format adjustments.

Mar-April – Finalize content.

Early May – Web pages to be live; hold promotional event.

July-October – Receive feedback, adjust content, plan for impact survey.

Stormwater Control/LID Program

Jan-Feb – Convene a work group to determine what additional actions are needed to advance stormwater controls and specific LID projects.

Mar-June – Expend remaining capital funds anticipated to expire with FY12.

FY13 – Follow up based on actions above.

Dredging

Jan-Mar - Follow up with town on additional funding to dredge the northern basin of Morses Pond; a total request of $400,000 has been suggested and is justified based on recent experience.

Note that this work plan covers calendar year 2012, which spans FY12 and FY13.

Need to work up cost allocations from Pond Manager budget, separate P inactivation account, and monitoring account, based on remaining FY12 funds and expected FY13 funds. This can be done in conjunction with revision of this report.

We have about $40,000 left in pond mgr account, all of monitoring account ($7140), and $3328 out of the expected $7000 to be spent on labor out of P inactivation account (used some of this money for late August inactivation treatments). This appears adequate for what we have to do in FY12, with FY13 allocations beginning in July (FY13).