Water Resource Services Inc.
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413-219-8071

June 30, 2020

Mr. Brandon Schmitt, Director
Natural Resources Commission
Town Hall, Lower Level
525 Washington Street
Wellesley, MA 02482

RE: **Condition of Morses Pond as of June 29, 2020**

Dear Mr. Schmitt:

Water Resource Services (WRS) has assessed Morses Pond since about 2007 under the Comprehensive Plan. After completion of some of the major items (e.g., dredging part of the north basin/area 1, educational efforts, changes in fertilizer content, and alteration of the phosphorus inactivation system) and adjustment of monitoring to better support responsive management, we settled into a pattern of management that has been fairly constant since 2015. This year has posed some new challenges as a consequence of COVID19, but within the context of the weather pattern and management program, it is most like 2016. Conditions as of the end of June 2020 are not as good as in most recent years, and here I will explain and illustrate why for the benefit of the Town and concerned lake users. This explanation is data driven, not a matter of impressions or general opinion. Hopefully it will illustrate both the value of the monitoring program and the limitations of the management program in an understandable manner.

Plants:
Rooted plant growth that can reach nuisance densities occurs over about 45 acres of the 105-acre Morses Pond. The pond has been divided into 7 areas (Figure 1) for management purposes. Area 7 is the central, deeper area and while some problems and management occur along its edge, it is largely unmanaged for plants. Area 1, the north basin, receives only a small amount of harvesting to create access for a few homes along the west side. Area 5, the Natick part of the lake with no homes on it, is not harvested. Areas 2, 3, 4 and 6 are the primary targets of harvesting.

The growth rate of plants depends partly on the weather. Most plants die back over the winter and return in the spring from root systems and/or seeds. However, in a mild winter (e.g., 2016, 2020) not all plants die back, notably the perennial invasive species, and growth may start as early as March after the ice goes out and water temperature starts to warm. This variable start to the growth season creates problems, as the harvester(s) are not typically given spring maintenance and readied for use until early May, after the snow removal season is over and the maintenance yard has been cleared of other seasonal equipment and staff are available. With scheduling limitations and even the need for a police detail to move the larger harvester on town roads, harvesting does not commence until about the 3rd week of May. If there are issues with parts delivery or other town emergencies, that start date can be later and has been in some years.

In a year like 2015, with a cold and long winter, starting to harvest in late May is just fine, In years like 2016 and 2020, with a mild winter, the program is behind before it starts and operators have to try to catch up with plant growth to maintain desirable conditions. Note that in 2020 the fanwort (*Cabomba caroliniana*) is higher in the water column than I have ever seen it in MA this early in the year. This has been true in other lakes as well, and this is one of the main problem plants.

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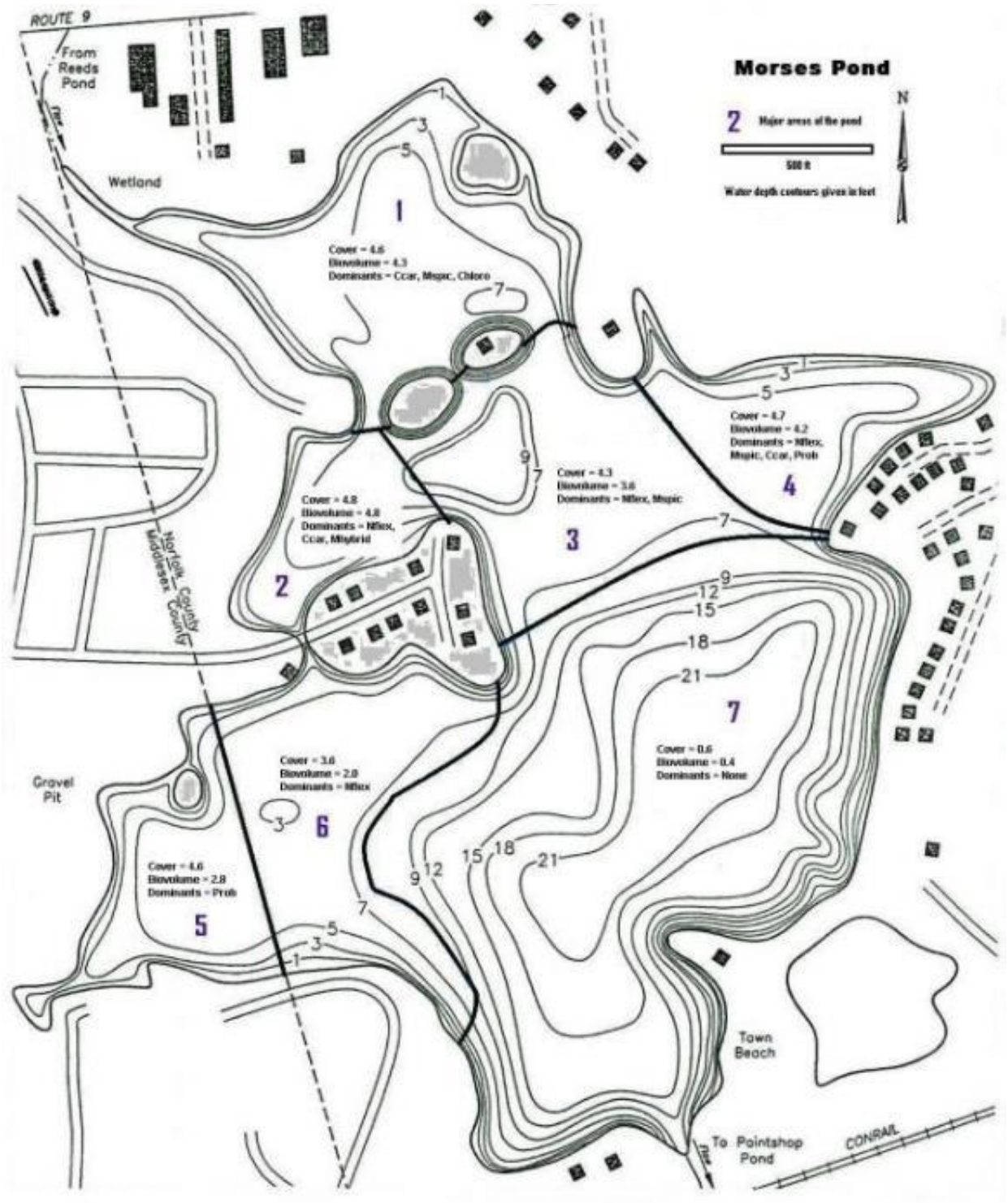
Figure 1. Plant harvesting areas at Morses Pond.



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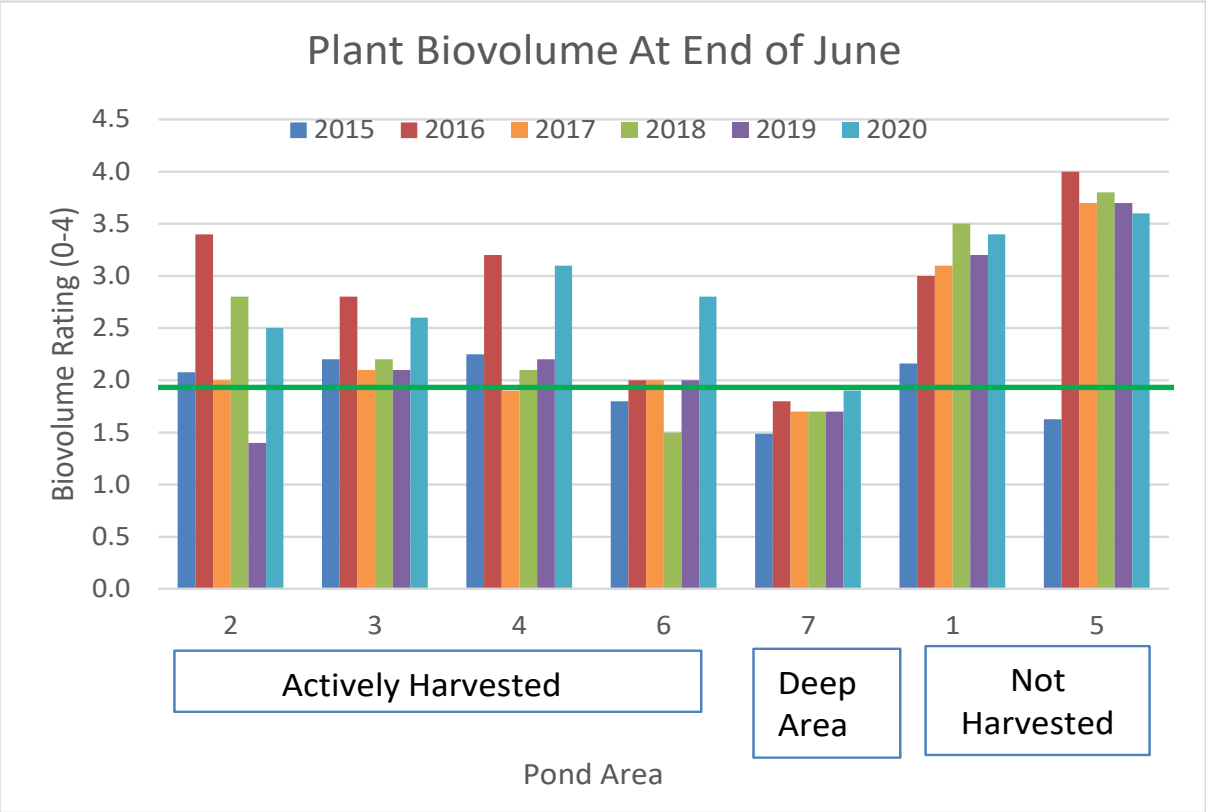
Plant mass is measured as biovolume on a 0 to 4 scale. 0 signifies no plants and 1 through 4 represent quartiles of the water column. A value of 1 means that <25% of the water column is filled with plants while a 4 means that 75-100% of the water column is full of plants. A suite of sites in each area are assessed for biovolume on that 0-4 scale and the average is reported for each area for each assessment. Assessments occur before harvesting starts, at the end of June (close to the end of the first cut) and after the second cut (usually September). The main goal of harvesting is to keep the biovolume value near 2, meaning that 25-50% of the water column has plants, mostly the bottom half in areas 2, 3, 4 and 6. Not every monitoring site will have the same biovolume, but the average should be close to 2 if harvesting is working as planned. Figure 2 shows how we have done over the last 6 years as of the end of June, usually coinciding with the end of the first cut of all target areas.

Figure 2. Plant biovolume at the end of June over 6 years in Morses Pond.



As is evident from Figure 2, we were successful in achieving the desired conditions in areas 2, 3, 4 and 6 in 2015, 2017, 2018 and 2019 except for area 2 in 2018 when the program was just a little behind schedule at the end of June and area 2 was about to be harvested for the first time that year. In 2016 and 2020 we did not achieve the goal of a biovolume rating of 2 except in area 6 where extra effort was put in due to the influence of that area on the public beach (fragments can clutter the swim area if not harvested early and well). By comparison, note that the biovolume in areas 1 and 5, which are largely unharvested, are much higher and unacceptable except in 2015 after a long, harsh winter. Conditions would be worse in the harvested area during all years if not for the harvesting program. So 2016 and 2020 are similar years in terms of having a mild winter and not achieving the target plant biovolume in the key harvesting areas by the end of June.

With the larger harvester in operation by late May, target conditions may have been achieved in even 2016 and 2020, but another similarity of those two years is that large harvester was not operational until after mid-June. Unanticipated repairs in both years caused delays in the launch of the larger harvester. The smaller harvester, which was a very old machine in 2016 and a new machine in 2020, is not able to cut at a rate that will keep up with plant growth over the target area. The larger harvester, purchased in 2007, is nearing the end of its useful lifespan. It can still function well, but breakdowns are more frequent as parts age. After the 2016 experience, an assessment of all harvester components was made and spare parts were ordered for maximum preparedness, but even then there are surprises and the repairs cannot always be made quickly. In 2020 the main issue was a leak in the barge itself. Maintenance issues have occurred in all years since 2015, but the staff was able to make repairs fast enough to limit the impact to the harvesting program except in 2016 and 2020.

The level of staff effort, assessed as cutting time, is documented with daily logs and is reviewed at the end of the harvesting season. While that record was not accessed for this report, discussion with staff indicates no fewer days on the water and no fewer hours spent cutting, so the problem is not lack of manpower devoted to harvesting. There was a new harvester operator this year, so there was some training time early on, but I personally went out with the new operator on June 18th, the first day that the larger harvester operated on Morses Pond, and the work is proceeding as it should. The issue appears to lie with the combination of an early start of the growing season and a late start to the use of the large harvester.

The smaller harvester was operated from late May until June 17th and cut in areas 3 and 4 mostly. Normally area 6 gets priority, but with the beach not opening as usual this year, we focused on the areas with the greatest plant growth first. When the larger harvester was launched on June 18th, area 4 was the first area harvested by it. Another day of effort was expended later, so area 4 has had 3 rounds of harvesting in 2020 already, albeit partly with a smaller harvester that is less efficient, but it still had the highest biovolume of any harvested area on June 29th (Figure 2). The growth rate of plants this year is simply too high to keep up with using even the larger harvester with the late start of its use.

The situation is much like trying to maintain a very large lawn or ballfield with a pushmower. It is hard to keep all areas properly manicured and if one gets behind, it becomes even harder as progress slows with greater growths. This is a limitation of the harvesting program, but harvesting was chosen over alternatives by the town and is consistent with town policies. If both harvesters are operational and fully staffed, we can keep up with even a high growth year but being able to keep both harvesters running is a challenge. Fortunately, most years are not like 2016 or 2020, but when we have such a year, we may need to lower expectations and focus on cutting lanes from key access points. We have so far tried to gain control over all target areas in 2020, but as the data show, we have not met the goals to date.

The smaller harvester had an issue about the time the larger harvester became operational, so running both at once has not been an option. As soon as the smaller harvester is repaired (awaiting a part) they may be operated simultaneously. Running the larger harvester more is an option and the Town has allowed overtime for operators in the past to try to meet goals on Morses Pond, but the risk of a breakdown increases with excessive large harvester use. It is scheduled to be replaced a couple of fiscal years from now if all goes as planned. Cutting is expected to continue until about mid-July, when the smaller harvester will be in use on Rockridge and Longfellow Ponds and there may be some staff limitations but will resume again in August. We will need to adjust the strategy if desirable conditions have not been achieved by mid-July.

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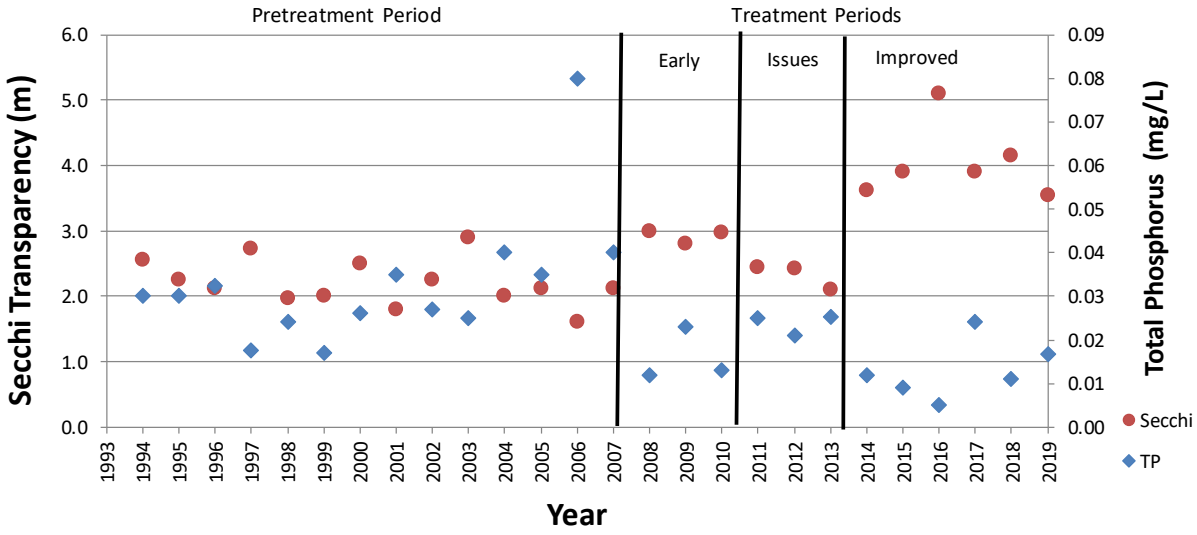
Water Clarity:
As a relatively small waterbody with a large, mostly developed watershed, Morses Pond is at risk from watershed inputs during every storm. Entering solids create turbidity and delivered nutrients foster algae growth. In a big storm a decade ago, one could watch the changes at either of the two main inlets (Bogle Brook and Boulder Brook, both off Rt 9) and see a wave of turbid water move through the lake. After spring flows subsided, the mix of organic matter and nutrients in the lake lowered the oxygen level and supported algae blooms of several kinds, including cyanobacteria. The swim area was treated with algaecides several times a summer to keep it safe and open.

In 2008 a water treatment system was installed to treat incoming stormwater at the two main inlets. It has undergone considerable adjustment over the years but has been operational in its current form for the last 6 years. The high phosphorus and low clarity of the past have largely been eliminated (Figure 3). The goal is to treat late May into July to get the phosphorus concentration in the lake <20 ug/L, preferably close to 10 ug/L, and maintain water clarity of >3 m (10 feet). The system has used the same form of coagulant since 2014 and been automated since 2016 and has worked well. It is very much the same process used in drinking water facilities, just being used in the north basin of the pond. The dredging in 2012-2013 also improved the detention time in the north basin, and the dense growths of plants also add to the treatment process. Water in the main body of Morses Pond has been safe for swimming and other contact recreation as a result.

Figure 3. Phosphorus and water clarity in Morses Pond.



The pattern of precipitation and amount of coagulant used vary by year with some variation in results, but since 2014 all years have met the clarity goal. In 2019 we used the least amount of aluminum product ever, had one of the rainiest Junes in recent history, and still met the goal, although this was probably the limit for system operation. In 2020 we had a very dry June until just the past few days. We treated 3 storms until June 28, then treated 3 storms in 2 days. With so little rain in June, we had not done much treating and the heavier rains of April and May were impacting pond water quality. Additionally, we had several electrical and mechanical problems

with the treatment system that caused us to only treat about half the water entering in the first 3 storms, so water quality in June was not ideal, although clarity was still >3 m.

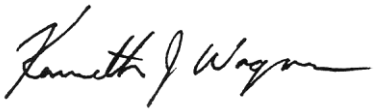
Extra effort by town staff and one contractor refurbished the system just in time for the 3 storms in late June and all were treated well. Our second delivery of coagulant is today (June 30th) and that will allow us to treat into July. So we are entering July with water clarity at 3.4 m, slightly lower than the averages in 2014 and 2019, the least impressive 2 years of the last 6, but with the capacity for more treatment than we have ever done after June 30th. While the beach complex is not operating as usual this year due to COVID19, the beach is open and well used. Water quality for swimming has been acceptable and we expect to keep it that way through the summer, but we are slightly behind where we would like to be at this point in terms of clarity and phosphorus concentrations. Monitoring will continue and management of water clarity will be as responsive as possible.

Conclusion

2020 has been a challenging year so far. COVID19 has not helped, but the issues stem mainly from the weather pattern and equipment limitations. The staff has worked to minimize equipment issues as they arise, but we have been behind on both plant and water quality management as a function of the mild winter and wet early spring. Harvesting will continue and may be enhanced by additional operator hours, preferably through simultaneous operation of the large and small harvesters. Water quality management will continue at a greater level of effort into July. The water clarity goal has been met so far, but at a lower level than in recent years. The plant abundance goal has not been met, so receiving complaints is understandable, but hopefully the discussion provided here makes the reasons clear. There is no lack of effort or intent to back off management goals by the Town of Wellesley, but no management system is perfect and 2020 is straining our capacity to deliver the desired conditions so far.

Contact me with any questions or comments.

Sincerely,
WRS



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Water Resource Manager