Background

Bell Pond is an 11 acre pond located in the Bell Hill neighborhood of eastern Worcester. Despite its size, it has a depth in the middle of about 17 feet (see *Figure A*). It is bordered on the north by Belmont Street/Rt 9, a highly trafficked road to Shrewsbury. To the east is the Seabury Heights retirement housing complex, and to the west there are wooded parklands with footpaths. Water is primarily supplied by underground springs, though there were a series of catchment ponds created in the mid-1800's in the vicinity of what is now the Worcester Technical High School, which augmented flow to the pond when it was the city's fire suppression and drinking water supply. The pond's outlet is a catch basin near the Seabury Heights driveway entrance at Belmont Street. There is also a secondary, less well defined outlet to the south of the pond in the vicinity of a fishing platform. The pond is stocked in the spring with trout, and is a popular local fishing destination.

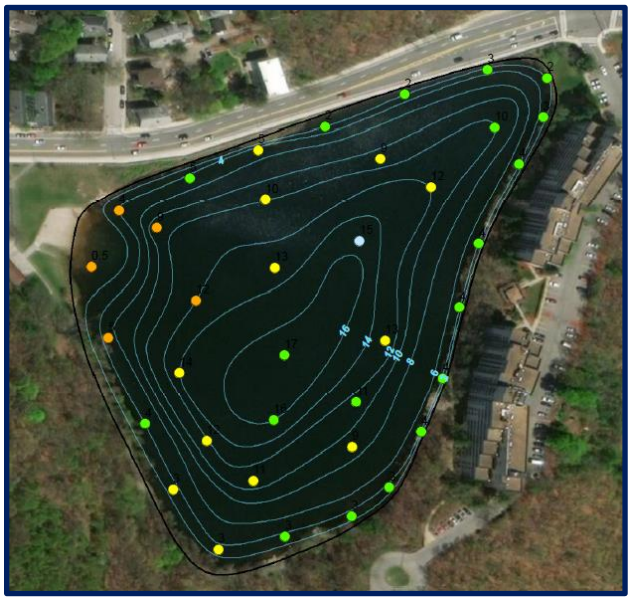

Figure A **-** Bathymetric map of Bell Pond. Maximum pond depth is 17 ft.

There is a small city-run beach on the west side of the pond that is well-used in the summer months. Foot paths run from the beach around the park and provide access to Cristoforo Colombo Park to the south. Bell Pond is one of the most accessible waterbodies in the City, located in a dense residential neighborhood. Unlike other accessible waterbodies in the city, Bell Pond has no public advocacy group or watershed association speaking on its behalf.

The following report details the results of the water quality monitoring program in 2021, as well as the exciting projects and opportunities the Lakes and Ponds Program intends on implementing in 2022.

Water Quality Summary

Prior to the Lakes and Ponds Program, Bell pond had not been monitored or managed by the City of Worcester or any other entity, most likely because it was seen as having no apparent water quality challenges. It is not listed as impaired by the Department of Environmental Protection (MassDEP). Since monitoring began in 2017, results have generally confirmed that this continues to be the case. In 2020, the invasive mollusk, *Corbicula fluminea,* was identified in the pond, but was not considered a threat to recreation, although its threat to local ecology remains unknown. In addition, in 2020 there had been no beach closures for fecal bacteria nor cyanobacteria, clarity was high, and no contaminants of concern had been identified. Anecdotal accounts of litter were a potential threat to wildlife and recreation. Over the past four years, the Lakes and Ponds Program has consistently rated water quality at Bell Pond as "excellent".

Management Summary

As of 2021, the Lakes and Ponds Program has conducted lake management activities to mitigate invasive aquatic plants, excessive nutrients and sediments, cyanobacteria, and fecal bacteria that threatened waterbodies throughout the City of Worcester. As Bell Pond has had not been observed to have any of these challenges, no management in these areas has been necessary. The Program is investigating the methods and the need for future management of the invasive mollusk, *Corbicula fluminea*, and continues to monitor this threat.

The greater Chandler Park is managed by the City of Worcester Department of Public Works and Parks, and staff pick up litter and maintain public waste receptacles throughout the year, increasing the frequency of visits in the summer months. In addition, during the summer months, additional youth staff visit the lake on a rotating basis to collect litter and maintain vegetation. In 2021, the Lakes and Ponds Program began to use a new tool to evaluate the existing and best practices for litter control.

Sampling Analysis and Overview

Bell Pond was visited semimonthly from May through November and sampled at the deepest point, located in approximately the center of the pond (see *Figure B*). As no aboveground tributary exists, no tributary sample was taken. Water samples were taken at the surface and two feet from the bottom of the pond. Parameters evaluated included: Secchi transparency, temperature, dissolved oxygen (DO), pH, total phosphorus, total dissolved phosphorus, *E. coli*, phycocyanin, and litter. Samples were also collected for total suspended solids, ammonia, and nitrate on a monthly basis. Altogether, the Lakes and Ponds Program visited Bell Pond 14 times. For 10 of these events, there were less than 0.25 inches of rainfall in the 24 hours prior to data collection. However, on 5/27 there were 0.93 inches of rain in the 24 hours prior to sampling, on 7/15 there were 0.28 inches, on 9/16 there were

Figure B **-** Bell Pond location and sampling points.

0.37 inches, and on 10/25 there were 0.48 inches of rain. These days are categorized as “wet weather” sampling events (see *Figure C*).

Volunteers from the Worcester Cyanobacteria Monitoring Collaborative (WCMC) collected samples from the city beach area for phycocyanin, particle counts, and microscope analysis in preparation for monthly analysis meetings on 5/22, 6/19, 7/17, 8/21, 9/25 and 10/26. Additionally, the Worcester Department of Inspectional Services tested the beach area for *E. coli* as an indicator for harmful bacteria on a weekly basis during the summer months.

Raw data are displayed and explained in this report. No statistical analysis has been performed. Subsequent ratings of “excellent”, “good”, “fair”, and “poor” for reported values are based on the Massachusetts Department of Environmental Protections SMART Monitoring Watershed Report Card Criteria. While the report will refer to previous data collected by the program, one must be cautious in comparing data sets of this nature over a five year period.

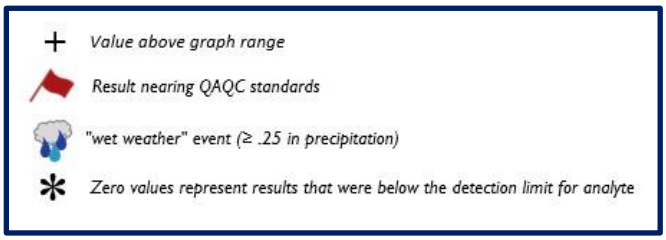

Figure C - Data points with QAQC abnormalities or other notable attributes are marked on figures with these symbols.

Fecal Bacteria

Quality Assurance/Quality Control

To have confidence that the data that were collected are representative of local conditions, Quality Assurance/ Quality Control (QAQC) checks were employed along the way, and certain measures were used to verify the validity of the data. Duplicates, or two measurements or samples taken in a row were compared to ensure precision. Blanks and matrix spikes compared our results to known benchmarks to ensure they are close to their true value. Blanks evaluated our equipment, technique, and the lab that analyzed our samples. All checks were carried out randomly to ensure that each parameter received robust review. When data failed to meet acceptable criteria for these checks they were either flagged as being slightly less robust or censored entirely. Flagged data points are marked with a red flag and censored data are not included in this report (see *Figure C*).

Recreational contact with water contaminated by bacteria may make people ill. *Escherichia coli,* or *E. coli*, are a type of bacteria found in the digestive tract of warm-blooded animals, including humans. While most strains are harmless, some can make you very sick. These bacteria can come from pet and goose waste running into the water, from human waste, from illicit sewer connections to the storm water system, or from leaking septic tanks, and improper application of manure on land. The Commonwealth of Massachusetts has strict water quality standards for public bathing beaches, and Worcester Inspectional Services tests the water for *E. coli* on a weekly basis during the summer months. If the readings are too high, the city is required to close the beach until readings return to safe concentrations. The Lakes and

Ponds Program also samples for *E. coli* semimonthly at one in-lake site to understand it's prevalence outside of the beach area. Samples are collected from the water's surface and sent to an external lab for analysis.

Fecal Bacteria at Bell Pond. For the 5th year running, there were no closures of Bell Pond beach due to *E. coli* exceedances. All results taken at the beach by Inspectional Services were rated as good or excellent (see *Table 1*). For open water sampling, all but three results rated as "excellent" with three rating "good" on 5/27, 6/29 and 7/15. Two of the elevated days, 5/27 and 6/29, were rain events, although "good" results were not consistently associated with rain. Lower concentrations of bacteria in open water than at the beach supports the observation that these organisms can't live outside of a warm blooded creature for very long. Overall, Bell Pond does not have any challenges with fecal bacteria.

2021 OPEN WATER E.COLI RESULTS		2021 BEACH E.COLI RESULTS	
DATE	RESULT	DATE	RESULT
13-May	4		
27-May	29		
10-Jun	7	28-Jun	68
29-Jun	29	6-Jul	24
15-Jul	50	12-Jul	56
29-Jul	5	19-Jul	88
12-Aug	7	26-Jul	< 4
26-Aug	3	2-Aug	< 4
16-Sep	< 1	9-Aug	92
30-Sep	3	16-Aug	20
14-Oct	2	23-Aug	16
10-Nov	2	30-Aug	8
23-Nov	1		
Excellent	*Good*		
Fair	*Poor*		

Results in colonies/100 ml

Table 1 **-** All results taken in open water and at the beach by Inspectional Services were rated as "good" or "excellent".

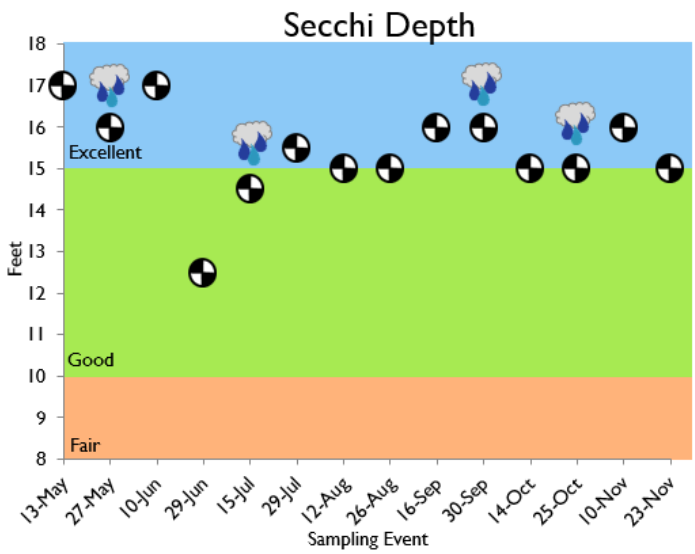

Figure D – Secchi depth results stayed in the "excellent" and "good" categories all season long.

Water Clarity

Water clarity, or the level of transparency of water, is an important measure of water quality. Algae, microscopic organisms, eroded particles, and re-suspended bottom sediments are factors that interfere with light penetration and reduce water transparency. Water clarity is important for a variety of reasons in a lake. Clear water allows light to penetrate to greater depths and encourages the growth of aquatic plants, which provide food, shelter, and oxygen to aquatic organisms. Turbid water, or water filled with particles, will warm up faster as it absorbs heat from sunlight. This causes oxygen concentration to fall because warm water can hold less oxygen than cool water. Finally, clear waters are pleasant to the eye, and safer for recreational contact. Water clarity can be measured with a Secchi disk or by quantifying total suspended solids (TSS). A Secchi disk is a weighted black and white disk on a calibrated line that is lowered

into the water until it is no longer visible. Secchi readings are collected on each lake visit. TSS is a measure of the dry weight of suspended particles in a given amount of water. TSS samples are taken on a monthly basis and submitted to a lab for analysis. This year the Lakes and Ponds Program used samples collected by the Worcester Cyanobacteria Monitoring Collaborative (WCMC) to help assess clarity by conducting particle counts on a tool called the FlowCam Cyano. The FlowCam takes microscopic pictures of the particles in a sample, counts them and allows users to catalog classifications. This aids in understanding what may be impeding clarity and determine next steps for management.

Water Clarity at Bell Pond. Water clarity at Bell Pond was consistently very high, perhaps the highest of any water body in the city. This year, clarity was considered "excellent" (over 15 feet) in 12 of 14 readings. Only in the early summer did secchi depth dip into the "good" classification for two consecutive sampling events: 6/29 and 7/15 (see *Figure D*). After those readings, clarity returned to the "excellent" category for the rest of the season. In past years, similar short-lived drops in clarity have been observed and the program will continue to monitor the situation. At the surface, TSS results were generally below the detection limit for the laboratory equipment (1 mg/l) and never higher than 1.3 mg/l, showing no discernible trends over the course of the season. At the bottom of the lake, this was also the case except for a reading of 11 mg/l on 6/29. The trend of high clarity is also supported by the WCMC's particle count findings. This year, Bell Pond continued to exhibit higher than average clarity among Worcester's lakes.

Temperature and Stratification

Water temperature is important to both the biological activity and water chemistry in a lake. Organisms tend to live in a preferred band of temperatures, and when temperatures are too cold or warm, their populations may decrease. Water temperature also affects the speed of chemical reactions in addition to how much oxygen can be held in the water. The extent to which water circulates through a lake affects the ability of that water to support aquatic life by mixing oxygen and nutrients up and down the water column.

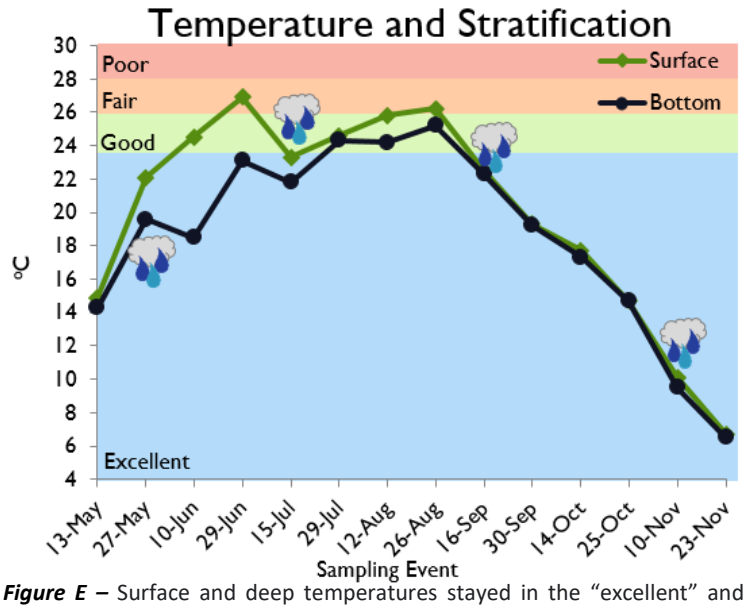

Figure E – Surface and deep temperatures stayed in the "excellent" and "good" categories this season only dipping into "fair" once.

Temperature and Stratification at Bell Pond. Water Temperature in Bell Pond was generally in the "excellent" and "good" categories (see *Figure E*). Surface temperature was rated "excellent" from May to early June and then again from September to the end of the year. The bottom of the lake was slightly colder, only peeking into the "good" category three times in July and August. Despite this slight difference, surface and bottom temperature are consistently close for the duration of the season, suggesting good mixing throughout the water column. Temperature readings were generally lower than in 2020. Overall,

temperature is not a present concern in Bell Pond, although changes these dynamics will continue to be tracked in years to come.

Dissolved Oxygen

Oxygen in the water is essential to aquatic life, just like it is for life on land. Because algae, plants, fish, and other aquatic organisms require a certain amount of oxygen to survive, dissolved oxygen (DO) is an important indicator of water quality. It is a highly variable parameter with daily and seasonal variation. DO concentration can be affected by temperature, pressure, rate of photosynthesis, and respiration by aquatic life, decomposition, aeration, and diffusion. Lakes experiencing nutrient loading can suffer from low DO due to increased algal growth and excessive decomposition of organic material. This can lead to fish kills and other ecological issues. DO was measured using a galvanic DO sensor on a handheld probe at the water's surface, and two feet from the bottom in the in-lake locations.

Dissolved Oxygen at Bell Pond. For the entire sampling season, DO readings at the surface were always rated as "excellent" (over 6 mg/l) (see *Figure F*). This was generally the case at the bottom as well, except during 2 events, one of them being June 29 where bottom DO was rated "poor". Bottom DO also rated 'fair" on August 12. Although there are subtle differences year to year, this year's DO results follow expectations set by past years' results. Previously at Bell Pond, depth profiles showed that when low dissolved oxygen occurred it was only in the last two feet of the water column, leaving plenty of space for aquatic organisms to thrive. Although full depth profiles were not recorded this year, it is expected that this trend continued and oxygen concentration was in the healthy range for fish and wildlife.

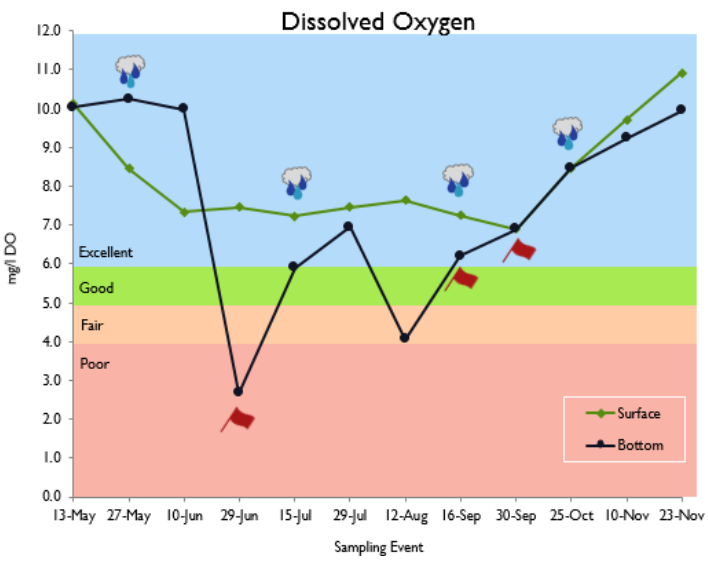

Figure F – Surface DO stayed in the "excellent" category all season long. Bottom DO twice dipped into the "fair" "poor" categories.

pH

pH is a measure of the number of hydrogen ions (H+) in a substance. The more H+ that are present, the more acidic the solution. On a scale of 0-14 units, 7 a neutral pH. As pH increases from 7, the solution is more basic, and as pH decreases, it becomes more acidic. In waterbodies, pH can change due to respiration and photosynthesis by aquatic organisms. A pH that is too high or low can have implications on the health of aquatic organisms. For example, a high pH can also promote chemical reactions that release phosphorus from lake sediments, adding to nutrient loading concerns. Like DO, pH can vary

throughout the day and season. Healthy lakes in our area have a pH between 6.5 and 8.5. A low pH can be the result of external forces like acid rain. pH is monitored using an ion-selective electrode (ISE) pH sensor on a handheld monitoring probe. Readings are taken at the water's surface and two feet from the bottom.

pH at Bell Pond. Throughout the 2021 season, pH in Bell Pond continued the trend of past years, and was low in comparison to other waterbodies in Worcester. Ranging between 7.1 and 6.3 at the surface and bottom, the majority of readings were below 7 (see *Figure G*). Readings were largely consistent between the surface and bottom, just slightly lower on the bottom on all but one sampling event. These comparatively low results may be explained by the less aquatic vegetation in the lakes, which results in lower rates of photosynthesis and less removal of dissolved CO_2 (which reduces water acidity). A low pH may also be explained by the groundwater tributaries, a major source of water for the pond. Groundwater can have a pH as low as 6, depending on the soil composition. Pond water pH at these levels should not harm native aquatic life. Several sampling days are not represented in this figure due to equipment challenges that caused the data to be unreliable during those events. All displayed data meets QAQC standards.

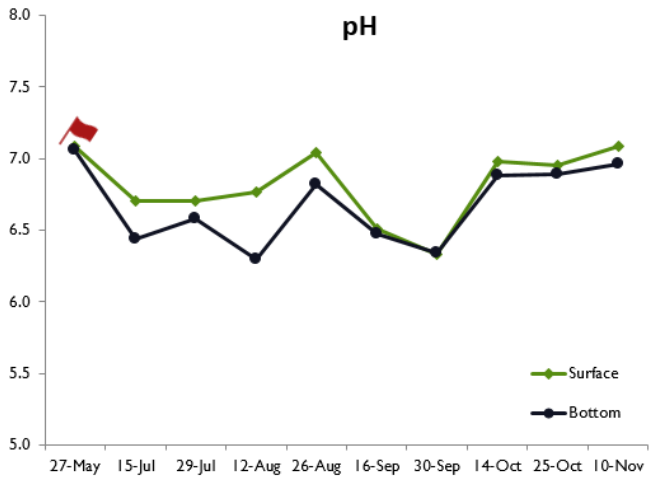

Figure G – pH at Bell Pond continued the trend of past years, skewing low in comparison to other waterbodies in the Worcester.

Nutrients

Nutrients, primarily nitrogen (N) and phosphorus (P), are food sources for aquatic plants and algae. Although aquatic plants and algae are the basis of the food chain, and necessary for a healthy lake ecosystem, an overabundance of nutrients can lead to issues such as harmful algal blooms and excessive plant growth. Overgrowth of these organisms can lead to conditions where oxygen is depleted in the water column, potentially causing fish kills. These nutrients have many known sources in urban lakes including fertilizers, pet and goose waste, illicit sewer connections, and runoff that washes over land and into the storm sewer system. Additionally, under the right conditions, P can be released from the sediments at the bottom of the lake, becoming more available for uptake by organisms. Nutrients are measured in our lakes by collecting a variety of samples and submitting them to an external lab for analysis. N takes several forms in water bodies, including nitrate (NO_3) and ammonia (NH_3). To measure N, samples are collected for NO_3 and NH_3 at all sites monthly. For phosphorus, samples are collected bi-

weekly for total phosphorus (TP) at all sites and total dissolved phosphorus (TDP) at all bottom locations (not displayed). Measuring TDP allows us to understand how much total phosphorus is in a form that can be easily absorbed by plants and algae.

Nutrients at Bell Pond. Results for TP at the surface of the lake were in the "excellent" category for the entire season, with all but four readings below the equipment detection limit of 0.010 mg/l (*see Figure H*). At the bottom, TP generally followed the same trend, although most results were detectable and one result was considered "good" on 6/29. TDP results largely followed the same patterns, only straying above "excellent" on two occasions.

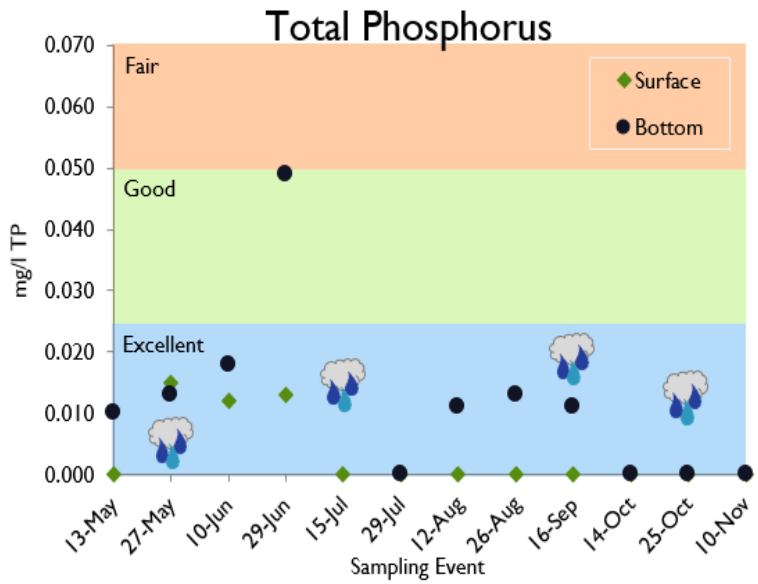

Figure H – Except for one "good" reading, TP stayed in the "excellent" category all season long.

At the surface and bottom, NH_3 results were generally undetectable or rated as "excellent". There was only one day, 9/30, where it was rated as "good" at the surface. NO_3 data was inconsistent due to laboratory inconsistencies, but results that met QA/QC standards were either undetectable or below 0.1 mg/l and not of concern. Overall, nutrients are not a concern at Bell Pond.

Cyanobacteria

Cyanobacteria are commonly occurring microorganisms in aquatic ecosystems. These organisms are bacteria that use sunlight, N, and P in a similar way to algae. While they are present in small numbers in healthy ecosystems, under warm, high-nutrient conditions they can reproduce quickly, causing a bloom. Cyanobacteria blooms, in addition to being unsightly and smelly, can cause low oxygen conditions that are harmful to aquatic life. Cyanobacteria can also produce toxins that are harmful to humans and pets. It is therefore important to understand cyanobacteria dynamics in our lakes and ponds.

Cyanobacteria and algae use the pigment chlorophyll to harness the sun's energy, converting carbon dioxide to sugars for growth and reproduction. Unlike algae, cyanobacteria also use a pigment called phycocyanin. Because of this, the concentration of phycocyanin is an indicator of cyanobacteria's relative abundance in a waterbody. This concentration can be measured using a tool called a fluorimeter. This year, samples collected by the WCMC were used to conduct fluorometry analysis and measure concentration of phycocyanin, and compare them between waterbodies over the course of the sampling season.

Cyanobacteria at Bell Pond. According to the data collected by the WCMC, phycocyanin was only detectable during 2 of the 5 sampling events and remained low when it was observed. Under the microscope WCMC volunteers mostly found plant material and few cyanobacteria. In September, a pervasive green, mossy algae was noticed on the bottom of the pond. Upon closer inspection, it was identified as a green algae not known to be harmful to humans and wildlife. Due to low nutrient concentrations and water temperature cyanobacteria are not a concern in Bell Pond.

Invasive Aquatic Plants and Animals

Native aquatic plants and animals are vital parts of any lake ecosystem. Native plants provide food, shelter and oxygen to other aquatic organisms. Their uptake of nutrients reduces the likelihood of algal blooms, and their root systems stabilize sediments. Native animals play invaluable roles in food webs and their removal can disrupt the ecology of a system. An invasive plant or animal is an organism that is not native, or did not originally come from the area. These plants and animals can become nuisances because their natural constraints, such as predators or environmental limitations, do not exist in their new home, allowing them to multiply at a rapid rate. When aquatic plants and animals become too numerous, they can reduce people's ability to enjoy our lakes and ponds, as well as crowd out local species. Invasive organisms can arrive by hitching a ride on boats, pets, or boots to get from place to place. Some are released with good intentions as a beautiful addition to a landscape or sport fishing opportunity. Professional surveys and visual inspections from Lakes and Ponds Program staff are used to make management decisions regarding invasive species.

Worcester Cyanobacteria Monitoring Collaborative

Photo Credit: Stephanie Tam

The Worcester Cyanobacteria Monitoring Collaborative (WCMC) is a group of community science volunteers that is working to better understand the diversity and abundance of algae and cyanobacteria in local lakes and ponds. Volunteers collect data monthly between spring and fall at 22 waterbodies in and around Worcester, including Bell Pond. Samples are collected for pigment analysis, particle counts and qualitative analysis under a microscope. In the future, this program aims to provide robust quantitative data to local government and community members to assist in making public health and lake management decisions.

Invasive Aquatic Plants and Animals at Bell Pond. Past plant surveys and monitoring have indicated that invasive aquatic plants are not currently a challenge at Bell Pond. However in 2020, the Lakes and Ponds Program found evidence of the invasive mollusk, *Corbicula fluminea* (see *Figure I*). Although it is not known how long it has been residing in Bell Pond, it does not appear to be impeding lake health or recreation at this point. Moving forward, the Lakes and Ponds Program will continue to monitor changes in the population of this and other mollusks in Bell Pond.

Figure I – Invasive aquatic mollusk, *Corbicula fluminea, at Bell Pond*.

Litter

Litter, or inappropriately disposed waste, is harmful to the ecological, aesthetic, and recreational value of lakes and ponds. Improperly discarded plastic and Styrofoam products can be mistaken as food by aquatic organisms and can kill them. Mounds of trash and rotting organic material can cause infestation by disease-carrying vermin. Additionally, they look and can smell unpleasant to beachgoers and hikers. Finally, sharp objects like syringes, broken metal, or glass can pose a threat to swimmers and other beach visitors.

Litter is a difficult parameter to measure in a quantitative way. This past year, the Lakes and Ponds Program was privileged to work with several students from WPI to develop a tool to track and quantify litter at our public spaces. The students determined a classification system that used two sets of metrics: One that included overall condition of the beach for various aspects of usability, and one that characterized the litter itself.

There were five categories that were used for judging "*Overall Conditions*", including cleanup effort, aesthetic, safety, litter density, and impact on the functionality of the site. Each one of these categories receives a score from 1-5. The final score therefore ranges between 5 (the best) and 25 (the worst). The second portion of the clarification includes "*Litter Characterization*", which compares the different types

of litter found that day, and includes things like bottles, glass, tobacco products, textiles, and other things commonly found in public spaces.

Litter at Bell Pond. At Bell Pond the area from the parking lot to the City beach was scored for overall litter conditions and litter characterization. For the "Overall litter conditions" category, the area had an average score of about 2, indicating that litter was present but conditions were not severe and cleanup would not be extremely difficult (see *Table 2*). Relative abundance of different types of trash were also noted. Of the litter categories examined, "small items", "tobacco products", "bags", and "food packaging and containers" all scored 3 or higher, while the rest scored below 2 (see *Table 3*). One common observation was that a majority of the litter had gathered in the reeds along the shore. Over the course of the season, litter continued to accumulate in this area. Cigarette butts and other small items commonly gathered in the parking area. Overall, litter accumulation was not severe on the grass at the park. However, it was quite noticeable in the water along the reeds and deeper in the pond. The hope is that in the future this information can help to guide management decisions.

Overall Litter Conditions

Date	Clean Up Effort	At a glance	Safety	Litter Density	Impact/Functionality	Matrix Score
6/10	3	2	2	2	2	11
6/29		2	3	2	2	9
7/15	2	2	3	2	2	11
7/29	3	2	2	2	2	11
8/12	2	2	2	2	2	10
8/26	2	2	2	2	2	10
9/16	2	2	2	2	2	10
9/30	2	2	2	2	2	10
10/14	2	2	2	3	2	11
10/25	2	2	2	2	2	10
11/10	2	2	2	2	2	10
11/23	2	2	2	2	2	10

Table 2 – For the "Overall litter conditions" category, Bell Pond usually scored 2, indicating that litter was present but conditions were not severe.

Figure J – Litter documented at Bell Hill Park included food packaging (left) and tobacco products (right).

Litter Characterization

Date	Bottles	Plastic cups	Glass	Bags	Food packaging	Tobacco products	Recreational/toys	Textiles/clothing	Junk	Small items
6/8	4	4	2	1	3	1	3	3	1	3
6/23	1	1	1	1	3	3	2	1	1	5
7/13	3	1	2	1	3	3		3	2	4
7/28	3	2	2	3	2	3	2	1	1	4
8/10	1	2	1	2	3	3	2	2	2	4
8/24	1	1	1	1	3	4	1	2	1	4
9/14	3	2	1	1	3	3	1	1	2	4
9/28	2	4	2	3	2	3	2	1	2	3
10/12	2	2	3	2	3	3	1	1	3	3
10/20	1	3	2	3	3	3	1	2	2	3
11/10	3	3	2	3	2	3	2	2	2	3
11/23	3	2	2	2	3	2	1	3	3	3

Table 3 **–** Of all the litter categories, "small items", "tobacco products", "bags" and "food packaging and containers" scored highest.

Ongoing Projects

Community Science and Water Storage

Since 2019, Bell Pond has been part of a worldwide scientific study on freshwater storage called "Lake Observations by Citizen Scientists & Satellites" which was spearheaded by the University of North Carolina and funded through NASA. The study relies on community scientists, or ordinary people, to collect lake level observations from a gauge located in the shallow water off of Belmont Street, and text them into the study. Simultaneously, satellites are collecting data on changes to the area of the lake from above. Using both data points, the study can track changes in the volume of water in the lake over time. Since the study began, the community has texted in about 120 water level observations. Results from 2021 are shown in *Figure K*. You can get involved and see the data in real time at *www.locss.org.*

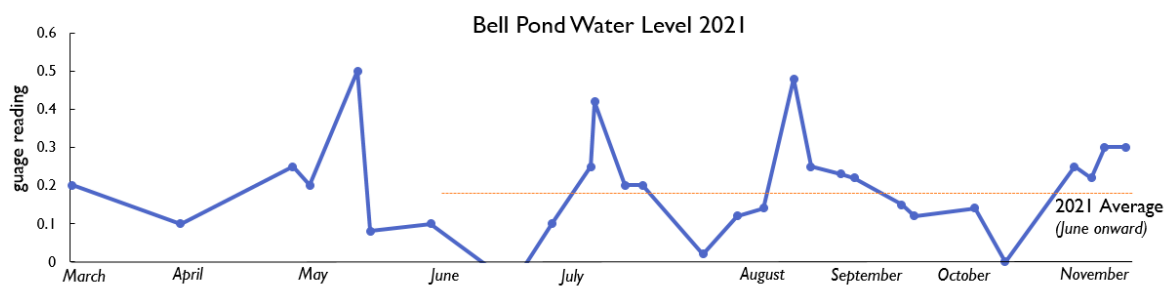

Figure K **–** Depth readings at the staff gauge ranged between 0 and 0.48 feet in 2021.

State of the Lake

For the fifth year running, the Lakes and Ponds Program has rated Bell Pond's overall water quality as "excellent". Since monitoring began in 2017, there have been no beach closures for fecal bacteria exceedances, and no lakes closures due to cyanobacteria.Water clarity at Bell Pond remains the highest in the city. There are no observed invasive aquatic plants, and while an invasive mollusk is present, it does not appear to be impacting recreation. Finally, in 2021, litter was quantified for the first time at the beach, and received a score of "good" on the spectrum of the new tracking tool.

Plan for 2022

Water Quality Monitoring

In 2022, the Lakes and Ponds Program plans to continue to monitor Bell Pond to ensure that it is maintaining high quality water. In addition to the standard parameters that are taken every month, the Lakes and Ponds Program will be collecting one to two rounds of samples to be run for industrial contaminants. These include those compounds which one may expect to find in a post-industrial city, or emerging contaminants of concern. These parameters, including heavy metals, PCBs, PFAS, and others, were last sampled at Bell Pond in 2019. At that time, none of the results were of concern.

Litter Tracking and Management

The Lakes and Ponds Program plans to continue to refine its new litter tracking tool to better understand patterns in litter and trash at Bell Pond. In addition, the Lakes and Ponds Program will work with its partners, including the Department of Public Works & Parks, and Worcester Green Corps, to use this data to create litter reduction strategies.

Worcester Cyanobacteria Monitoring Collaborative

The Worcester Cyanobacteria Monitoring Collaborative (WCMC), a group of volunteer community scientists, has been active at Bell Pond since 2018. Over the past year, the WCMC has increased program capacity so that sampling can occur more frequently and results will have a quicker turnaround time. While results are already available on the WCMC webpage (*worcesterma.gov/wcmc*), the WCMC hopes to install signs at Bell Pond and other participating waterbodies to alert lake users of results when they are available using a QR code. The WCMC hopes that this information will allow people to make more informed decisions about their contact with the water, as well as spread the word about the program.

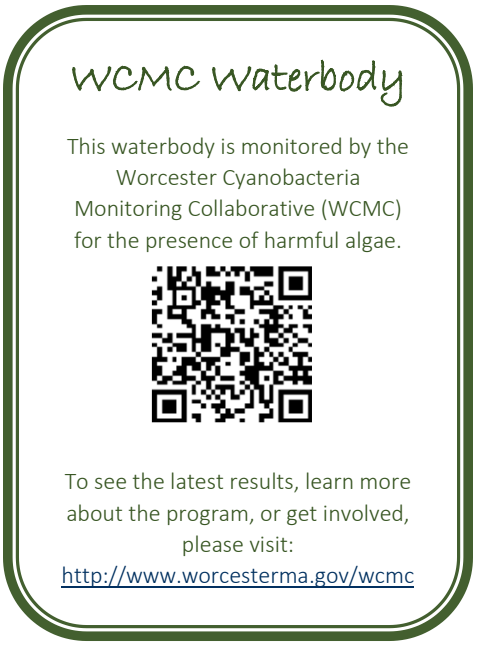

Figure L – Example sign alerting people to the results of cyanobacteria results