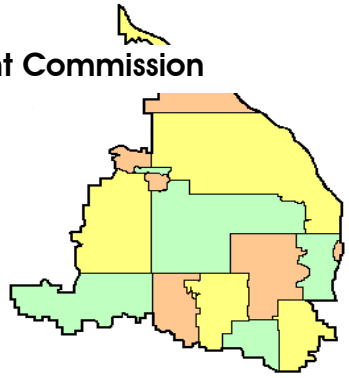
Shingle Creek Watershed Management Commission

West Mississippi Watershed Management Commission



3235 Fernbrook Lane N • Plymouth, MN 55447
Tel: 763.553.1144 • Fax: 763.553.9326
Email: judie@jass.biz • Website: www.shinglecreek.org

April 1, 2021

Commissioners
Members of the TAC
Shingle Creek and West Mississippi
Watershed Management Commissions
Hennepin County, Minnesota

The agendas and meeting packets for both the TAC and regular meetings are available to all interested parties on the Commission's web site at http://www.shinglecreek.org/tac-meetings.html **and** http://www.shinglecreek.org/minutes--meeting-packets.html

Dear Commissioners and Members:

Regular meetings of the Shingle Creek and West Mississippi Watershed Management Commissions will be held **Thursday, April 8, 2021, at 12:45 p.m.** This will be a virtual meeting.

The Joint SCWM Technical Advisory Committee will meet at 11:30 a.m., prior to the regular meeting.

Until further notice, all meetings will be held online to reduce the spread of COVID-19. **To join a meeting,** click https://us02web.zoom.us/j/834887565?pwd=N3MvZThacmNRVDFrOWM3cU1KRU5qQT09, which takes you directly to the meeting.

OR, go to www.zoom.us **and click Join A Meeting. Please use the regular meeting ID and passcode for both meetings.** The meeting ID is **834-887-565.** The passcode for this meeting is **water.**

If your computer is not equipped with audio capability, you need to dial into one of these numbers:

+1 929 205 6099 US (New York)	+1 312 626 6799 US (Chicago)	+1 669 900 6833 US (San Jose)
+1 346 248 7799 US (Houston)	+1 253 215 8782 US	+1 301 715 8592 US

Meetings remain open to the public via the instructions above**.**

Please email me at judie@jass.biz to confirm whether you or your Alternate will be attending the regular and TAC meetings. Thank you.

Regards,

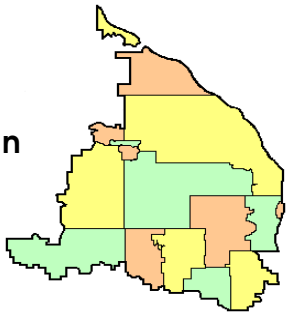
Judie A. Anderson
Administrator

cc:	Alternate Commissioners	Member Cites	Troy Gilchrist	TAC Members
	Wenck/Stantec	BWSR	MPCA	Met Council

Z:\Shingle Creek\Meetings\Meetings 2021\04 Notice_Regular and TAC Meetings .docx

Shingle Creek Watershed Management Commission

West Mississippi Watershed Management Commission



3235 Fernbrook Lane N • Plymouth, MN 55447
Tel: 763.553.1144 • Fax: 763.553.9326
Email: judie@jass.biz • Website: www.shinglecreek.org

A combined regular meeting of the Shingle Creek (SC) and West Mississippi (WM) Watershed Management Commissions will be convened Thursday, April 8, 2021, at 12:45 p.m. Agenda items are available at **http://www.shinglecreek.org/ minutes--meeting-packets.html.** *Black typeface denotes SCWM items, blue denotes SC items, green denotes WM items.*

To join the meeting, click https://zoom.us/j/834887565 or go to www.zoom.us and click Join A Meeting. The meeting ID is **834-887-565,** the passcode is **water.** If your computer is not equipped with audio capability, dial into one of these numbers: +1 929 205 6099 US (New York) | +1 312 626 6799 US (Chicago) | +1 253 215 8782 US | +1 669 900 6833 US (San Jose) | +1 346 248 7799 US (Houston) | +1 301 715 8592 US

		1.	Call to Order.
	SCWM	a.	Roll Call.
√	SCWM	b.	Approve Agenda.*
√	SCWM	c.	Approve Minutes of Last Meeting.*
		2.	Reports.
√	SC	a.	Treasurer's Report and Claims** - voice vote.
√	WM	b.	Treasurer's Report and Claims** - voice vote.
		3.	Open forum.
√	SCWM	4.	Project Reviews.
√	WM	a.	WM2021-004 610 Junction, Brooklyn Park.*
√	WM	b.	WM2021-005 Northpark Building VII, Brooklyn Park.*
		5.	Watershed Management Plan.
	SCWM	a.	Technical Advisory Committee Report - verbal.
√	SCWM	b.	Initiate Minor Plan amendment.*
		6.	Water Quality.
	SC	a.	HUC 8 Update.
√	SCWM	b.	2020 Annual Water Quality Report.*
		7.	Grant Opportunities.
√	SC	a.	Brooks Garden Partnership Cost Share.*
		1)	Presentation.*
√	SC	b.	Brooklyn Center Brine Center Cost Share – request for reimbursement.*
√	SC	c.	Authorize Execution of Crystal Lake Alum Treatment Cooperative Agreement.*
	SC	1)	Grant Agreement.*
√	SC	d.	Authorize Execution of Connections II/Meadow Lake Management Plan Grant Agreement.*
	SC	1)	Grant Agreement.*

(over)

8. Education and Public Outreach.

√ SC a. Shingle Creek 2020 Annual Activity Report.*

√ WM b. West Mississippi 2020 Annual Activity Report.*

√ SCWM c. Next WMWA meetings – 8:30 a.m., Tuesday, April 13, 2021, and 8:30 a.m., Tuesday, May 11, 2021. *Virtual meetings at* https://us02web.zoom.us/j/922390839?pwd=RU95T2ttL3FzQmxHcU9jcFhDdng1QT09 Meeting ID: 922 390 839 | Passcode: water **|** or by phone using numbers above.

SCWM 9. Staff Report – verbal.

10. Communications.

SCWM a. Communications Log.*

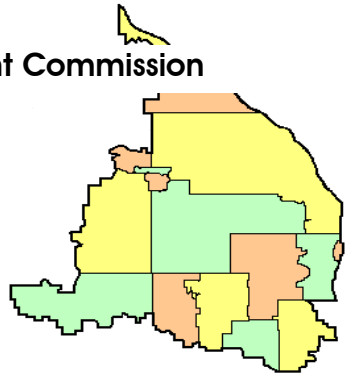
SC b. Letter of Support.*

11. Other Business.

12. Adjournment.

Shingle Creek Watershed Management Commission
West Mississippi Watershed Management Commission

3235 Fernbrook Lane N • Plymouth, MN 55447
Tel: 763.553.1144 • Fax: 763.553.9326
Email: judie@jass.biz • Website: www.shinglecreek.org



REGULAR MEETING MINUTES
March 11, 2021

(Action by the SCWMC appears in blue, by the WMWMC in green and shared information in black.
*indicates items included in the meeting packet.)

I. A joint virtual meeting of the Shingle Creek Watershed Management Commission and the West Mississippi Watershed Management Commission was called to order by Shingle Creek Chairman Andy Polzin at 12:49 p.m. on Thursday, March 11, 2021.

Present for Shingle Creek were: David Vlasin, Brooklyn Center; Adam Quinn, Brooklyn Park; Burton Orred, Jr., Crystal; Karen Jaeger, Maple Grove; Ray Schoch, Minneapolis; Bob Grant, New Hope; John Roach, Osseo; Andy Polzin, Plymouth; Wayne Sicora, Robbinsdale; Ed Matthiesen and Diane Spector, Wenck/Stantec; Troy Gilchrist, Kennedy & Graven; and Judie Anderson and Amy Juntunen, JASS.

Present for West Mississippi were: David Vlasin, Brooklyn Center, Alex Prasch, Brooklyn Park; Gerry Butcher, Champlin; Karen Jaeger, Maple Grove; Harold Johnson, Osseo; Ed Matthiesen and Diane Spector, Wenck/Stantec; Troy Gilchrist, Kennedy & Graven; and Judie Anderson and Amy Juntunen, JASS.

Also present were: Andrew Hogg, Brooklyn Center; Mitch Robinson, Brooklyn Park; Todd Tuominen, Champlin; Derek Asche, Maple Grove; Megan Hedstrom, New Hope; Leah Gifford, Ben Scharenbroich and Amy Riegel, Plymouth; and Richard McCoy, Robbinsdale.

II. Agendas and Minutes.

Motion by Schoch, second by Jaeger to approve the **Shingle Creek agenda.*** *Motion carried unanimously.*

Motion by Butcher, second by Johnson to approve the **West Mississippi agenda** as amended.* *Motion carried unanimously.*

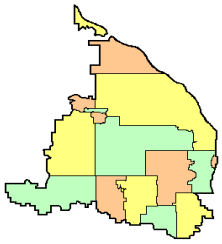
Motion by Jaeger, second by Schoch to approve the **minutes of the February 11, 2021 regular meeting.*** *Motion carried unanimously.*

Motion by Johnson, second by Jaeger to approve the **minutes of the February 11, 2021 regular meeting.*** *Motion carried unanimously.*

III. Finances and Reports.

A. Motion by Jaeger, second by Schoch to approve the Shingle Creek **March Treasurer's Report* and claims** totaling $25,892.72. Voting aye: Vlasin, Quinn, Orred, Jaeger, Schoch, Grant, Roach, Polzin, and Sicora; voting nay – none.

B. Motion by Johnson, second by Jaeger to approve the **West Mississippi March Treasurer's Report* and claims** totaling $9,690.93. Voting aye: Vlasin, Prasch, Butcher, Jaeger, and Johnson; voting nay – none.



IV. Open Forum.

Polzin reported that the **Minnesota Environmental Quality Board** (EQB) is considering changes to its Environmental Review Program to address climate change. The EQB has identified climate change as an important issue facing Minnesota and has made it the main organizing focus for its biennial work plan. https://www.eqb.state.mn.us/

V. Project Review.

WM2021-003 Avery Park, Maple Grove.* Construction of single-family and row-home residential development on a 24.6-acre site located at 9533 Jefferson Highway. Following development, the site will be 36 percent impervious with 8.8 acres of impervious surface, an increase of 8.6 acres. A complete project review application was received on February 24, 2021. **Note**: This project was originally reviewed by Staff as a Shingle Creek project (SC2021-02); however, a review of the overall site determined that it was actually within the West Mississippi watershed boundaries.

To comply with the Commission's water quality treatment requirement, the site must provide ponding designed to NURP standards with dead storage volume equal to or greater than the volume of runoff from a 2.5" storm event, or BMPs providing a similar level of treatment - 85% TSS removal and 60% TP removal. Infiltrating 1.3-inches of runoff, for example, is considered sufficient to provide a similar level of treatment. If a sump is used the MnDOT Road Sand particle size distribution is acceptable for 80% capture.

Runoff from the site is proposed to be routed to three stormwater ponds and two infiltration basins on site. The infiltration basins alone meet the Commissions standards and do not account for any additional treatment provided by the stormwater ponds. The applicant meets Commission water quality treatment requirements. Commission rules require that site runoff is limited to predevelopment rates for the 2-, 10-, and 100-year storm events. The majority of the site (19.1 acres, 80%) ultimately drains to the MnDOT pond northwest of the development. The rest of the site drains to existing storm sewer on the east side of the site. The applicant meets Commission rate control requirements.

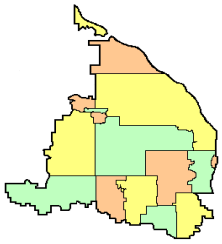
Commission rules also require the site to infiltrate 1.0 inch of runoff from new impervious area within 48 hours. The new impervious area on this site is 8.8 acres, requiring infiltration of 35,300 CF within 48 hours. The applicant proposes two infiltration basins that have the capacity to infiltrate 38,700 CF which is more than the required volume within 48 hours. The applicant meets Commission volume control requirements.

The erosion control plan includes a rock construction entrance, perimeter silt fence, silt fence surrounding wet ponds and infiltration basins, inlet protection, rip rap at pond and basin inlets, and native seed specified on the pond slopes. The erosion control plan meets Commission requirements.

The National Wetlands Inventory does not identify any wetlands on site. The applicant meets Commission wetland requirements. There are no Public Waters on this site. The applicant also meets Commission Public Waters requirements.

There is no FEMA-regulated floodplain on this site. The low floor elevations of the buildings are at least two feet higher than the high water elevation of the ponds/infiltration basins according to Atlas 14 precipitation. The applicant meets Commission floodplain requirements.

The site is located in a Drinking Water Management Area (DWSMA) with high vulnerability but is outside of the Emergency Response Area. Therefore, infiltration is permitted, but infiltrated water must first



filter through three feet of soil before contacting groundwater. The groundwater elevation onsite is >3 feet below the infiltration basin bottoms. The applicant meets Commission drinking water protection requirements.

A public hearing on the project was conducted on November 9, 2020 as part of Planning Commission and City Council review of this project, meeting Commission public notice requirements.

A template Operations & Maintenance (O&M) agreement between the applicant and the City of Maple Grove was provided.

Motion by Butcher, second by Jaeger to advise the City of Maple Grove that approval of Project WM2021-003 is granted with the following conditions:

1. Provide a complete O&M agreement between the applicant and the City of Maple Grove for all stormwater facilities on the project site.

2. Demonstrate by double ring infiltrometer or witness test that the site's infiltration basins can meet the design infiltration rate of 0.4 inches/hour.

3. Provide verification that extending the two new storm sewer pipes to MnDOT pond is allowable.

Motion carried unanimously.

VI. Watershed Management Plan.

McCoy recapped the **Technical Advisory Committee meeting** held earlier today. Topics discussed at the meeting included proposed additions to the 2021 Capital Improvement Program, the NPDES general permit application, and the partitioned TMDL Wasteload allocations, and two presentations – the HUC 8 Model status, and the Wild Wings Western Wetland project. The next TAC meeting is scheduled for 11:30 a.m., prior to the Commissions' April 8, 2021 regular meeting.

VII. Water Quality.

A. HUC 8 Model Status.*

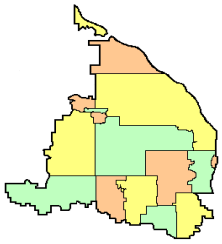
Matthiesen and Spector repeated the presentation that Erik Megow gave at the TAC meeting. Hydraulic and hydrologic modeling was completed in EPA-SWMM, allowing for easier updating and more detailed modeling. They were calibrated using two storm events:

1. Storm 1: This June 14-18, 2014 event consisted of a 4.33" rainfall event, approximately a 5-year (4.51") event.

2. Storm 2: This September 17-21, 2018 event consisted of a 6.03" rainfall event, between a 10-year (5.23") and 25-year (6.37") Atlas 14 storm event. Storm 2 was used for the hydraulic calibration as it represented the record USGS (Queen Avenue) discharge.

Included in the presentation were the hydraulic results for Shingle Creek, 13 lakes (the Twin Lakes counted as one lake), three ponds and one wetland.

Staff will submit the preliminary floodplain areas and profiles to the Minnesota Department of Natural Resources (MnDNR) for processing and review on March 15-16. The DNR will publish the Preliminary Floodplain Maps for the Federal Emergency Management Agency (FEMA) Review



Meeting, April 1. City staffs will work with the Commission and DNR to review and discuss where large rises occur before the Floodplain Areas and Profiles are published and mapped by FEMA.

B. The State of Minnesota **Clean Water Council*** submits a biennial report to the legislature summarizing Clean Water Fund activities that have taken place in the previous two years and recommendations, including funding recommendations, for the coming biennium. This item is included in the meeting packet for information and background purposes. Staff thought the Commissioners would be interested in this high-level overview of water resources policy and how it can inform the work of local organizations such as the Commissions. The FY 22-23 Clean Water Fund and Policy Recommendation Report can be found at https://www.pca.state.mn.us/sites/default/files/lr-cwc-1sy20.pdf

Of particular interest are three policy initiatives that have newly risen to prominence, discussion of which starts on page 19 of the report:

1. Reducing de-icing chloride (road salt) pollution (revised policy statement)

2. Reducing chloride pollution from water softening

3. Disclosure of well water quality at time of sale

While few, if any, households in the two watersheds still obtain their drinking water from private wells, road de-icing continues to be a major issue for Shingle Creek and other developed areas of the state. Chloride pollution from water softeners is a small but important source that has been only minimally addressed to this point. Both of these issues are also addressed in proposed legislation SF 884/HF 1660 discussed under agenda item IX.B.2. below.

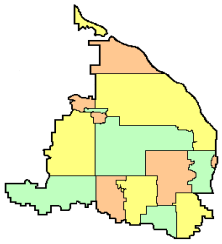
C. Wild Wings Western Wetland.*

Riegel presented this flood mitigation and drainage improvement project. The project consisted of recreation of a wetland channel and installation of an emergency overflow structure to protect against flooding on a 0.89-acre site located at 5220 Yorktown Lane in Plymouth. The project excavated a depth of about 4 feet of sediment along 2,068 linear feet of the 18-foot-wide channel; 3,100 CY of material were excavated. Permits/approvals were obtained from the US Army Corps of Engineers (USACE), the DNR, the Shingle Creek Commission, and the Wetland Conservation Act (WCA). The project took seven days to complete, including five days of excavation.

VIII. Grant Opportunities.

Meadow Lake Management Plan and Connections II Stream Restoration Clean Water Fund grants.* As a final step in processing these grants, the Board of Water and Soil Resources (BWSR) requires that a Project Assurance Agreement be completed. Essentially, this agreement states that the Commission as the grantee commits to ongoing monitoring to assure project outcomes are met and sustained for at least 20 years, and if that outcome does not last for 20 years, the Commission agrees to see that additional actions are taken using Commission or local funds. The Commission executed a similar agreement for the Bass and Pomerleau Lakes Alum Treatment Project a few years ago. Enclosed in the meeting packet is the **proposed agreement*** for Meadow Lake. It is the same as the Commission's attorney drafted for Bass and Pomerleau Lakes, modified for Meadow Lake and is recommended for approval.

Staff have not yet received guidance from BWSR whether a formal agreement is necessary for the Connections II project or whether that assurance can simply be made in the grant workplan. If so, Staff will work with the attorney to have a draft agreement for the Connections II project ready for consideration at



the April 8 meeting. That assurance must commit to provide financial assurance from local sources for repairs and maintenance. In this (and the Meadow Lake) case, the Commission levied for the full cost of the project, more than what is necessary for the required grant match. Those excess levy funds would be deposited into the Commission's Closed Projects account and would be available to fund future projects, including any maintenance beyond routine maintenance expected of cities. Details of maintenance responsibilities will be negotiated with the cities and included in the cooperative agreement ordering the project.

Motion by Schoch, second by Roach to approve and authorize the Chair to sign the agreement. *Motion carried unanimously.*

IX. Education and Public Outreach.

A. Included in the meeting packet is a draft of the **2020 National Pollutant Discharge Elimination System (NPDES) Phase II Education and Public Outreach Program.*** Contents of this document may be used by the member cities to fulfill their education and public outreach goals. The report will be forwarded to the city managers and members of the Technical Advisory Committee.

Motion by Jaeger, second by Schoch to accept the 2020 report. *Motion carried unanimously.*

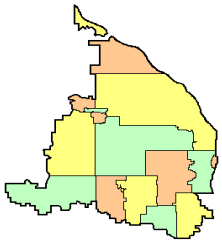
Motion by Butcher, second by Johnson to accept the 2020 report. *Motion carried unanimously.*

B. Hennepin County Chloride Initiative.* The eleven WMOs in Hennepin County elected to set aside 10 percent of the BWSR Watershed Based Funding from the 2018 Pilot Program, or $101,800, specifically for joint, countywide chloride reduction initiatives. The Initiative is comprised of one representative designated by each WMO. Ben Scharenbroich represents Shingle Creek and Andrew Hogg represents West Mississippi. The Riley-Purgatory-Bluff Creek Watershed District serves as coordinator and fiscal agent for the Hennepin County Chloride Initiative (HCCI). At its meeting on March 3, the group elected to proceed with two initiatives:

1. The group has contracted with Fortin Consulting to prepare *Winter Maintenance Chloride Management Plan templates* for private applicators and property managers. The templates will help those users to contract for and implement Smart Salting techniques. Fortin, with the help of HCCI, is assembling a focus group of property managers and applicators to be sure the templates are usable and useful. Those templates are expected to be completed in time to use next winter.

2. The City of Plymouth and Bassett Creek WMC are partnering to intensively *study a subwatershed upstream of Parker's Lake,* which is impaired for excess chloride concentration. The intent is to implement the best, most effective BMPs in this subwatershed to significantly decrease chloride (road salt) export to Parkers Lake. The HCCI agreed to cost share in the first phase, which is an intensive study and data gathering phase. The partners will work with Young Environmental to bring together a diverse group of stakeholders and knowledgeable professionals to better understand the sources of chloride and the structural and nonstructural BMPs that are likely to have the most impact. The outcome will be a written implementation plan.

The Initiative also discussed pending legislation regarding the proposal for limited liability for state certified salt applicators. This legislation had previously been received favorably by several committees in the state legislature but did not make it into a final bill. The legislation has been broadened to include other provisions, so it must go through the committee process again. The two bills are SF 884 and its companion HF 1660. The bill includes additional provisions beyond those relating to salt; the applicable sections are shown in Staff's March 5, 2021 memo.



SF 884 Draft as of March 5, 2021. A bill for an act relating to environment; establishing program to certify salt applicators; limiting liability; prohibiting water softeners that cause excessive chloride pollution; requiring report on process to adopt and amend water quality standards; appropriating money for water quality programs; proposing coding for new law in Minnesota Statutes, chapters 116; 325F.

The advocacy group *Stop Over Salting* has been lobbying in support of the legislation, as they did last session. They periodically ask for help contacting key legislators to help them understand the importance of the bill in helping protect our surface and groundwater and in meeting our obligations to reduce chloride load to Impaired Waters, and we in turn pass that along to Commissioners/alternates in districts of key legislators as the bills pass through the various committees.

C. Hennepin County has prepared and submitted for public input a **Climate Action Plan*** (https://www.hennepin.us/-/media/hennepinus/your-government/projects-initiatives/documents/hennepin-county-draft-climate-action-plan.pdf). Prepared in consultation with county departments, cities, watershed and park districts and public partners, the County also held a series of sessions with community groups, youth and the newly formed Race Equity Advisory Council. More than 2,300 residents responded to a survey.

In the plan the most important values to residents and community partners in creating a climate-friendly future are:

1. Ensuring a healthy environment for future generations
2. Protecting the most vulnerable people and reducing racial disparities
3. Protecting wildlife and nature
4. Responsibly using resources and minimizing wastefulness

To accomplish this, the plan includes "…initiatives to reduce greenhouse gas emissions and strategies to adapt to the changing climate in ways that reduce vulnerabilities and ensure a more equitable and resilient Hennepin County. This plan serves as the foundation for a coordinated approach to planning, policy development, and responses to climate change."

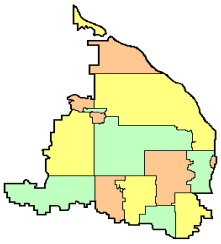
Of particular interest to the Commissions are strategies identified to prepare for and respond to extreme weather events, flooding, stormwater volumes and landslides, and to extreme heat and cold that are discussed in pages 25-35. The strategies target infrastructure such as roads, highways, and bridges; storm drainage systems; and natural resources.

This item is presented for information and background. While the public input period extended through March 3, the County would still be appreciative of any comments you may have. Staff encourage you to review the related work done in preparation for the climate action plan, which can be found at: https://www.hennepin.us/your-government/projects-initiatives/climate-action

Motion by Jaeger, second by Schoch to send a statement of support of the Plan to the County. *Motion carried unanimously.*

Motion by Jaeger, second by Johnson to send a statement of support of the Plan to the County. *Motion carried unanimously.*

D. The **West Metro Water Alliance** (WMWA) met on March 9, 2021, with the primary topic of discussion being education and outreach items in the new NPDES General Permit. A working group of city representatives had previously gone through the permit to list all the education and outreach requirements and identify which could be completed with the help of WMWA. A WMWA subgroup has been formed for each of the areas of concentration listed below. Members will focus on refining proposed deliverables and



estimating resources (e.g., design assistance, fabrication, printing) necessary as well as a plan for disseminating the materials.

At the April WMWA meeting these will be combined into a proposal to complete the work using the WMWA Special Projects budget, which had a balance of $10,700 at the end of 2020. The agreement between the four WMOs in WMWA (Bassett Creek, Elm Creek, Shingle Creek and West Mississippi) requires that Special Projects be approved by the four WMOs before expenditures can be made. This proposal is expected to be submitted to the Commissions for consideration at their May meetings. The goal is to have all the work identified below completed by the end of 2021. Areas of concentration include:

1. **Chloride.** Reduction in chloride use is a priority in the latest NPDES permit. Three of the four WMOs also have at least one chloride stream impairment. Potential WMWA work could include:

   a. Commercial – Multi Family – Institutional Property Maintenance Guide. Update the guide that already exists, Coordinate with the HCCI project that is developing Winter Maintenance Chloride Management Plan templates for private applicators and property managers.

   b. Residential brochure - Residential one-page handout / rack card

   c. Sample Ordinance?

2. **Pet Waste.** This is an area also called out in the permit for specific actions, including education and outreach. Potential WMWA work could include:

   a. Standardized educational signage to put at dog parks

   b. One-page handout or brochure for distribution at events and at dog parks

   c. Signage near pet waste bag distribution areas in parks and other publicly owned properties?

   d. Sample Ordinance?

3. **Training and Materials Library.** WMWA's website will become a depository for both education/outreach and training materials. Cities, WMOs, agencies and other interested parties may submit material to the website administrator. The intent is to have a library of educational materials, newsletter articles, social media content, photos, video, etc., that cities can draw on to meet their education and training needs. This will provide an opportunity, for example, for cities to rotate training videos so employees don't watch the same one every year. The subgroup will also identify gaps where a professional writer or photographer may be hired to prepare additional content.

4. **Education and Outreach Plan**. Each MS4 is required to develop and maintain an Education and Outreach Plan. One subgroup will revise the WMWA Education and Outreach Plan with an activity that specifically relates to the NPDES General Permit and how WMWA undertakings at a regional level dovetail with locally-focused undertakings at the city level. This will clarify that city actions supplemented by WMWA actions will meet the NPDES education and outreach requirements.

The next **West Metro Water Alliance (WMWA)** meeting is a virtual meeting and is scheduled for 8:30 a.m., Tuesday, April 13, 2021. The **Zoom number** is https://us02web.zoom.us/j/922390839. Or call in at any of these numbers using **meeting ID: 922 390 839**: (1) +1 301 715 8592 US (Germantown); (2) +1 312 626 6799 US (Chicago); (3) +1 929 205 6099 US (New York); or (4) +1 253 215 8782 US (Tacoma). The **passcode is water**.

X. Communications.

A. February Communications Log.* No items required action.

B. March Staff Report. No report this month.

C. HF1586.* Included in the packet was correspondence regarding legislation being proposed by State Representative Paul Torkelson regarding funding for a feasibility study to consider merging watershed districts and soil and water conservation districts. Staff will monitor the progress of this proposed legislation.

D. Scharenbroich reported on the **Canadian Pacific train derailment** which occurred on March 7, 2021, along the tracks at Northwest Boulevard, north of Schmidt Lake Road in Plymouth. Twenty-two train cars containing molten sulfur, asphalt and lumber derailed. The Plymouth Police and Fire departments have continually monitored the situation and no leaks have been discovered.

CP crews have worked around the clock to clear the derailed cars and lay new railroad tracks to resume normal operations. CP has been monitoring the air quality and has not obtained any unusual readings. A hazmat team will remain at the scene 24/7 until the site has been restored. No injuries have been reported. Restoration of the site is dependent upon ground and weather conditions, so the timeline is yet to be determined. Restoration work will occur primarily during daylight hours.

XI. Other Business.

Stantec is preparing new **professional services agreements for technical services**.

Motion by Schoch, second by Jaeger to approve and authorize the Chair to sign the Shingle Creek agreement pending approval of the attorneys of the parties. *Motion carried unanimously.*

Motion by Johnson, second by Prasch to approve and authorize the Chair to sign the West Mississippi agreement pending approval of the attorneys of the parties. *Motion carried unanimously.*

XII. Adjournment. There being no further business before the Commissions, the joint meeting was adjourned at 2:50 p.m.

Respectfully submitted,

Judie A. Anderson,
Recording Secretary
JAA:tim

Z:\Shingle Creek\Meetings\Meetings 2021\March 11, 2021 minutes.docx

March 23rd, 2021

WEST MISSISSIPPI WATERSHED MANAGEMENT COMMISSION

PROJECT REVIEW WM2021-004: 610 Junction

Owner: **Connor Mccarthy**
Company: **United Properties**
Address: **651 Nicollet Mall**
Minneapolis, MN 55431

Engineer: **Chad Ayers**
Company: **Sambatek**
Address: **12900 Whitewater Drive, Suite 300**
Minnetonka, MN 55343

Phone: **763-259-6697**
Email: **cayers@sambatek.com**

Purpose: Construction of 2 multi-tenant & 1 corporate HQ industrial buildings with associated utility, hardscape, and landscape improvements and 3 stormwater management facilities on 37.4 acres.

Location: NE of Decatur Drive N & 93rd Ave N, Brooklyn Park, MN (Figure 1).

Exhibits:

1. Project review application and project review fee of $2,500, dated 3/10/2021, received 3/9/2020.

2. Site plan, preliminary plat, grading (Figure 2), utility, erosion control, and landscaping plans dated 3/8/2021, received 3/9/2021.

3. Hydrologic calculations by Sambatek, dated 3/9/2021, received 3/9/2021.

Findings:

1. The proposed project is two multi-tenant and one corporate HQ industrial building. The site is 37.4 acres. Following development, the site will be 76.5 percent impervious with 28.6 acres of impervious surface, an increase of 28.6 acres.

2. The complete project application was received on 3/9/2021. To comply with the 60-day review requirement, the Commission must approve or deny this project no later than the 4/8/2021 meeting. Sixty calendar-days expires on 5/8/2021.

3. To comply with the Commission's water quality treatment requirement, the site must provide ponding designed to NURP standards with dead storage volume equal to or greater than the volume of runoff from a 2.5" storm event, or BMPs providing a similar level of treatment - 85% TSS removal and 60% TP removal. Infiltrating 1.3-inches of runoff, for example, is considered sufficient to provide a similar level of treatment. If a sump is used the MnDOT Road Sand particle size distribution is acceptable for 80% capture.

   Runoff from the site is proposed to be routed through three different two-celled stormwater systems consisting of a sedimentation pond and infiltration basin. The applicant proposes to meet water quality treatment requirements by infiltrating. The applicant meets Commission water quality treatment requirements.

4. Commission rules require that site runoff is limited to predevelopment rates for the 2-, 10-, and 100-year storm events. Runoff from the site is captured in three two-celled stormwater systems each consisting of a pond and infiltration basin. The applicant meets Commission rate control requirements (Table 1).

Table 1. Runoff from site (cfs).

Drainage Area	2-year event		10-year event		100-year event	
	Pre-	Post-	Pre-	Post-	Pre-	Post-
To Southwest	0.00	0.00	0.01	0.01	0.37	0.57
To South	0.86	0.00	7.37	0.01	34.26	0.60
To Decatur Dr	0.16	0.00	1.48	0.01	7.34	0.55
To West	0.09	0.00	0.31	0.00	0.93	0.08
To MnDOT ROW	4.79	1.63	18.06	3.93	58.82	22.19
TOTAL	5.90	1.63	27.23	3.96	101.72	23.99

5. Commission rules require the site to infiltrate 1.0 inch of runoff from new impervious area within 48 hours. The new impervious area on this site is 28.6 acres, requiring infiltration of 134,807 cubic ft within 48 hours. The applicant proposes 3 infiltration basins that have the capacity to infiltrate 153,943 within 48 hours. The applicant meets Commission volume control requirements.

6. The erosion control plan includes a rock construction entrance, perimeter silt fence, a double silt fence surrounding detention ponds/infiltration basins, inlet protection, rip rap at inlets, slope checks, and native seed specified on the pond slopes. The erosion control plan meets Commission requirements.

7. The National Wetlands Inventory does not identify any wetlands on site. The applicant meets Commission wetland requirements.

8. There are no Public Waters on this site. The applicant meets Commission Public Waters requirements.

9. There is no FEMA-regulated floodplain on this site. The low floor elevations of the buildings are at least two feet higher than the high water elevation of the detention ponds/infiltration basins according to Atlas 14 precipitation. The applicant meets Commission floodplain requirements.

10. The site is located in a Drinking Water Management Area, but is outside of the Emergency Response Area. Therefore, infiltration is permitted, but infiltrated water must first filter through 1 foot of soil, the top four inches of which are amended topsoil, and the bottom 8 inches of which are tilled. The applicant proposes a minimum 3' of infiltration media above the groundwater. The applicant will do a post construction infiltration test to verify infiltration rates are less than 8.3"/hr. The applicant meets Commission drinking water protection requirements.

11. A public hearing on the project will be conducted on April 8th, 2021 as part of Planning Commission and City Council review of this project,

meeting Commission public notice requirements.

12. A draft Operations & Maintenance (O&M) agreement between the applicant and the City of Brooklyn Park must be provided.

13. A Project Review Fee of $2500 has been received.

Recommendation: Recommend approval subject to the following condition(s):

1. Provide a completed O&M agreement between the applicant and the City of Brooklyn Park for all stormwater facilities on the project site.

2. Demonstrate by double ring infiltrometer test or other approved method that the infiltration rate is less than 8.3”/hr in the ponds and infiltration basins.

Wenck Associates, Inc.
Engineers for the Commission

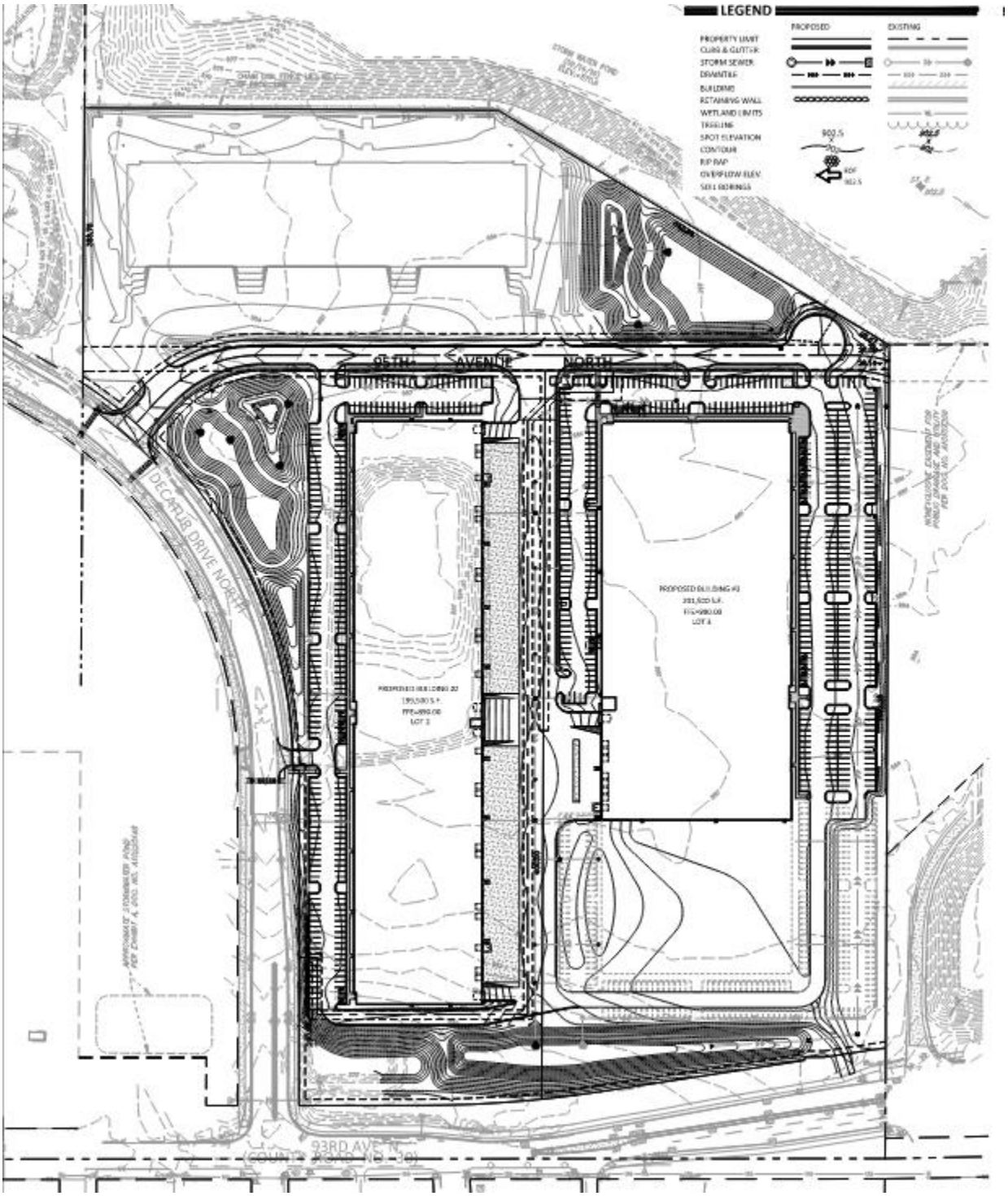
Ed Matthiesen, P.E. Date

WM 2021-004:

Figure 1. Site location.

WM 2021-004:

Figure 2. Site grading plan.



Date 3/31/2021

WEST MISSISSIPPI WATERSHED MANAGEMENT COMMISSION

PROJECT REVIEW WM2021-005: NorthPark Building VII

Owner: **Scannell Properties**
Company: **Scannell Properties #500 LLC**
Address: **8801 River Crossing Blvd, Suite 300**

Engineer: **Benjamin R. Johnson**
Company: **Kimley-Horn & Associates**
Address: **767 Eustis Street, Suite 100**

Phone: **612-326-9506**
Fax:
Email: **Benjamin.johnson@kimley-horn.com**

Purpose: Construction of one office warehouse building on approximately 14 acres.

Location: Northeast corner of Oxbow Creek Drive & Xylon Avenue

Exhibits:

1. Project review application and project review fee of $2,500, dated 3/19/2021, received 3/25/2021.

2. Site plan, preliminary plat, grading (Figure 2), utility, erosion control, and landscaping plans dated 3/25/2021, received 3/25/2021.

3. Hydrologic calculations by Kimley-Horn, dated 3/25/2021, received 3/25/2021.

Findings:

1. The proposed project is the construction of one office warehouse building. The site is approximately 13.44 acres. Following development, the site will be 80.97 percent impervious with 10.88 acres of impervious surface, an increase of 10.88 acres.

2. The complete project application was received on 3/25/2021. To comply with the 60-day review requirement, the Commission must approve or deny this project no later than the 5/13/2021 meeting. Sixty calendar-days expires on 5/25/2021.

3. To comply with the Commission's water quality treatment requirement, the site must provide ponding designed to NURP standards with dead storage volume equal to or greater than the volume of runoff from a 2.5" storm event, or BMPs providing a similar level of treatment - 85% TSS removal and 60% TP removal. Infiltrating 1.3-inches of runoff, for example, is considered sufficient to provide a similar level of treatment.
   If a sump is used the MnDOT Road Sand particle size distribution is acceptable for 80% capture.

   Runoff from the southwest portion of the site is proposed to be routed to pond P-G.2. P-G.2 overtops into temporary pond P-D. The rest of the site drains to pond P-H and P-G.1. P-H overtops to infiltration basin I-H and also connects P-G.1 to I-H. The 100 year storm would produce 48,829 cubic feet of runoff. The proposed site can infiltrate 102,882 cubic feet. The applicant meets Commission water quality treatment requirements.

4. Commission rules require that site runoff is limited to predevelopment rates for the 2-, 10-, and 100-year storm events. There is no runoff from the site because it is all infiltrated. HydroCAD models show the proposed site can infiltrate the 100 year storm. This project meets rate control requirements (Table 1).

Table 1. Runoff from site (cfs).

Drainage Area	2-year event		10-year event		100-year event	
	Pre-	Post-	Pre-	Post-	Pre-	Post-
G1	0	0	0	0	0	0
G2	0	0	0	0	0	0
H	0	0	0	0	0	0

5. Commission rules require the site to infiltrate 1.0 inch of runoff from new impervious area within 48 hours. The new impervious area on this site is 10.88 acres, requiring infiltration of 39,465 cubic feet within 48 hours. The applicant proposes to use ponds and infiltration basins which have the capacity to infiltrate the required volume feet within 48 hours. The applicant meets Commission volume control requirements.

6. The erosion control plan includes 2 rock construction entrances, silt fence surrounding detention ponds/infiltration basins, inlet protection, rip rap at inlets, slope checks, and erosion control blanket specified on the pond slopes. The erosion control plan meets Commission requirements.

7. The National Wetlands Inventory does not identify any wetlands on site. The applicant meets Commission wetland requirements.

8. There are no Public Waters on this site. The applicant meets Commission Public Waters requirements.

9. There is no FEMA-regulated floodplain on this site. The low floor elevations of the buildings are at least two feet higher than the high water elevation of the detention ponds/infiltration basins according to Atlas 14 precipitation. The applicant meets Commission floodplain requirements.

10. The site is located in a Drinking Water Management Area, but is outside of the Emergency Response Area. Therefore, infiltration is permitted, but infiltrated water must first filter through 1 foot of soil, the top four inches of which are amended topsoil, and the bottom 8 inches of which are tilled. The applicant proposes a minimum 3’ of infiltration media above the groundwater in the infiltration basin. The applicant meets Commission drinking water protection requirements.

11. A public hearing on the project will be conducted on 4/8/2021 as part of Planning Commission and City Council review of this project, meeting Commission public notice requirements.

12. A draft Operations & Maintenance (O&M) agreement between the applicant and the City of Brooklyn Park must be provided.

13. A Project Review Fee of $2,500 has been received.

WM 2021-005:

Recommendation: Recommend approval subject to the following condition(s): [with no conditions.]

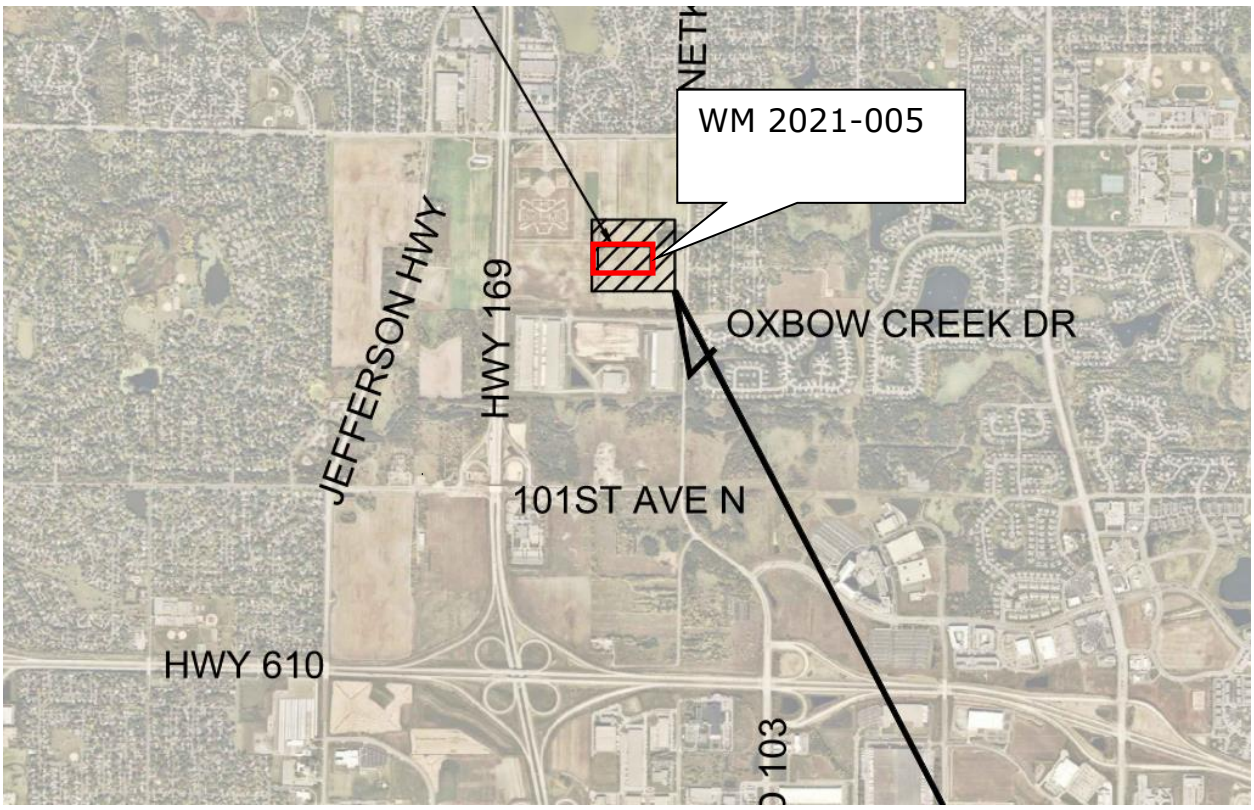
1. Provide a complete O&M agreement between the applicant and the City of Brooklyn Park for all stormwater facilities on the project site.
2. Demonstrate by double ring infiltrometer test or other approved method that the infiltration rate is less than 8.3”/hr in the ponds and infiltration basins.

Wenck Associates, Inc.
Engineers for the Commission

Ed Matthiesen, P.E. Date

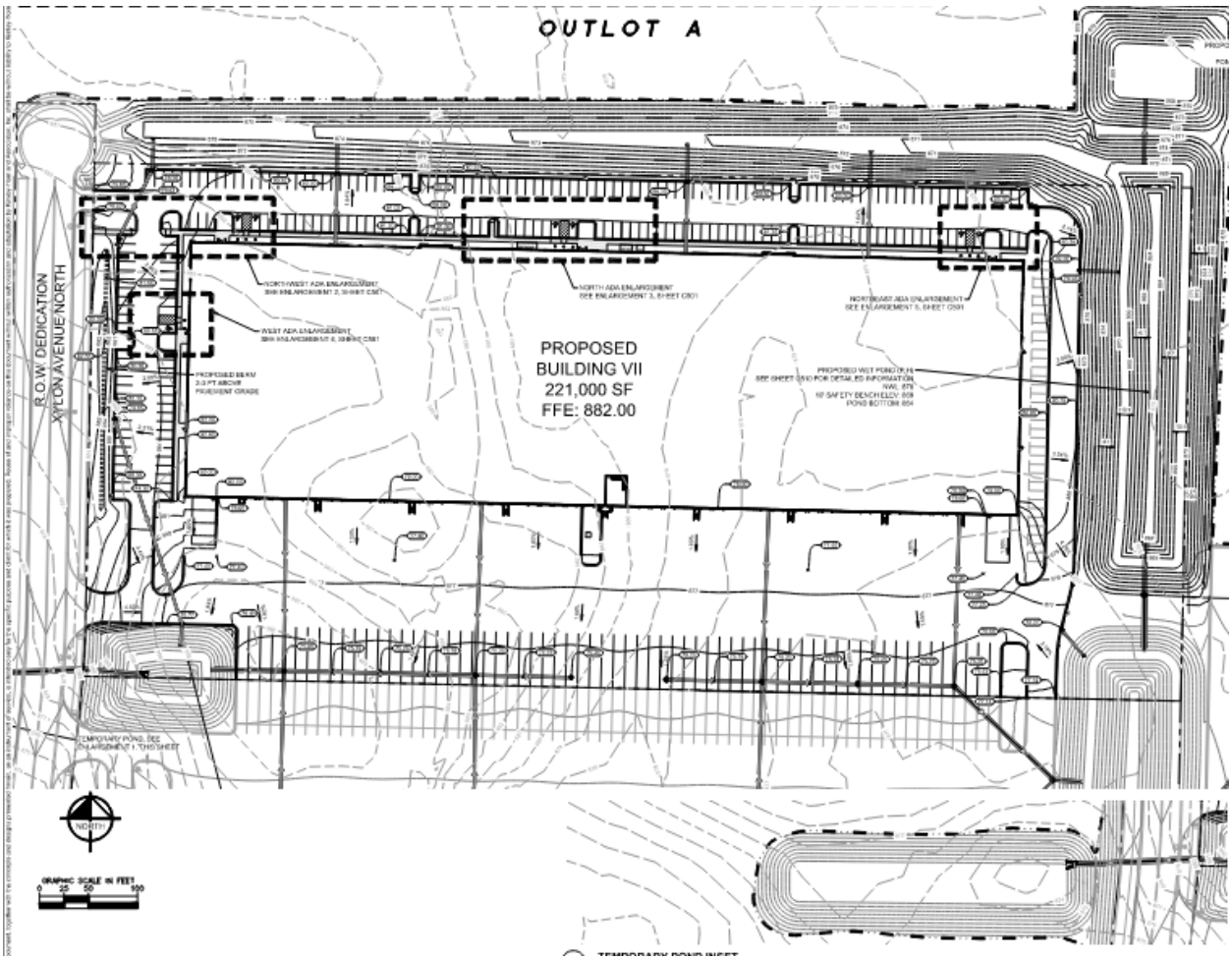
WM 2021-005:

Figure 1. Site location.



WM 2021-005:

Figure 2. Site grading plan.



To: Shingle Creek/West Mississippi WMO Commissioners

From: Ed Matthiesen, P.E.
Diane Spector

Date: April 2, 2021

Subject: Initiate Minor Plan Amendment

Recommended Commission Action	Staff recommends that each Commission authorize proceeding with the attached Minor Plan Amendment and set the date for the required public meeting as the May 13, 2021 regular meeting.

The Shingle Creek and West Mississippi Third Generation Watershed Management Plan and Capital Improvement Programs (CIP) are proposed for a Minor Plan Amendment (MPA). The Technical Advisory Committee (TAC) reviewed proposed revisions at its March 11, 2021 meeting.

As recommended by the TAC, the Plan would be revised to:

- Modify the existing Palmer Lake Estates Bass Creek Restoration Project on the Shingle Creek CIP to reflect both the latest cost estimate – increasing from $450,000 to $600,000 – and to specify that the Commission under its revised cost share policy will fund 100% of the project cost similar to other stream restoration projects.

- Add a new project to the West Mississippi CIP – "Partnership Cost Chare Program" – similar to the Shingle Creek Partnership Cost Share program. Brooklyn Park has partnered with Hennepin County to identify a number of high priority Mississippi Riverbank Stabilization projects on private property that would significantly reduce sediment loading to the River. This partnership program could be a potential source of match funds.

Also proposed to be added to the CIP is Phase 2 of the Channel Modification with SRP Filter project. Phase 1 was recently awarded a Hennepin County Opportunity Grant and will be matched from existing Closed Projects Account funds rather than additional levy.

If the Commissions choose to go forward with the Minor Plan Amendment, we recommend setting May 13, 2021 as the public meeting at which it would be discussed. At that May 13 meeting, the Commissions would discuss any other 2021 CIP projects proposed and establish a maximum levy for 2021. The current CIPs are attached for reference. The Minor Plan amendment and maximum levy would then be forwarded to Hennepin County for consideration by the Hennepin County Board.

Attached is the proposed Notice of Minor Plan Amendment. Because you have a joint Plan both Commissions must authorize proceeding with the Minor Plan Amendment. The Commissions must send a copy of the proposed minor plan amendment to the member cities, Hennepin County, the Met Council, and the state review agencies for review and comment, and must hold a public meeting (not a hearing) to explain the amendment. This meeting must be public noticed twice, at least seven and 14 days prior to the meeting.

Notice of Minor Plan Amendment
Shingle Creek and West Mississippi Watershed Management Commissions

The Shingle Creek and West Mississippi Watershed Management Commissions propose to amend their joint *Third Generation Watershed Management Plan* to adopt revisions to the Capital Improvement Program (CIP). This Amendment adds one project to the Shingle Creek CIP and amends the cost of another project and adds one project to the West Mississippi CIP.

The proposed minor plan revision is shown as additions (underlined) or deletions (~~strike outs~~).

Table 4.5. Shingle Creek WMC Third Generation Plan Implementation Plan is hereby revised as follows:

Action	2021
Channel Modification with SRP Filter Phase 2	125,000
-Commission Contribution	125,000
-Local Contribution	0
Palmer Lake Estates Bass Creek Restoration	~~450,000~~ 600,000
-Commission Contribution	~~112,000~~ 600,000
-Local Contribution	~~337,500~~0

Table 4.6. West Mississippi WMC Third Generation Plan Implementation Plan is hereby revised as follows:

Action	2021
Partnership Cost Share Projects	100,000
-Commission Contribution	100,000
-Local Contribution	0

Appendix F, CIP Descriptions is hereby revised as follows to add under Shingle Creek Projects:

Channel Modification with SRP Filter Phase 2
This is the second phase of a project to install a media filter in the outlet channel from Wetland 639W in the City of Crystal, which conveys runoff with high concentrations of soluble reactive phosphorus (SRP) to Upper Twin Lake. This proposed project would treat the outflow from the wetland by lining approximately 400 feet of the outlet channel with interconnected cells of iron-enhanced sand to reduce 70-90% of SRP.

Appendix F, CIP Descriptions is hereby revised as follows to add under West Mississippi Projects:

Partnership Cost Share Projects
This program makes funds available to its member cities to help fund the cost of Best Management Practices (BMPs) partnership projects with private landowners. Participating projects on private property must be for water quality improvement and must be for improvement above and beyond what would be required to meet Commission rules. Preference is given to projects in a priority area identified in a subwatershed assessment or TMDL.

To: Shingle Creek/West Mississippi WMO Commissioners

From: Ed Matthiesen, P.E. Ali Stone
Diane Spector Nick Omodt
Katie Kemmitt Aaron Hyams

Date: April 1, 2021

Subject: Annual Water Quality Report

Recommended Commission Action	Receive and review the report.

Attached is the 2020 Annual Water Quality report. Katie Kemmitt will attend the April 8th, 2021 meeting to present the findings. The report and technical appendices will soon be available at shinglecreek.org/water-quality.html.

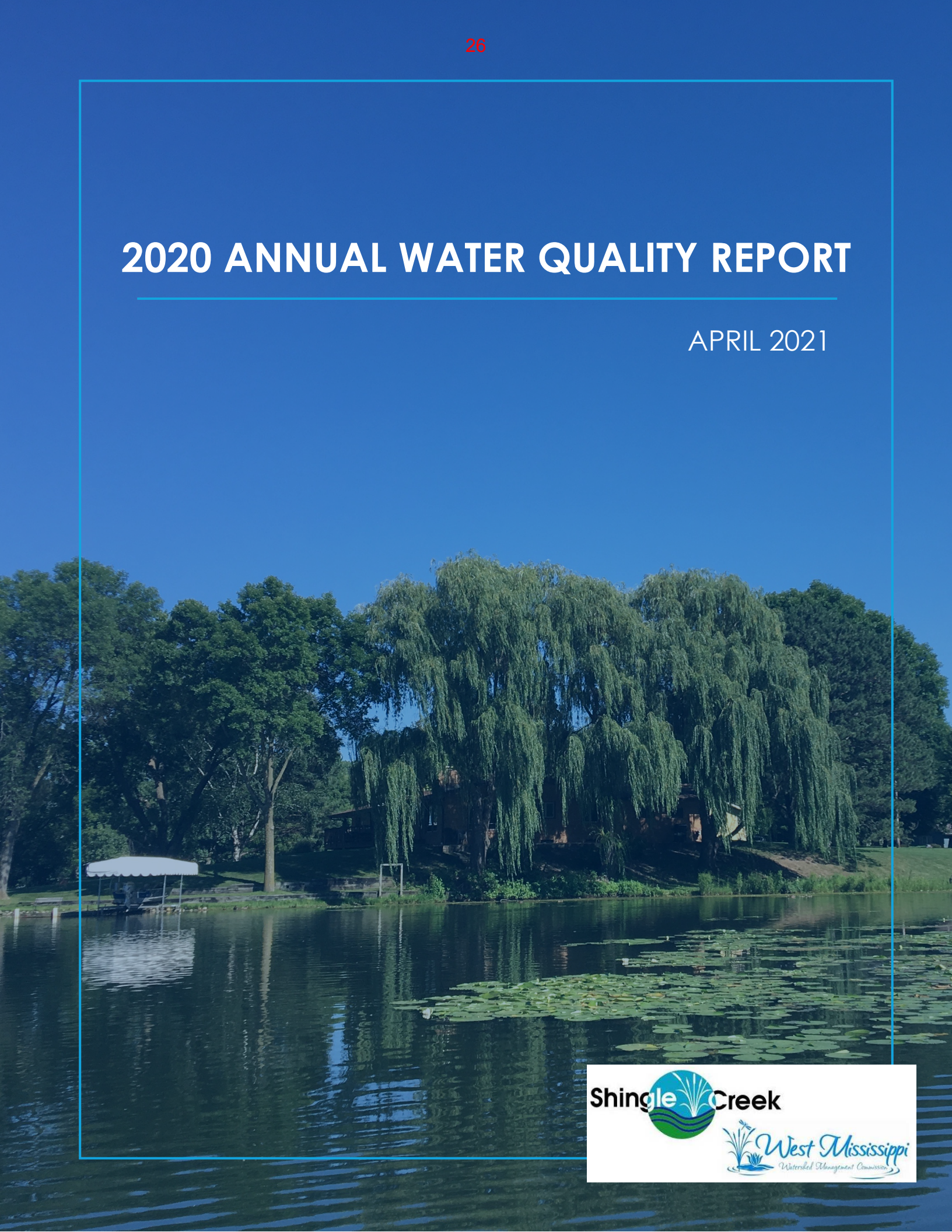
2020 was a dry year, with 26.4 inches of precipitation for the year compared to the historic (1992-2020) average of 34.3 inches. The dry year contributed to low volume of runoff and good water quality in Shingle and West Mississippi streams. Pollutant loads of TP and TSS at Shingle Creek sites were the lowest in recent years. Typically, total phosphorus (TP) and total suspended solids (TSS) values are below state standards except during storm events, when wash-off from the watershed increases those concentrations above the standards. Winter chloride concentrations remain high in Shingle Creek.

Lake conditions (water quality, plankton, vegetation) were monitored in five lakes in the watershed. Bass and Pomerleau Lakes showed continued good water quality following alum treatments in 2019. Pomerleau showed particularly good water quality, with Secchi depth, TP, and chlorophyll concentrations below the State standards during the entire summer. The lakes received their second alum treatments in fall 2020. Results from Crystal Lake showed poor water quality, little submerged vegetation, and signs of a potential harmful algae bloom in late summer. Conditions in Eagle and Pike were good. Both lakes had healthy aquatic vegetation and plankton communities and water quality that remained below or near the State standards for much of the season.

The Water Quality Report provides summary information for each of the water resources within the three management units of Shingle Creek and for West Mississippi as a whole. More detailed information is presented in the appendices.

2020 ANNUAL WATER QUALITY REPORT

APRIL 2021



Shingle Creek

West Mississippi Watershed Management Commission

The Monitoring Program

The Shingle Creek and West Mississippi Watershed Management Commissions annually monitor water quality in the lakes, streams and outfalls of the watersheds. Data has been collected from Shingle Creek since 1996 and at West Mississippi river outfalls since 2010. In 2012 Shingle Creek expanded its volunteer-based lake monitoring program to start systematic detailed lake monitoring. The program has also expanded to incorporate fish, macroinvertebrate, and aquatic vegetation monitoring in the lakes and streams. Student and adult volunteers collect additional lake water quality and stream and wetland macroinvertebrate data. A Water Quality report summarizing current and historic conditions in the watersheds has been published annually since 1998.

Surface water quality in the watersheds is typical of urban lakes and streams in the Twin Cities metropolitan area. Agriculture followed by urban development have changed drainage patterns, increased pollutants to the waters, and reduced habitat for aquatic and terrestrial life. Both Shingle Creek and Bass Creek do not meet state water quality standards for chloride, bacteria, and dissolved oxygen, and have severely impacted fish and macroinvertebrate communities. Thirteen of the 16 lakes were listed as Impaired Waters of the State because of their high concentrations of phosphorus. Diagnostic and feasibility studies completed between 2007 and 2011 have identified actions that can be taken in the watersheds to help improve water quality.

In the more than ten years since the results have been heartening. Three of the impaired lakes **now meet state standards** and have been removed from the list of Impaired Waters. Long-term stream water quality monitoring shows a **clear improvement** in suspended sediment and nutrient concentrations in both Shingle Creek and Bass Creek, a result of ongoing efforts to stabilize streambanks, increase the frequency of street sweeping, enhance erosion control on construction sites, and install Best Management Practices to treat stormwater before it is discharged into the streams. However, chloride concentrations in the streams, mostly from road salt applied in the winter for snow and ice control, continue to be high.

Why Do We Monitor?

- To quantify the **current status** of streams and lakes throughout the watershed and compare to water quality standards.
- To quantify **changes over time**, or trends, in stream and lake water quality
- To **identify problem areas** for potential BMPs
- To quantify the **effectiveness** of implemented BMPs throughout the watershed

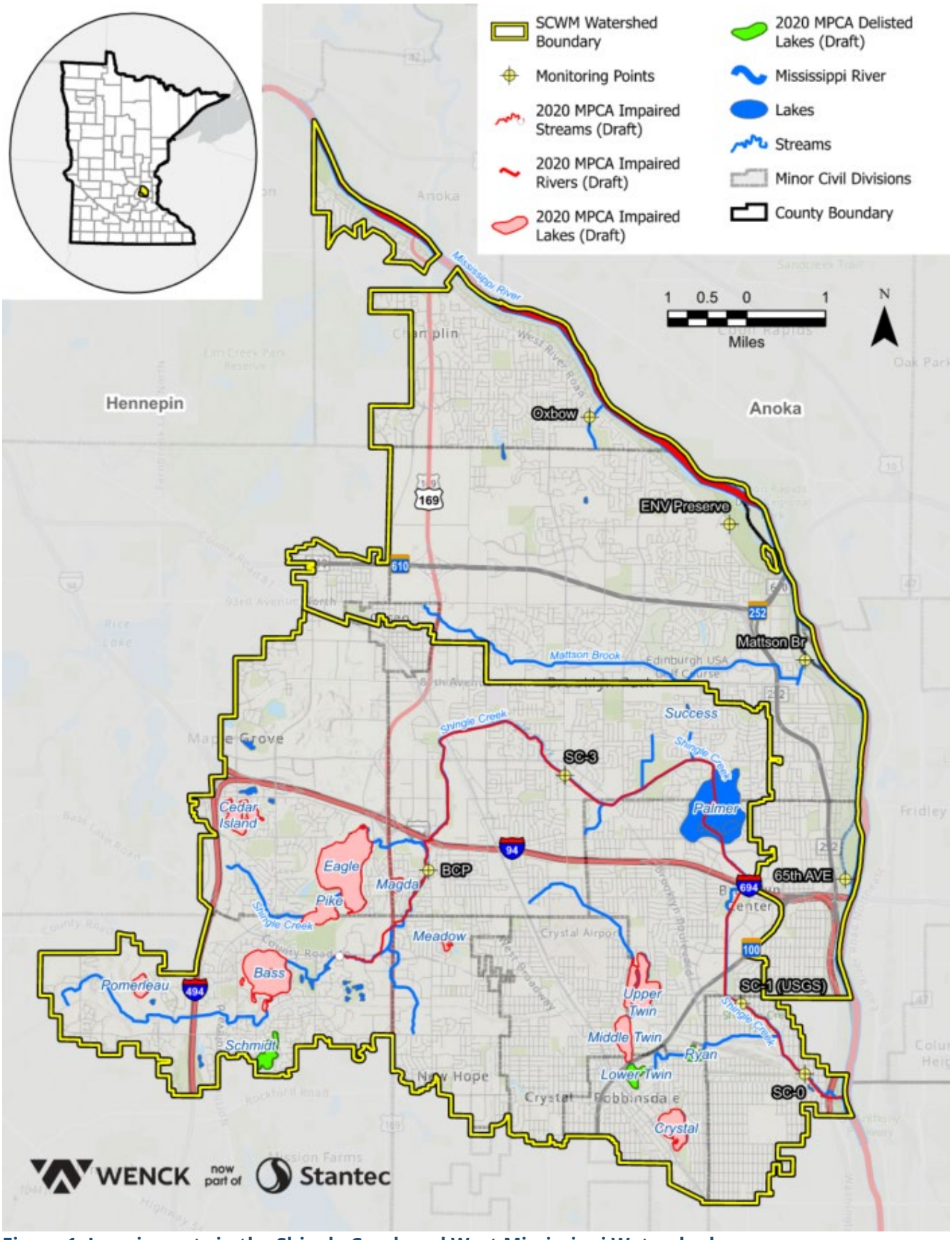


Figure 1. Impairments in the Shingle Creek and West Mississippi Watersheds.

What's in the watershed?

West Mississippi

- 25 square miles
- High impervious urban development (25%) and low-moderate impervious urban development (38%)
- 4 stream sites and 18.3 miles of streams
- No lakes, few wetlands

Middle Shingle Creek

- 15 square miles
- High impervious urban development (45%) and low-moderate impervious urban development (28%)
- 1 stream and 10.34 miles of streams
- 2 lakes: Success and Palmer

Upper Shingle Creek

- Headwaters of Shingle Creek
- 13 square miles
- High impervious urban development (28%) and low-moderate impervious urban development (26%)
- 3 streams and 16.2 miles of streams
- 8 lakes: Bass, Pomerleau, Schmidt, Cedar Island, Pike, Eagle, Magda, Meadow

Lower Shingle Creek

- Shingle Creek discharges to the Mississippi River
- 17 square miles
- High impervious urban development (71%) and low-moderate impervious urban development (8%)
- 2 streams and 18.9 miles of streams
- 5 lakes: Upper Twin, Middle Twin, Lower Twin, Crystal, and Ryan

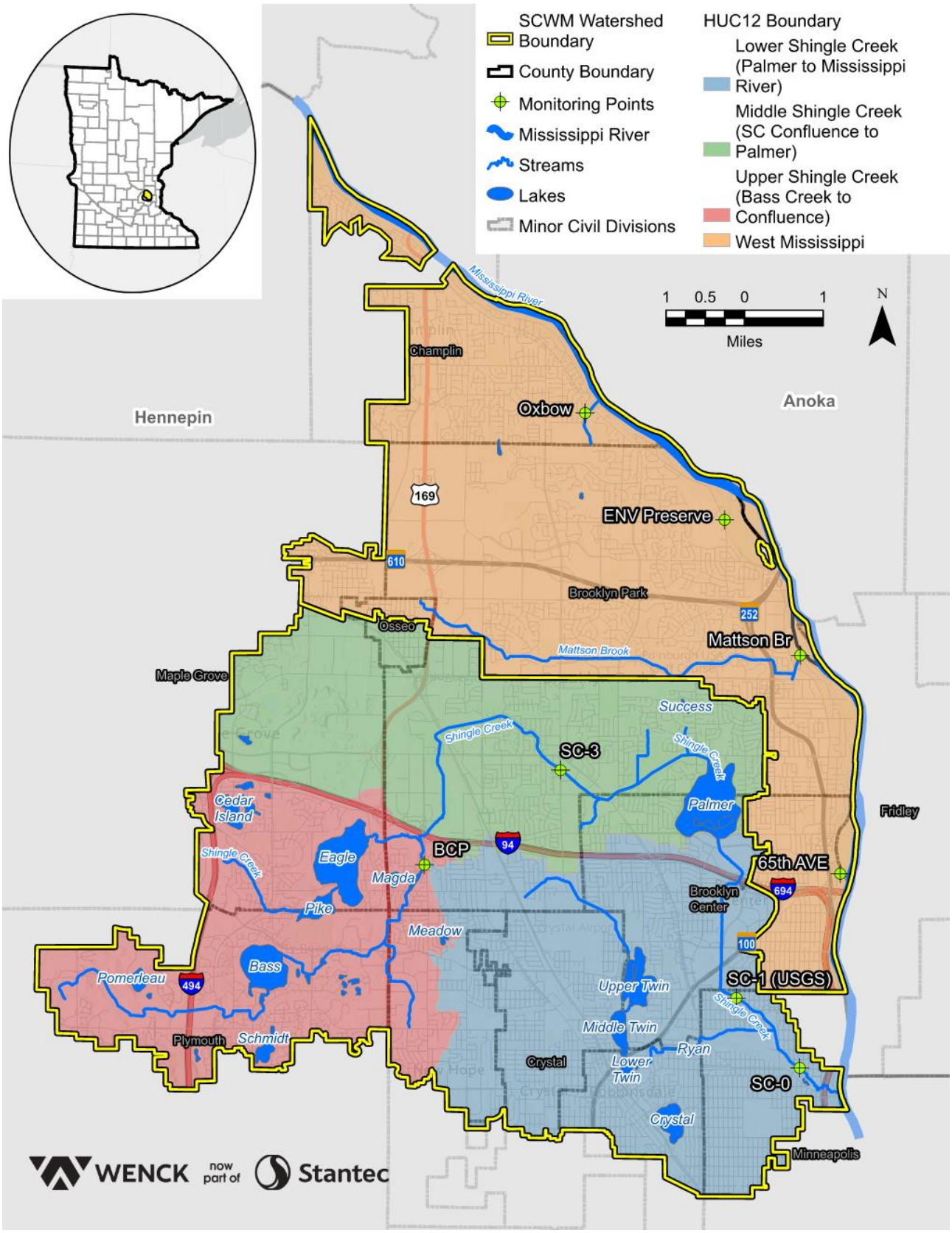


Figure 2. Overview and monitoring locations of the Shingle Creek and West Mississippi Watersheds.

Monitoring in 2020

Stream Monitoring

Routine Flow and Water Quality: Three sites along Bass and Shingle Creek were monitored biweekly from April through October: near the stream's outlet to the Mississippi River in Minneapolis (SC-0); mid-watershed in Brooklyn Park (SC-3); and in Bass Creek (BCP) in the upper watershed. Winter chloride was sampled monthly from November through March at the three locations mentioned and the USGS gage site (SC-1). In the West Mississippi Watershed, the Environmental Preserve (ENVP) and 65th Avenue were monitored monthly April through October.

River Watch: Stream macroinvertebrates are typically monitored by high school students at two sites on Shingle Creek through the Hennepin County River Watch program, however no monitoring occurred in 2020 due to the COVID-19 pandemic. Shingle Creek at Park Center High School has been monitored for 24 years by science students from the school. Shingle Creek at Webber Park was monitored by students from Patrick Henry High School between 2001 and 2012, then in 2018 and 2019 by students from the Avail Academy.

Lake Monitoring

Routine Water Quality: Water quality in Eagle and Pike Lakes in Maple Grove was monitored biweekly from May through September as part of Shingle Creek's routing monitoring program. Aquatic vegetation was surveyed once in late spring and once in late summer. The carp populations on both lakes were last surveyed in July 2018.

CAMP: Each year the Commission sponsors volunteer lake water quality monitoring through the Met Council's Citizen Assisted Monitoring Program (CAMP). Meadow, Success, Ryan, Upper Twin, Middle Twin and Lower Twin were monitored in 2020.

Grant Projects: Crystal, Bass, and Pomerleau Lakes were monitored biweekly from May through September for water quality as part of grant projects. These lakes have all been listed as impaired for nutrients and are undergoing active management. Bass and Pomerleau Lakes received a 2nd dose of alum in September 2020, following the first dose that occurred in May 2019. Crystal Lake will receive its first alum treatment in spring 2021. Water quality monitoring in the lakes has helped our understanding of changes in lake health following management activities.

Wetland Monitoring

Macroinvertebrate communities and vegetation are typically monitored, two in each watershed, by volunteers through the Wetland Health Evaluation Program (WHEP) administered by Hennepin County. That routine monitoring was not completed in 2020 due to the COVID-19 pandemic. Two wetlands in Shingle Creek watershed were monitored, both located within Webber Park.

2020 in Review

This summary provides an overview of findings and conditions in the two watersheds in 2020. A more detailed assessment and data are available in the technical appendices, which can be found at shinglecreek.org/water-quality.html.

Rainfall

Water quality in lakes, streams and wetlands is heavily influenced by precipitation and storm water runoff. Precipitation in 2020 in the Shingle Creek and West Mississippi watersheds rainfall was below the historic average (1992-2020) each month except March and August. Total rainfall in 2020 was 26.4 inches, 7.9 inches below the historic average of 34.3 inches.

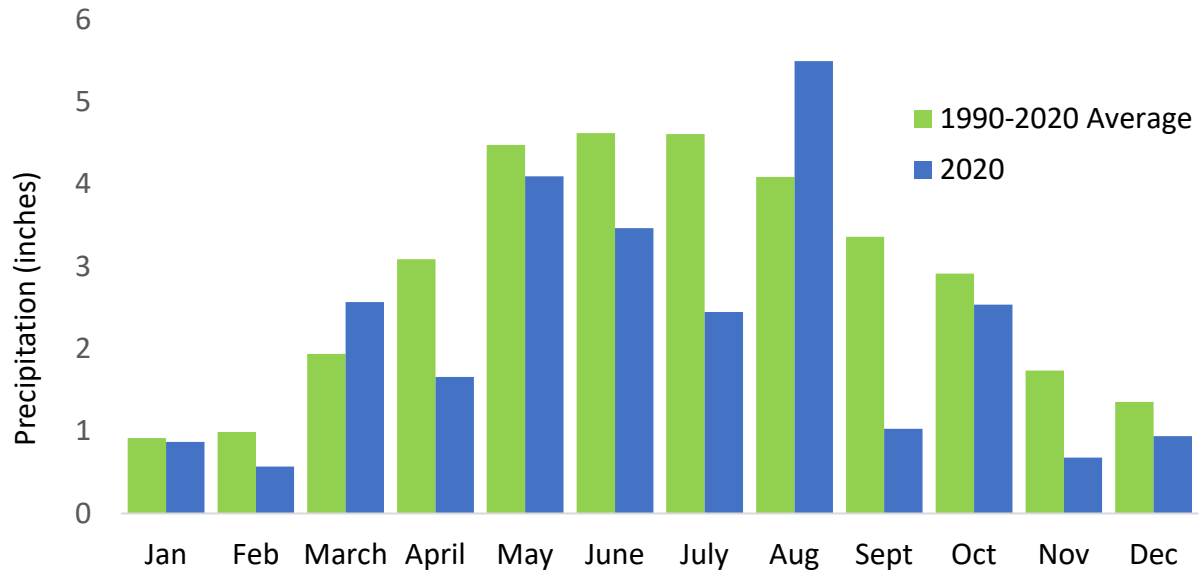


Figure 3. Monthly precipitation totals at the New Hope weather station for 1990-2020 and 2020.

Streams

Stream sites in Shingle Creek and West Mississippi Watersheds are monitored during normal, baseflow conditions (routine monitoring) and during rainfall events (storm monitoring). Runoff during storms carries pollutants into the stream and can contribute to downstream water body impairments. Stream water quality during storms is often worse than during routine monitoring.

Shingle Creek

Flow at all the monitored Shingle Creek sites (BCP, SC-3, SC-0) and at the USGS gage site were similar across sites and was largely driven by rainfall events in the watershed (Figure 4). The highest flows occur at the site closest to the watershed outlet (SC-0) and the lowest flows occur near the watershed headwaters (BCP). 2020 was a relatively dry year compared to historic precipitation averages (Figure 3), and total runoff from each monitoring site was the

lowest it has been since 2009 (Appendix C). The small amount of runoff resulted in historically low TP and TSS loading to the watershed.

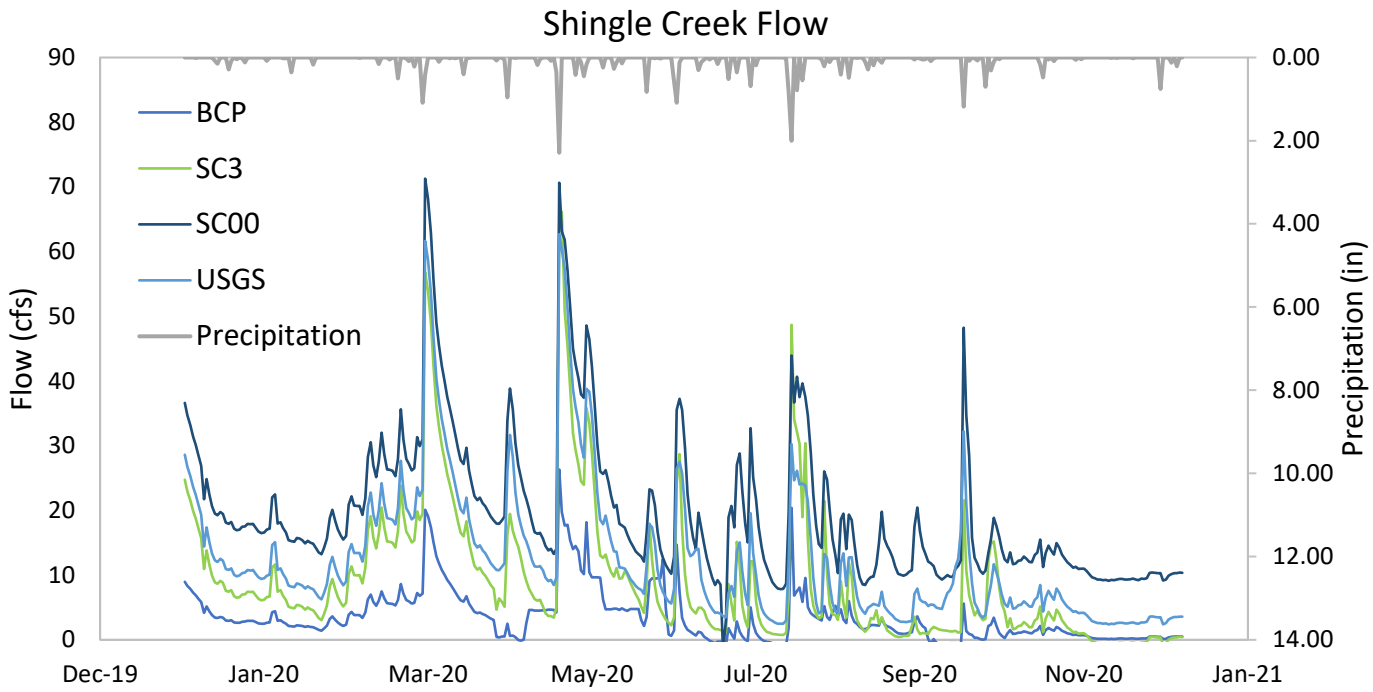


Figure 4. Flow at monitored stream sites and precipitation in the Shingle Creek Watershed during 2020.

Water quality at the Shingle Creek stream sites is generally worse during storm event monitoring (Figure 5). Average concentrations of chloride, *E. coli*, TP, and TSS during storm events were higher than during routine monitoring, with the exception of chloride. Chloride samples were collected year-round but were highest during winter routine monitoring when road salt application occurs.

Annual pollutant loads of TP, TSS, and chloride were estimated for each monitoring site by multiplying the mean pollutant concentration by the annual volume of runoff at each site. Loads are highest near the Shingle Creek watershed outlet at site SC-0.

Table 1. Annual pollutant loads at each Shingle Creek routine monitoring site.

Site	TP Load (lbs/acre/year)	TSS Load (lbs/acre/year)	Chloride Load (lbs/acre/year)
BCP	0.09	12.8	194
SC-3	0.11	17.1	218
SC-0	0.11	16.3	176

Trends: Water quality data has been collected in Shingle Creek since 1996, and trend analysis shows significant changes to stream water quality. TP concentrations are improving in both Shingle (SC-3) and Bass Creeks (BCP). Dissolved oxygen concentrations are declining at the

upper watershed site on Shingle Creek (SC-3), indicating a need to continue focusing on dissolved oxygen management. Trends were not detected for chloride, TSS, *E. coli*, or nitrogen.

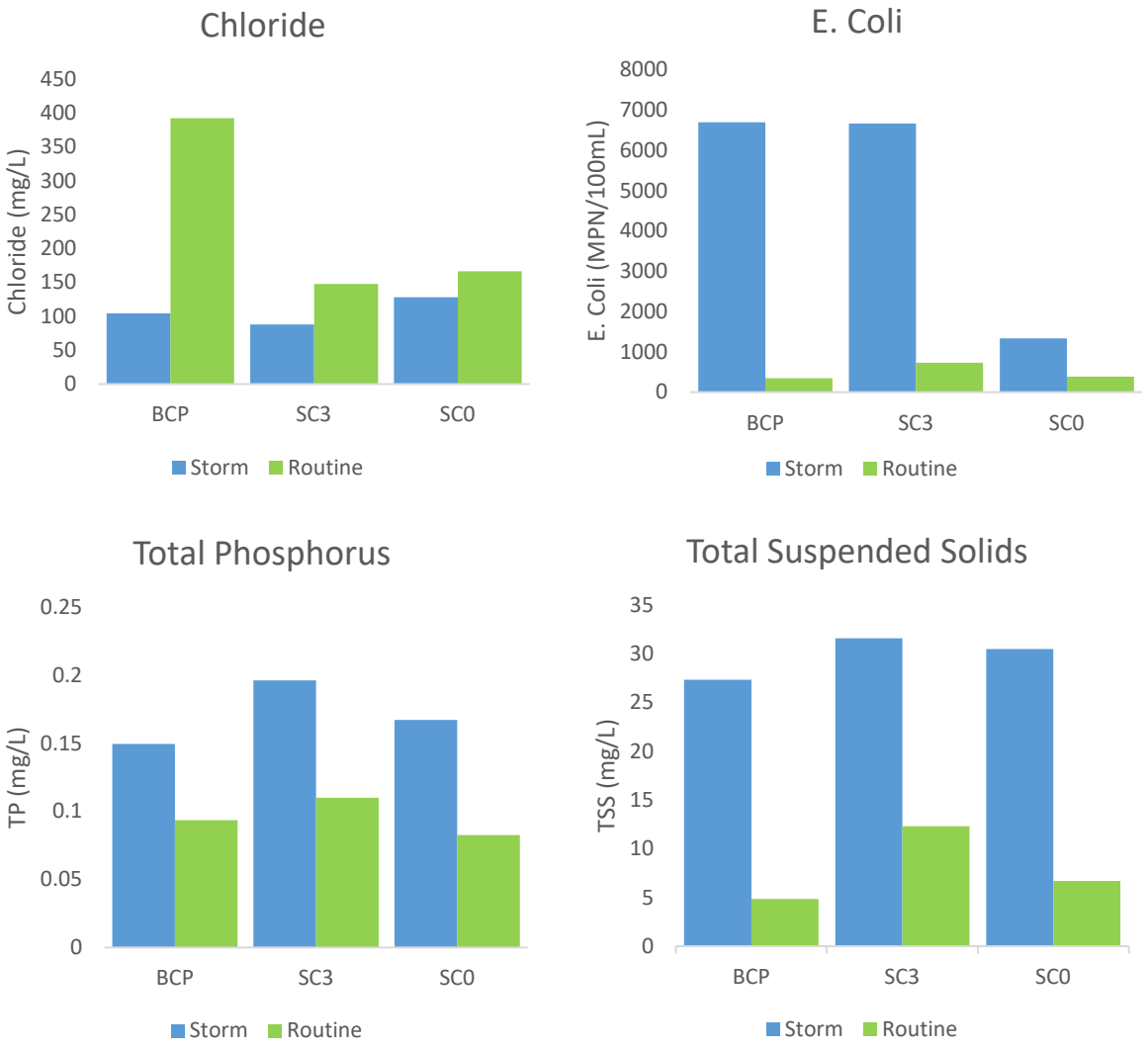


Figure 5. Average concentration of water quality parameters at Shingle Creek sites sampled during storm and routine monitoring in 2020.

West Mississippi

Flow at West Mississippi sites was monitored starting in April 2020. Flow at the 65th Ave site in West Mississippi was much higher than at the Environmental Preserve (Figure 6). Flow was highest during precipitation events.

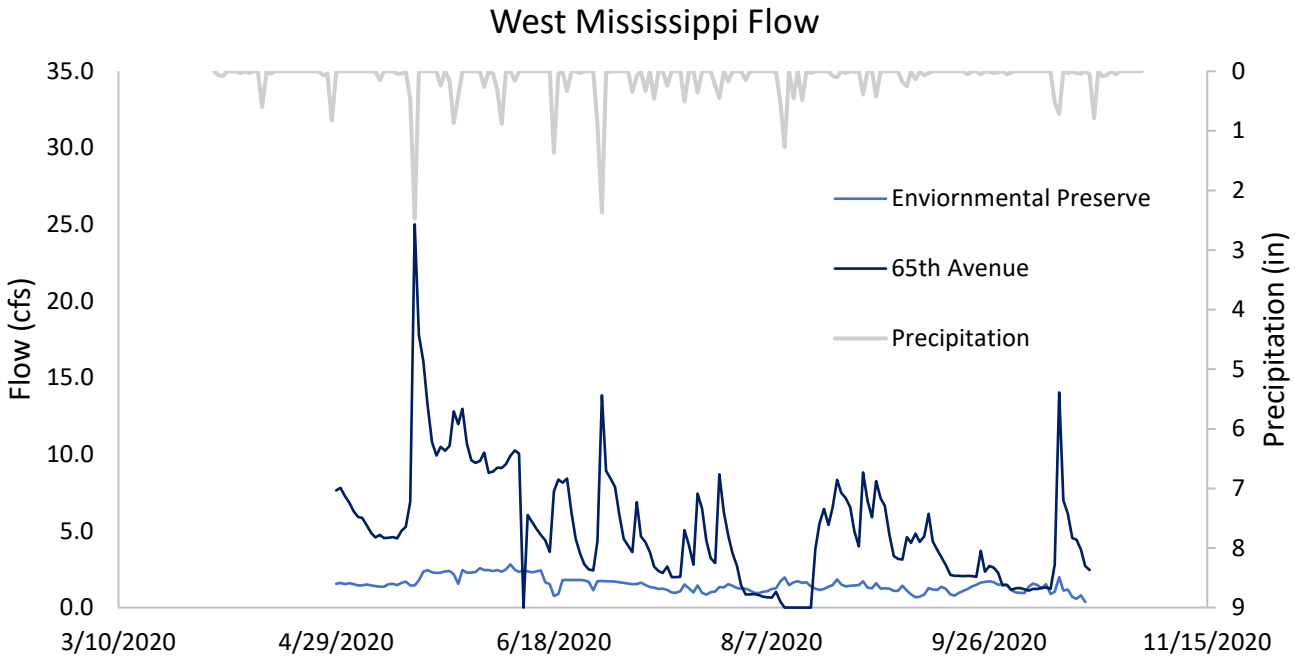


Figure 6. Flow at monitored stream sites and precipitation in the West Mississippi Watershed during 2020.

Similar to Shingle Creek stream sites, water quality (*E. coli*, TP, TSS) at West Mississippi sites was worse during storm events (Figure 7). No chloride samples were collected during storm events at ENVP and 65th Ave.

Monitoring season pollutant loads of TP, TSS, and chloride were estimated for each monitoring site by multiplying the mean pollutant concentration by the volume of runoff during the monitoring season at each site. Year-round flow data for West Mississippi sites were not available, preventing the calculation of annual pollutant loads.

Table 2. Monitoring season pollutant loads at West Mississippi routine monitoring sites.

Site	TP Load (lbs)	TSS Load (lbs)	Chloride Load (lbs)
ENVP*	120	22,760	13,166
65th Ave**	899	210,174	599,051

* ENVP Load was calculated from April 29th – October 19th, 2020.

** 65th Avenue Load was calculated from March 12th – December 31st, 2020.

Trends: Water quality data have been collected in the West Mississippi watershed since 2010. Trend analysis did not detect any trends in TP or TSS concentrations at ENVP. No other trends in chemical parameters at ENVP or 65th Ave could be detected due to lack of long-term data. Continued data collection at West Mississippi sites should be a focus of future monitoring activities.

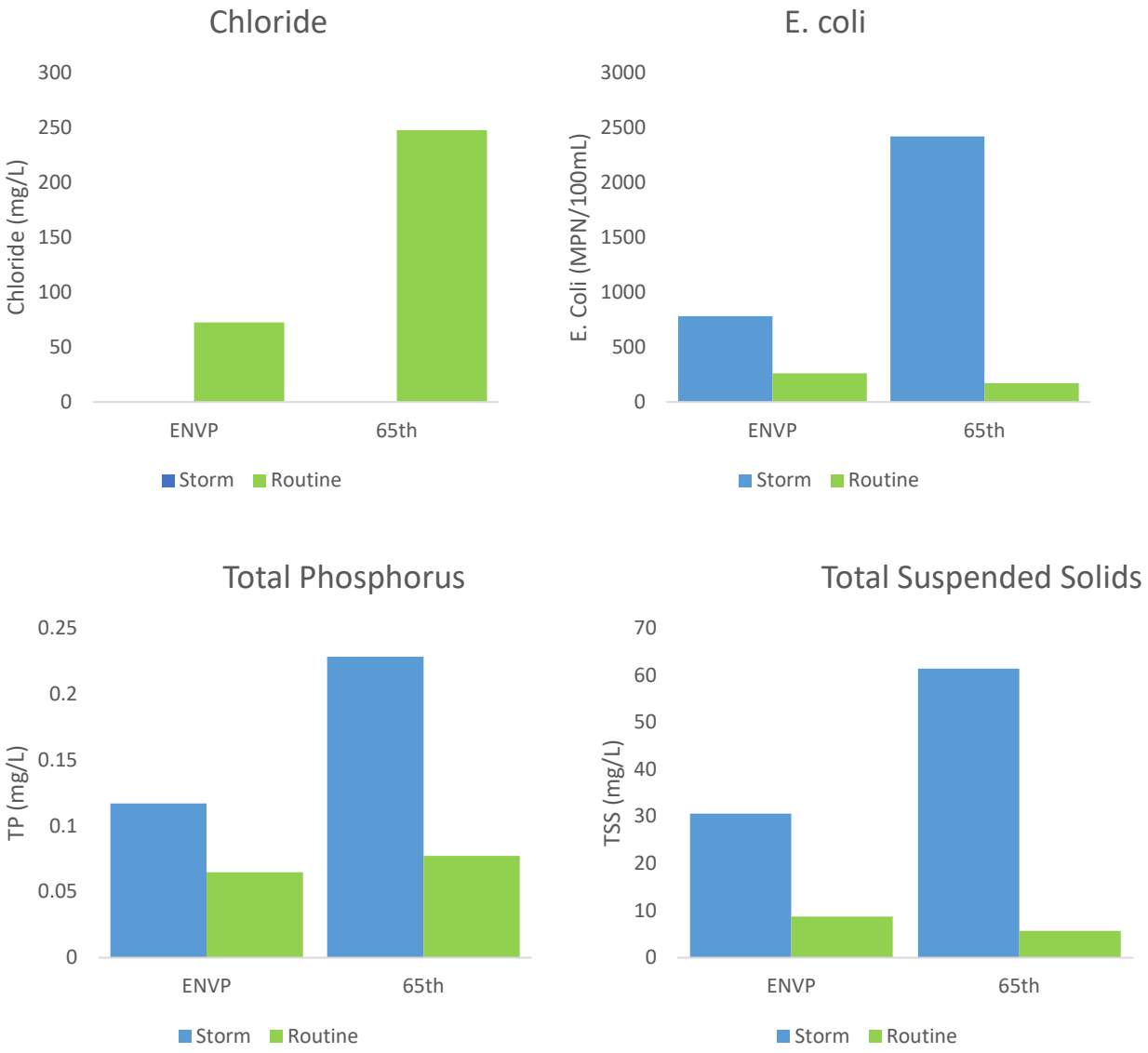
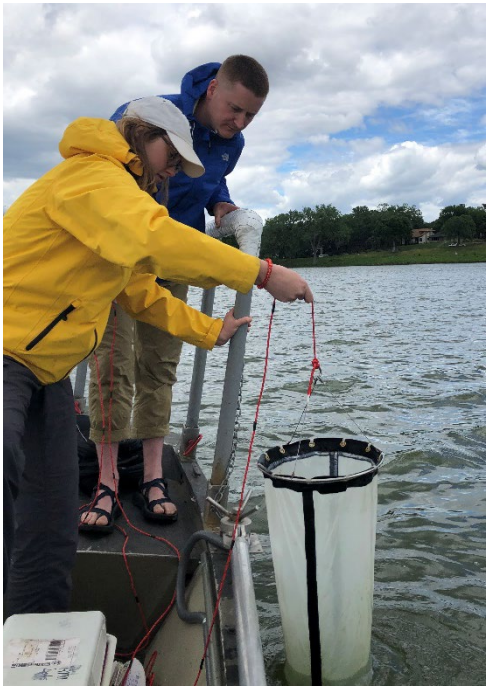


Figure 7. Average concentration of water quality parameters at West Mississippi sites sampled during storm and routine monitoring in 2020.

Lakes



Five lakes were monitored by the Commission in 2020 as part of the routine monitoring program or grant projects. Lakes were visited 11 times from early May through mid-September. Water quality in the lakes was measured as Secchi depth, TP concentration, and chlorophyll-*a* concentration. Submersed aquatic vegetation (SAV) communities were surveyed in three of the lakes (Eagle, Pike, Crystal). The health of the SAV community was measured as Floristic Quality Index (FQI) and species richness. The first routine zooplankton and phytoplankton samples were taken in all five lakes in mid and late Summer to assess the plankton community and how it changes over the monitoring season.

A brief overview of water quality, and the SAV, phytoplankton, and zooplankton communities for all five monitored lakes is provided below. For more detailed data and analysis including fisheries assessments, methods, and long-term water quality data and lake condition grades for all Shingle Creek lakes, see Appendix E.

Eagle Lake

Eagle Lake is a deep lake in Maple Grove, MN. Water quality in the lake was sampled biweekly from May through September 2020. Two SAV surveys were completed, one in early summer and one in late summer to document the vegetation community and how it changes over the growing season. The phytoplankton and zooplankton communities were sampled in early summer and late summer.

Eagle Lake is impaired for nutrients; however, water quality was generally good in 2020 (Figure 8). Surface TP measurements remained below the State's deep lake standard of 40 ug/L for most of the monitoring season. Chlorophyll-*a* and Secchi depth measurements remained below the standard during the beginning of the monitoring season, but measurements exceeded the State standards late summer.

An analysis of the phytoplankton and zooplankton within the lake indicated a healthy, balanced community. The phytoplankton shifted slightly towards a cyanobacteria-dominated community in late summer (Figure 9), a typical composition shift in a healthy lake as water temperature warms and nutrients are high. The amount of cyanobacteria in the lake in late summer is not indicative of a cyanobacteria bloom. The zooplankton community shifted towards bosmina-dominated in late summer (Figure 10). Bosmina can survive on "poor" food sources like cyanobacteria, and thus were supported by the increase in cyanobacteria in late summer. The phytoplankton and zooplankton community changes were typical of a healthy lake ecosystem during the summer.

During both SAV surveys, biovolume, or the volume of water occupied by vegetation, was highest in shallow areas (Figure 9). The health of the SAV community was assessed using the Floristic Quality Index (FQI) and species richness. FQI during the early summer survey was 22.6 and FQI during the late summer survey was 27.0. Species richness was 18 and 23 during the early and late summer surveys, respectively. Eagle Lake FQI and species richness exceeded the suggested standards for deep lakes in this area and the lake is in good condition for aquatic plant life.

Eagle Lake water quality and plankton and SAV community data show the lake, though impaired, is in good condition. Routine monitoring of the lake should continue.

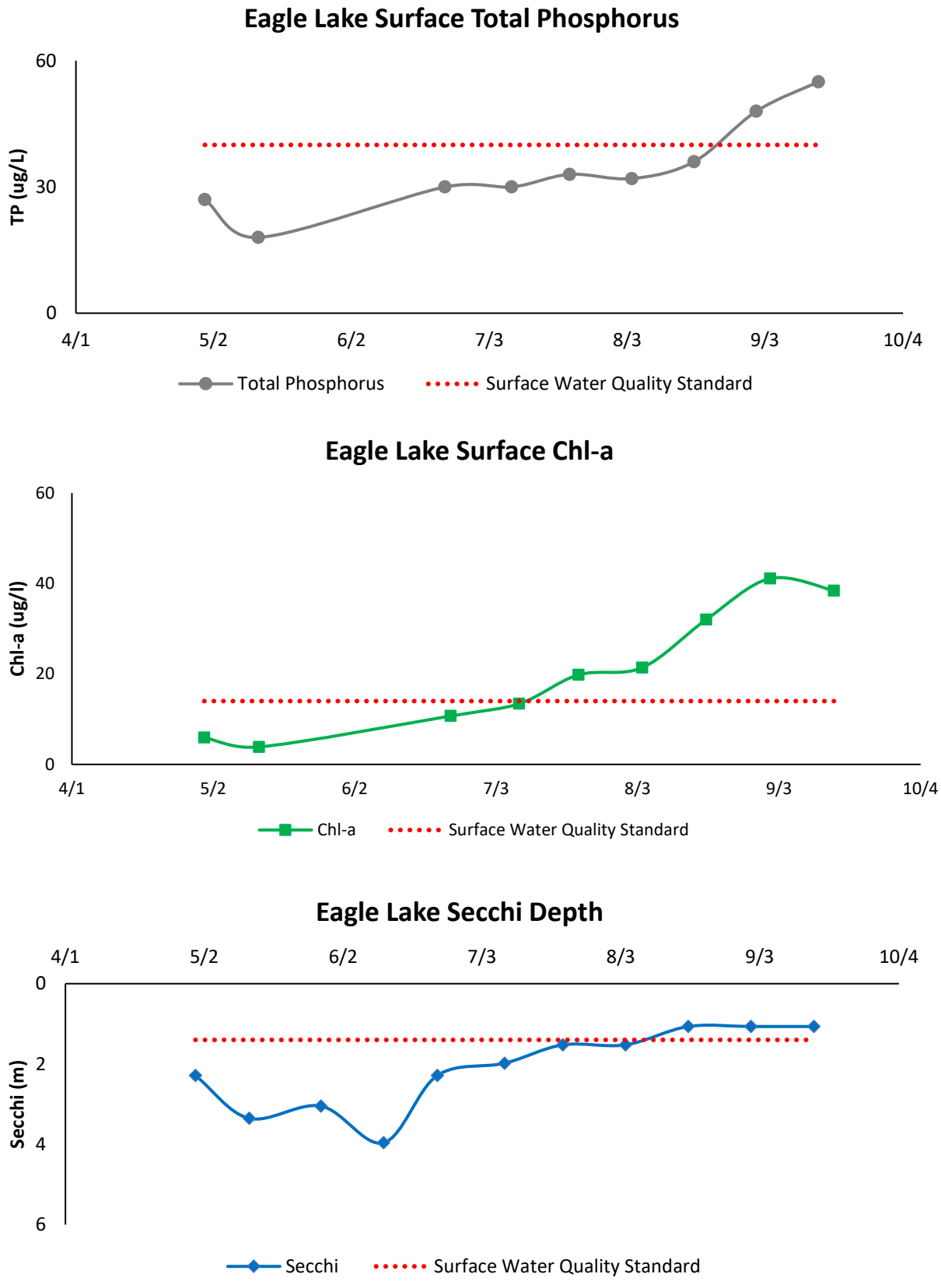


Figure 8. Water quality parameters in Eagle Lake during the 2020 monitoring season.

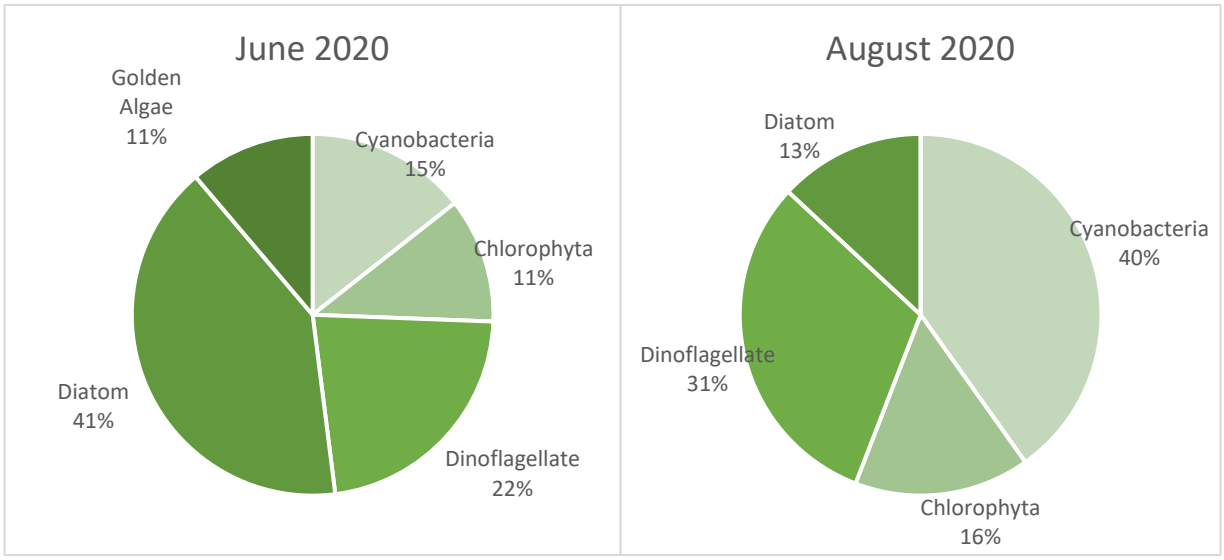


Figure 9. Phytoplankton community as relative percentage from June and August 2020 in Eagle Lake.

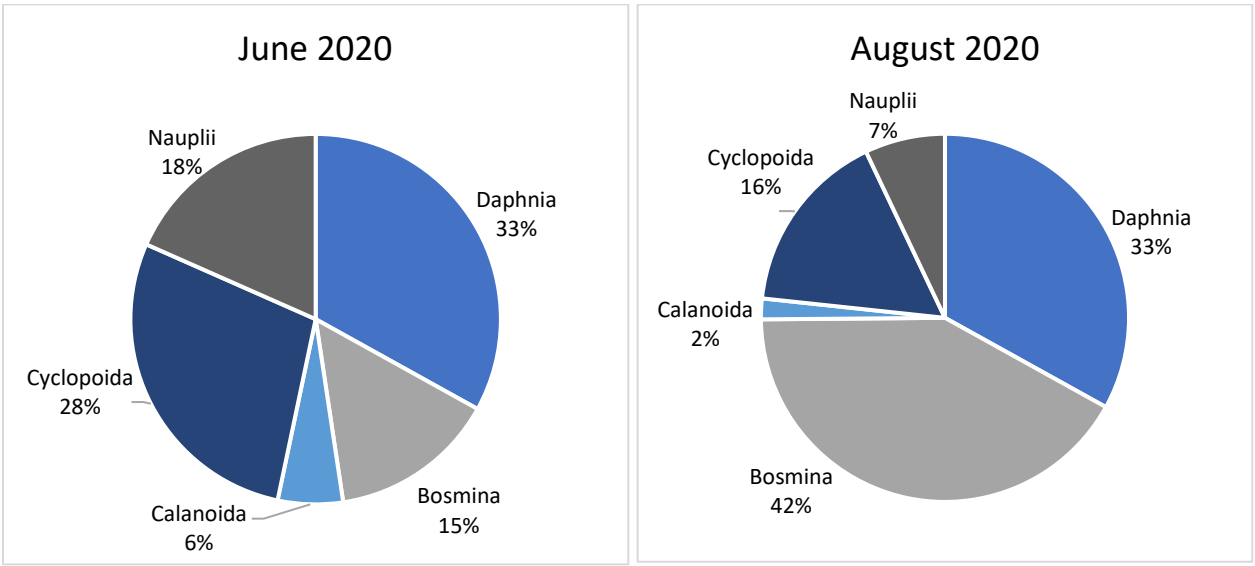


Figure 10. Zooplankton community as relative percentage from June and August 2020 in Eagle Lake.

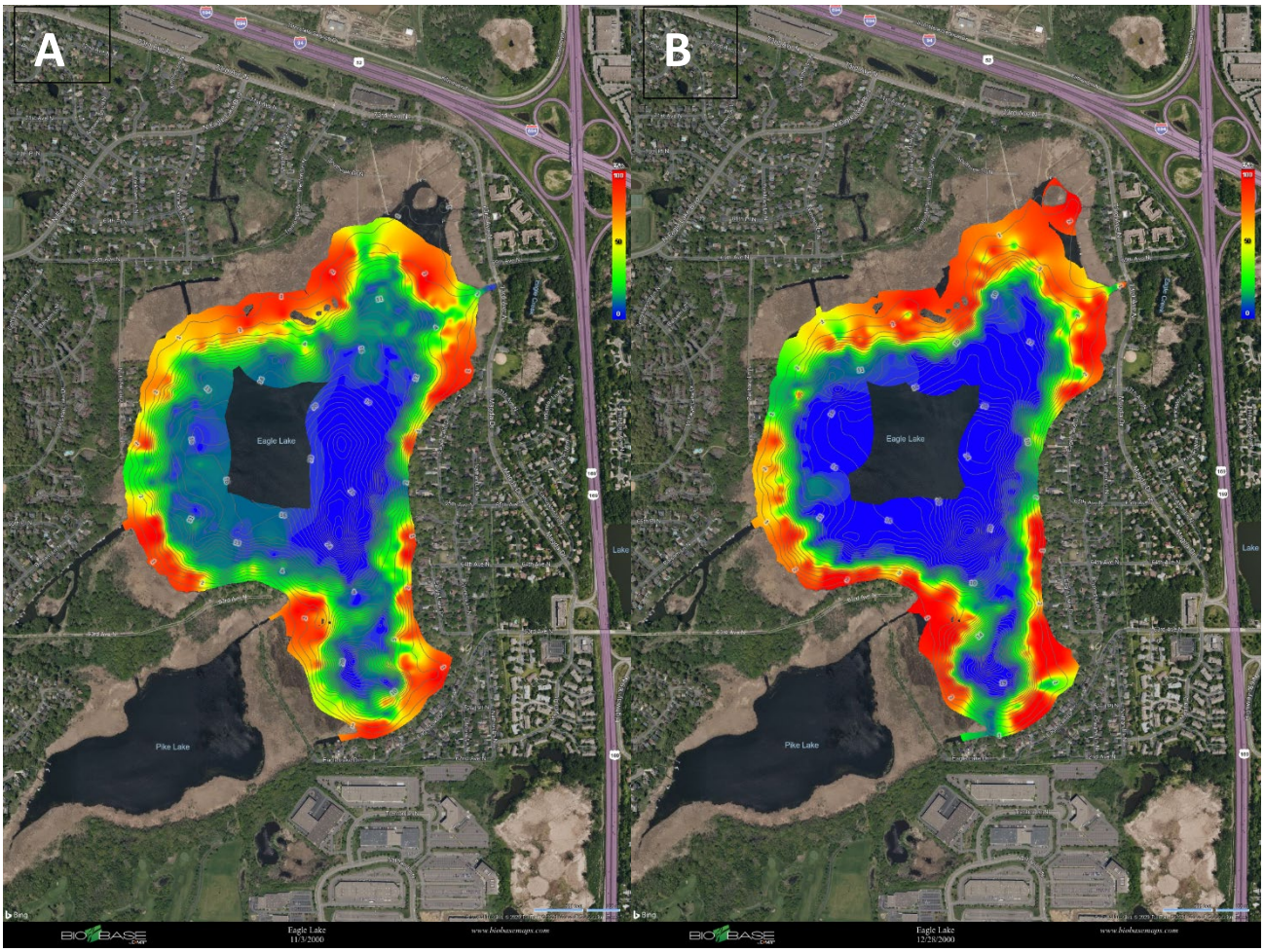


Figure 11. Submersed aquatic vegetation (SAV) shown as biovolume heat maps for Eagle Lake during the June (A) and July (B) 2020 surveys. In the heatmaps, red indicates 100% biovolume and blue indicates 0% biovolume. Biovolume refers to the percentage of the water column taken up by vegetation.

Pike Lake

Pike Lake is a shallow lake in Maple Grove, MN. Water quality in the lake was sampled biweekly from May through September 2020. Two SAV surveys were completed, one in early summer and one in late summer, to document the vegetation community and how it changes over the growing season. The phytoplankton and zooplankton communities were sampled in early summer and late summer.

Pike Lake is impaired for nutrients. Surface TP and chlorophyll-a concentrations in Pike Lake were in good condition early in the season but declined in later summer and exceeded the eutrophication standards (Figure 12). Water clarity was consistently high throughout the entire monitoring season. Both surface TP and chlorophyll-a peaked during the last sampling of the season in mid-September, indicating an algae bloom related to phosphorus availability. TP samples taken from the hypolimnion were high throughout the monitoring season and indicate the potential of internal phosphorus loading from lake sediments.

An analysis of the phytoplankton and zooplankton within the lake indicated a healthy, balanced community. The phytoplankton shifted from a dinoflagellate-dominated community in June to an equal distribution of dinoflagellates and cyanobacteria in August (Figure 13). The dinoflagellate-dominated community in early summer is indicative of lower nutrients and cooler water temperature. The late summer sample had very low concentrations of both dinoflagellates and cyanobacteria, indicating a collapse in the community most likely due to warmer water temperatures. The early summer zooplankton community was dominated by bosmina and daphnia (Figure 14). In late summer, the community shifted to an even distribution among bosmina, daphnia, nauplii, and cyclopoida, indicating less competition among groups.

During both SAV surveys, biovolume, or the volume of water occupied by vegetation, was high throughout the lake (Figure 15). The health of the SAV community was assessed using the Floristic Quality Index (FQI) and species richness. FQI during the early summer survey was 16.5 and FQI during the late summer survey was 18.8. Species richness was 12 during both surveys. The aquatic invasive species (AIS) curly-leaf pondweed was observed in Pike Lake in the early summer survey with high occurrence. Pike Lake species richness exceeded the suggested standards for shallow lakes in this area during both surveys. FQI fell short of the suggested standard during the early summer survey, suggesting that curly-leaf pondweed growth in Spring may have an impact on the health of the aquatic plant community.

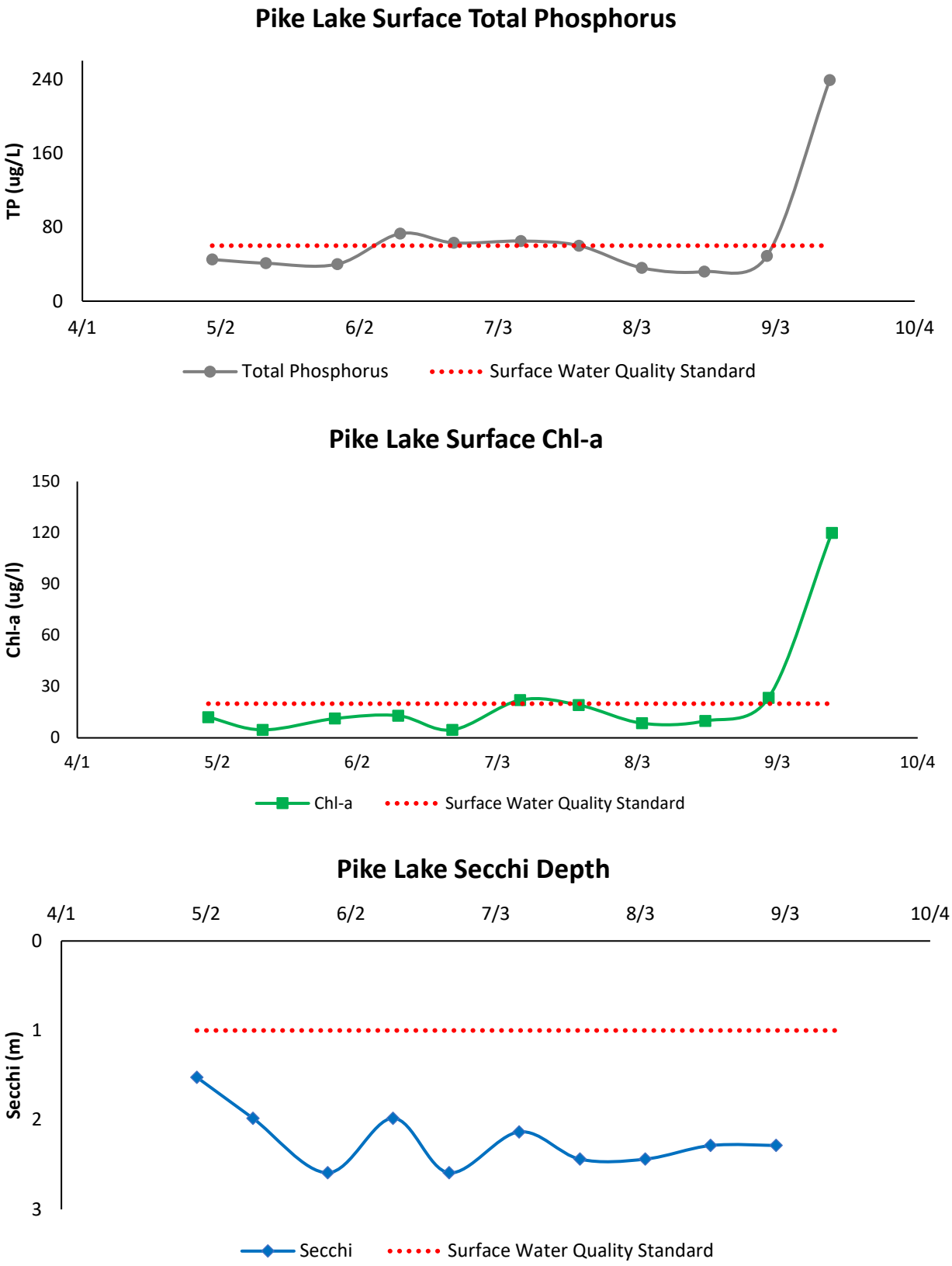


Figure 12. Water quality parameters in Pike Lake during the 2020 monitoring season.

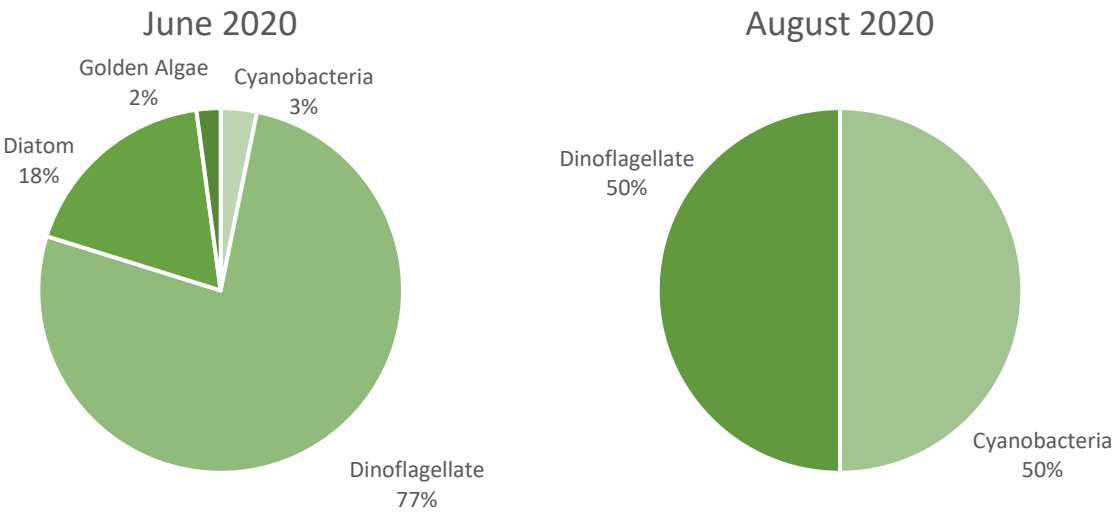


Figure 13. Phytoplankton community as relative percentage from June and August 2020 in Pike Lake.

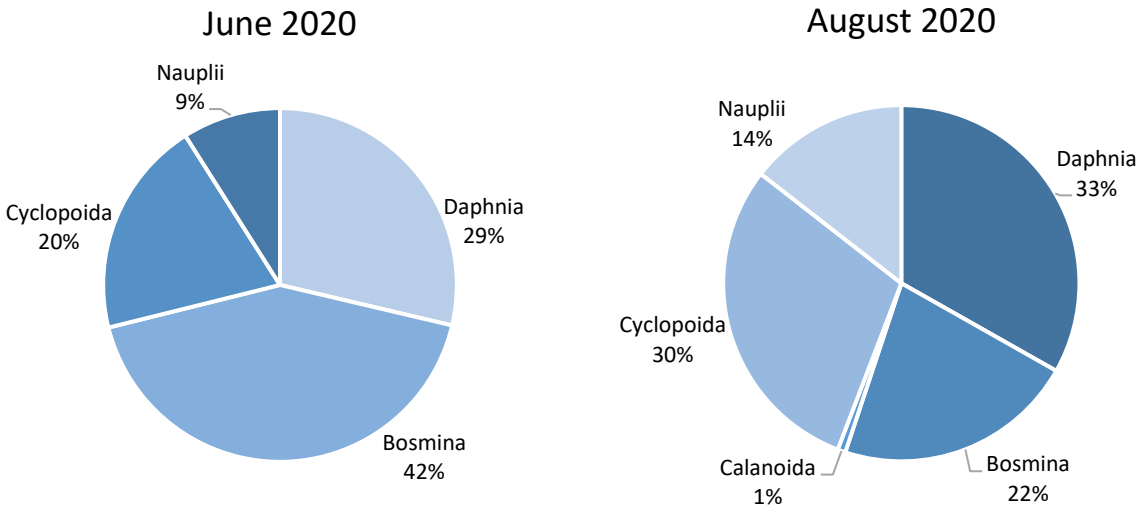


Figure 14. Zooplankton community as relative percentage from June and August 2020 in Pike Lake.

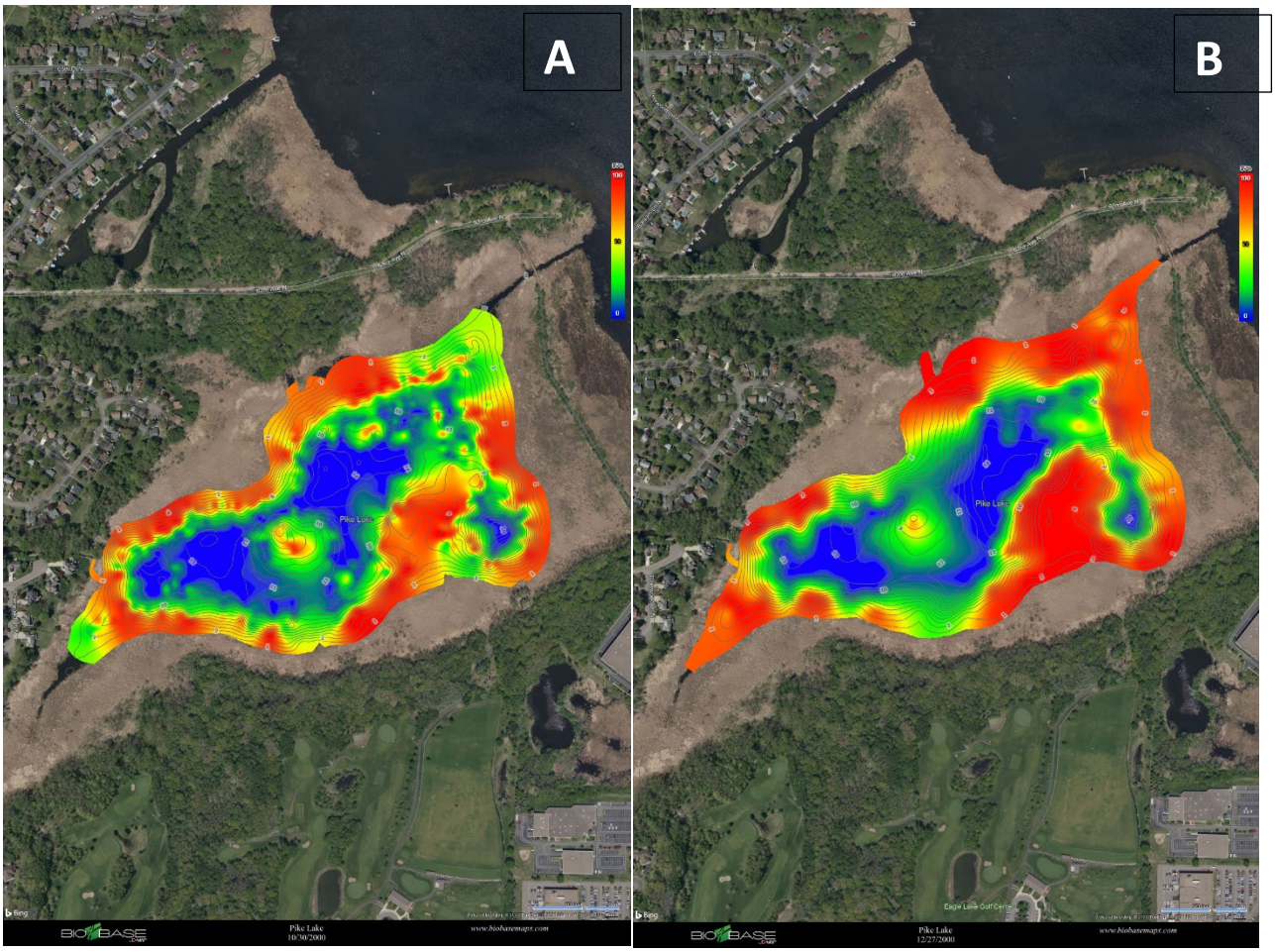


Figure 15. Biovolume heat maps for Pike Lake during the June (A) and July (B) 2020 surveys. In the heatmaps, red indicates 100% biovolume and blue indicates 0% biovolume. Biovolume refers to the percentage of the water column taken up by vegetation.

Bass Lake

Bass Lake is a shallow lake in Plymouth, MN. Water quality in the lake was sampled biweekly from May through September 2020. No SAV surveys were completed on the lake in 2020; however, a delineation of curly-leaf pondweed was performed on April 16, 2020. Delineated curly-leaf pondweed areas were treated with an herbicide in May 2020. The phytoplankton and zooplankton communities were sampled in early summer and late summer.

Bass Lake is impaired for nutrients and is undergoing active management by the Commission. Bass Lake received its first alum treatment in May 2019. The second treatment was applied in September 2020 at the end of the monitoring season. Surface TP remained below the shallow lake standard during the entire monitoring season in 2020 (Figure 16). Chlorophyll-a concentrations and Secchi depth declined in mid-summer and exceeded the eutrophication standards, indicating an algae bloom. Chlorophyll-a and Secchi depth were beginning to improve during the last lake sampling in mid-September. TP samples taken from the hypolimnion remained low throughout the monitoring season, similar to 2019 monitoring data, indicating the efficacy of the 2019 alum treatment (Appendix E).

An analysis of the phytoplankton and zooplankton within the lake indicated a healthy, balanced community. The phytoplankton community was well-balanced throughout the summer, with similar distribution of diatoms, dinoflagellates, chlorophyta, and cyanobacteria in June and August (Figure 17). Cyanobacteria became slightly more dominant in late summer, a normal shift as water temperature is warmer, but their abundance was not indicative of a cyanobacteria bloom. The zooplankton community shifted from calanoida-dominated in early Summer to nauplii-dominated in late summer (Figure 18). Nauplii are the early stage of many zooplankton species. Their abundance indicates a healthy zooplankton community with a plentiful food source.

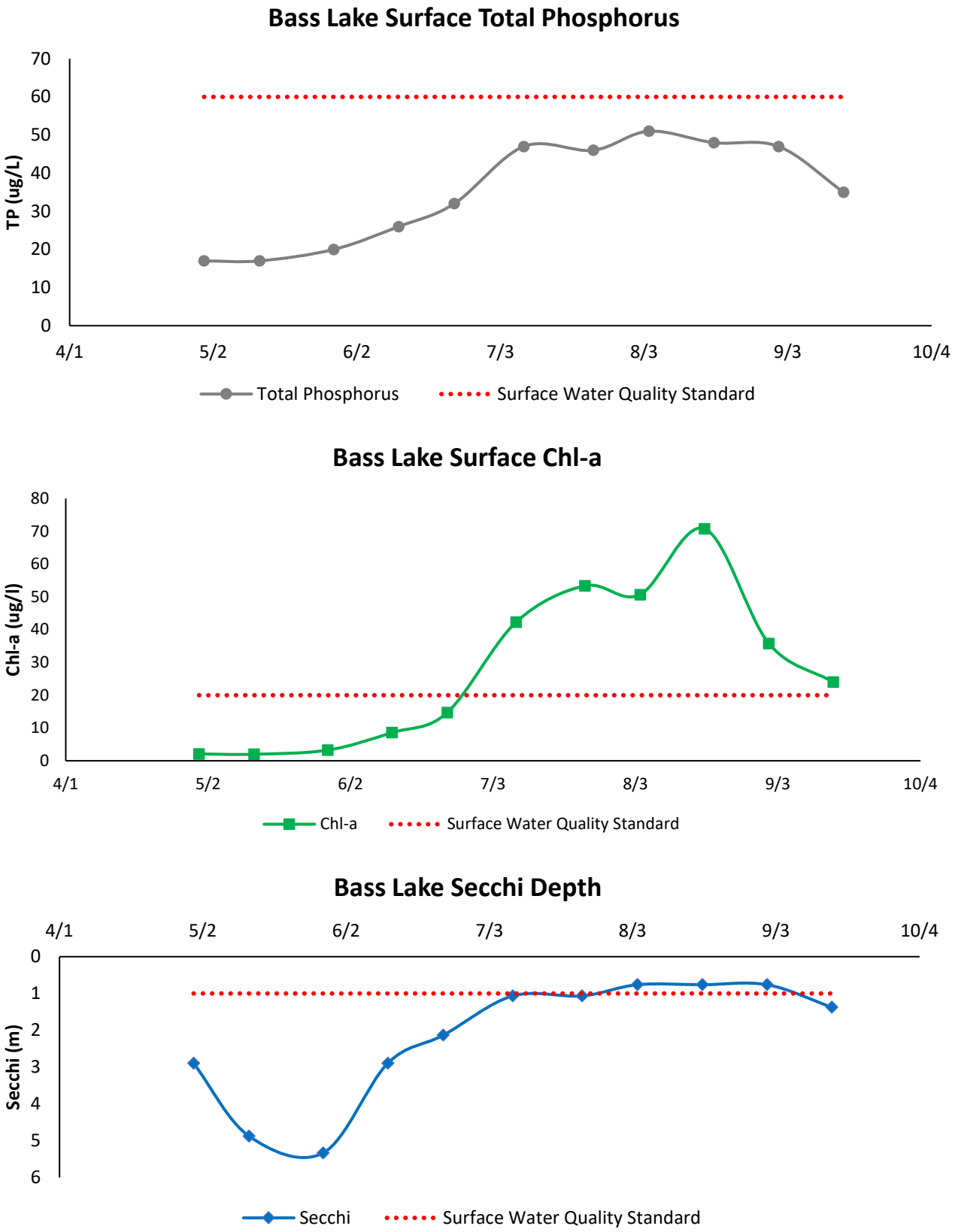


Figure 16. Water quality parameters in Bass Lake during the 2020 monitoring season.

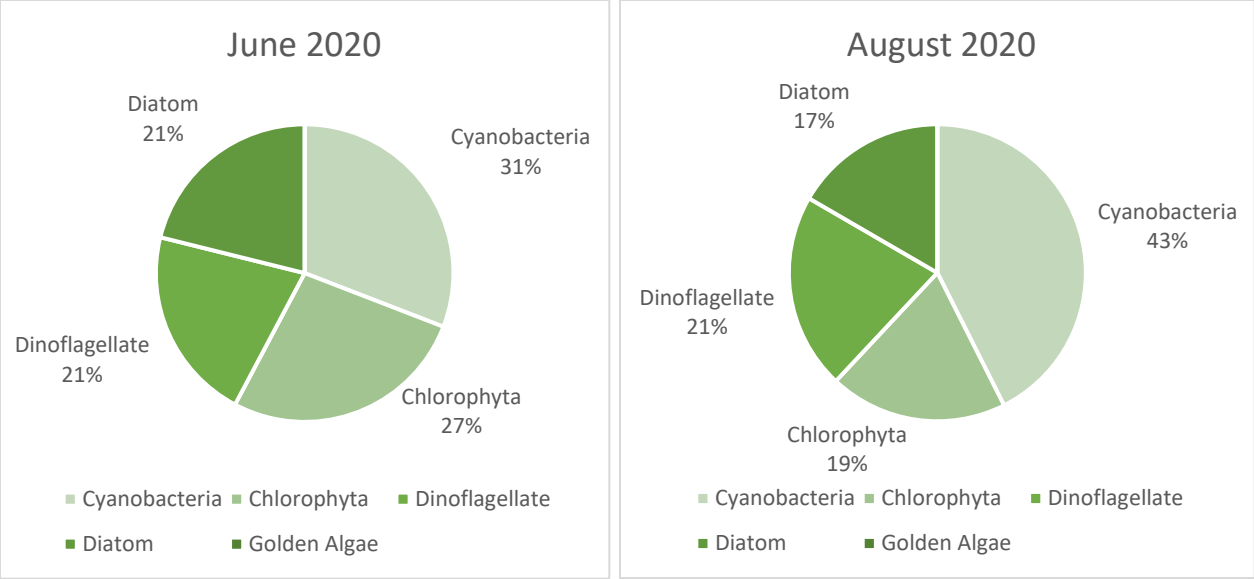


Figure 17. Phytoplankton community as relative percentage from June and August 2020 in Bass Lake.

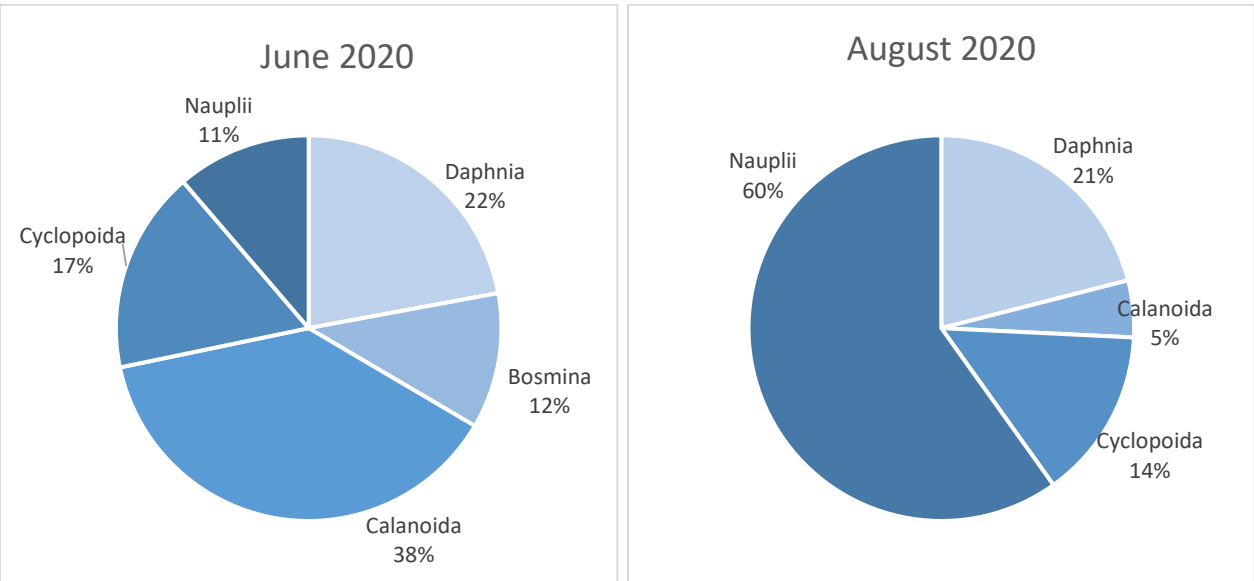


Figure 18. Zooplankton community as relative percentage from June and August 2020 in Bass Lake.

Pomerleau Lake

Pomerleau Lake is a deep lake in Plymouth, MN. Water quality in the lake was sampled biweekly from May through September 2020. No SAV surveys were completed on the lake in 2020; however, a delineation of curly-leaf pondweed was performed on April 16, 2020. Delineated curly-leaf pondweed areas were not treated because they were too small in extent. The phytoplankton and zooplankton communities were sampled in early summer and late summer.

Pomerleau Lake is impaired for nutrients and is undergoing active management by the Commission. Pomerleau Lake received its first alum treatment in May 2019. The second treatment was applied in September 2020 at the end of the monitoring season. Water quality in 2020 was excellent. Surface TP, chlorophyll-a, and Secchi depth met deep lake eutrophication standards throughout the entire monitoring season (Figure 19). TP samples taken from the hypolimnion remained low throughout the monitoring season, similar to 2019 monitoring data, indicating the efficacy of the 2019 alum treatment (Appendix E).

The phytoplankton community shifted from dinoflagellate-dominated in early summer to cyanobacteria-dominated in late summer (Figure 20). The shift from dinoflagellates to cyanobacteria is normal for Minnesota lakes during the monitoring season. The abundance of cyanobacteria at 67% in late summer indicates a potentially harmful algal bloom (HAB). Phytoplankton will be monitored again in 2021 to better understand the community changes throughout the season. The zooplankton community was dominated by daphnia in early summer, indicating abundant food sources and low predation (Figure 21). The late summer zooplankton community shifted to an even distribution between nauplii and daphnia, indicating zooplankton reproduction.

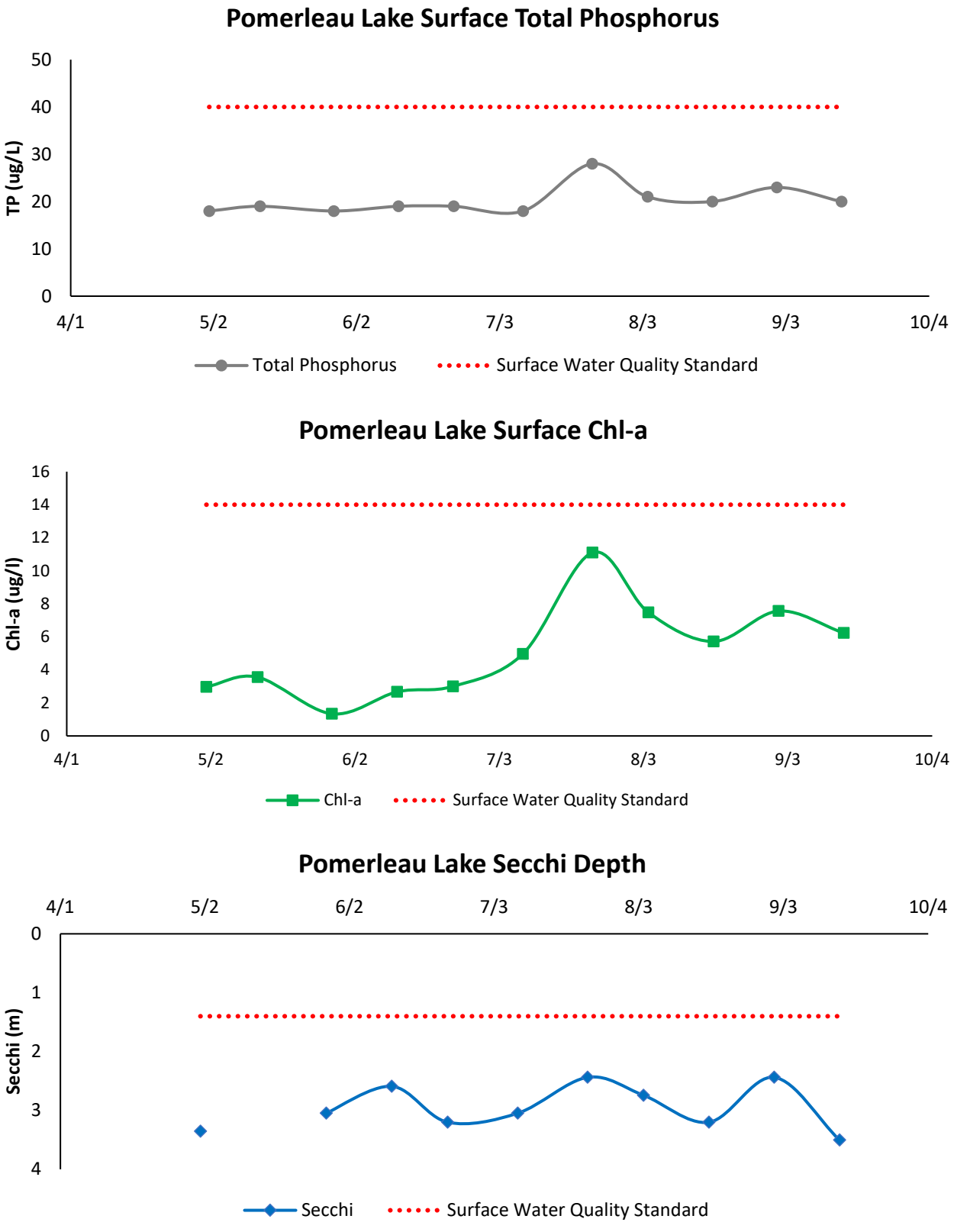


Figure 19. Water quality parameters in Pomerleau Lake during the 2020 monitoring season.

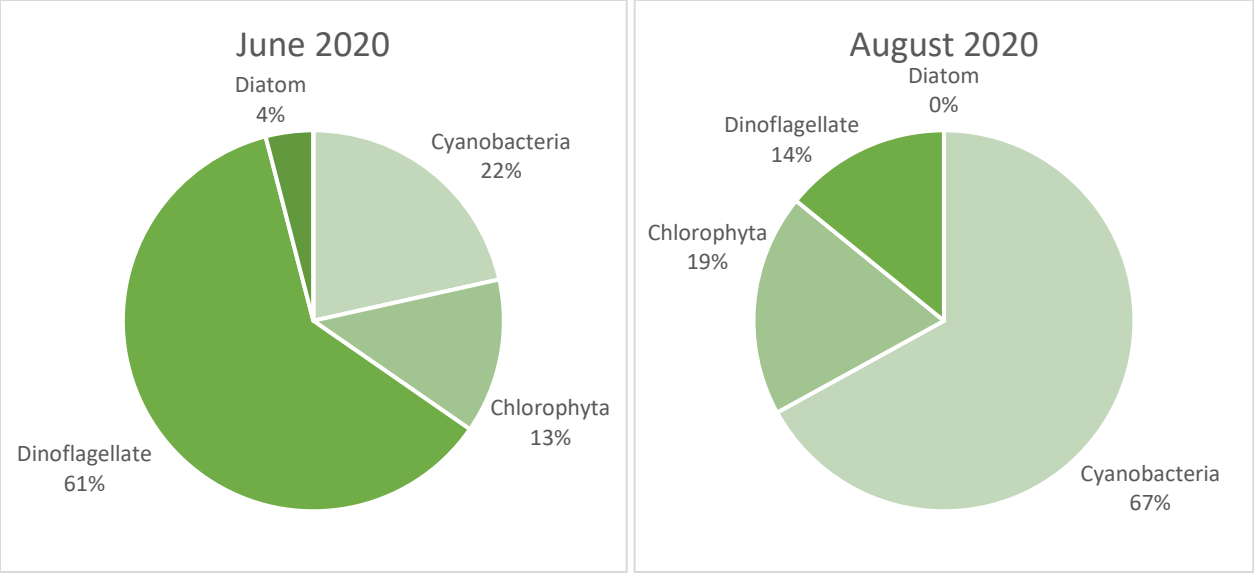


Figure 20. Phytoplankton community as relative percentage from June and August 2020 in Pomerleau Lake.

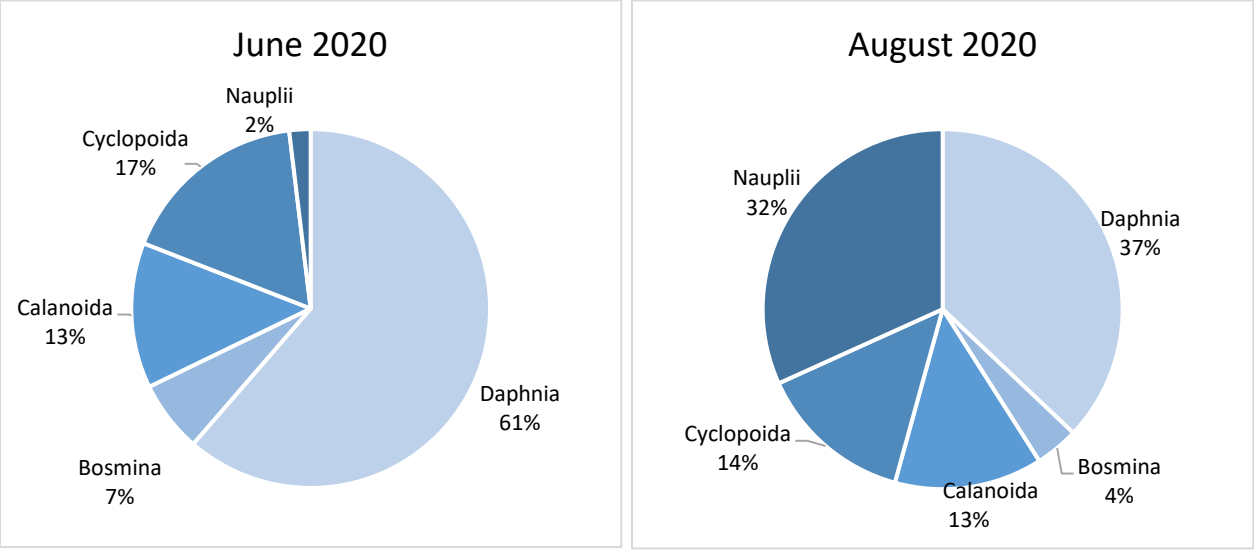


Figure 21. Zooplankton community as relative percentage from June and August 2020 in Pomerleau Lake.

Crystal Lake

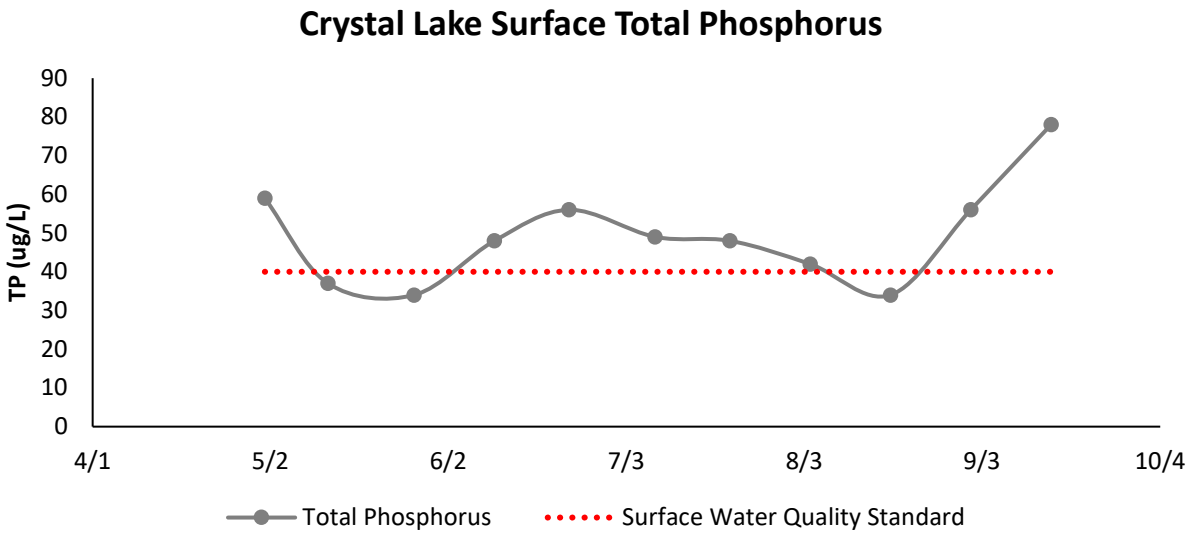
Crystal Lake is a deep lake in Robbinsdale, MN. Water quality in the lake was sampled biweekly from May through September 2020. A mid-summer SAV survey was completed on the lake in 2020. The phytoplankton and zooplankton communities were sampled in early summer and late summer.

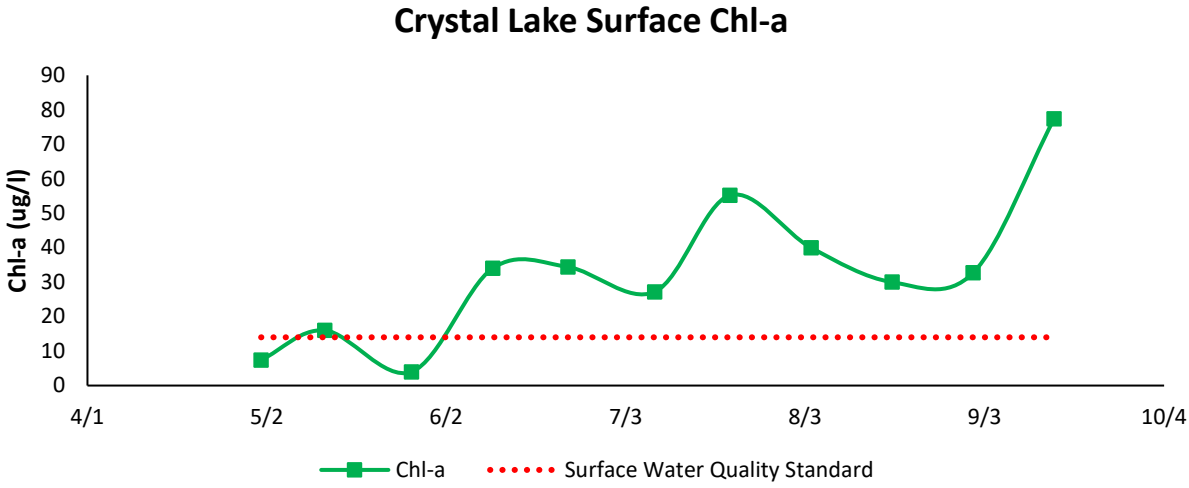
Crystal Lake is impaired for nutrients and is undergoing active management in 2021 by the Commission. The lake will receive its first alum treatment in Spring 2021 to reduce internal phosphorus loading. Monitoring in 2020 provided baseline lake condition data to help understand the impacts of active management lake health. Surface TP exceeded the deep lake standard for many of the sampling dates in 2020 and reached peak values in September (Figure 22). Chlorophyll-a concentrations and Secchi depth declined in early summer and exceeded the eutrophication standards from early June through September. TP samples taken from the hypolimnion show a high concentration, indicating internal loading from lake sediments during anoxic conditions. The Spring 2021 alum treatment will address phosphorus loading from Crystal Lake sediments.

An analysis of the phytoplankton in Crystal Lake showed an early summer community dominated by cyanobacteria and a late summer community made up completely of cyanobacteria (Figure 23). Concentrations of cyanobacteria in late summer were very high and indicate the likelihood of a HAB. The zooplankton community shifted from calanoida-dominated in early summer to daphnia-dominated in late summer (Figure 24). Daphnia can graze on poor-quality food like cyanobacteria and likely increased in abundance with the cyanobacteria bloom.

A mid-summer aquatic vegetation survey was performed on Crystal Lake in June 2020. Only two species were observed during the survey: curly-leaf pondweed and white waterlily. Both species were found in low abundance (Figure 25). FQI was 6.4. Neither species richness nor FQI met the proposed standards for a deep lake in this ecoregion (12 and 18.6, respectively). The Crystal Lake vegetation community is in poor condition. Increased water clarity from the 2021 alum treatment will increase light availability to aquatic vegetation in the lake.

The carp population was also assessed in 2020. Carp are present in Crystal Lake at an estimated abundance that is harmful to lake health and water quality. Active carp management on the lake begins in 2021.





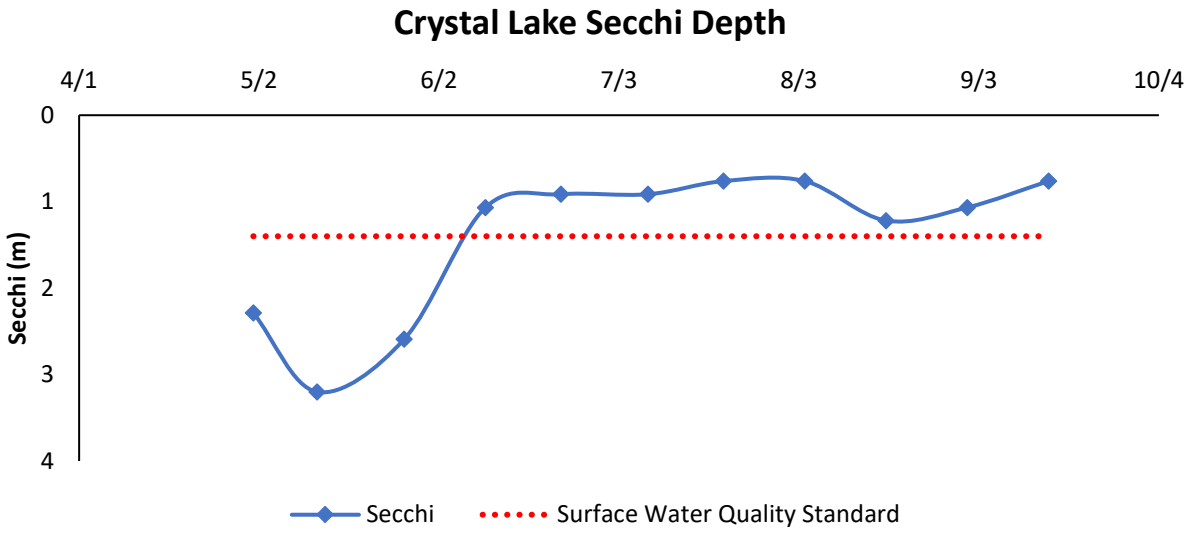


Figure 22. Water quality parameters in Crystal Lake during the 2020 monitoring season.

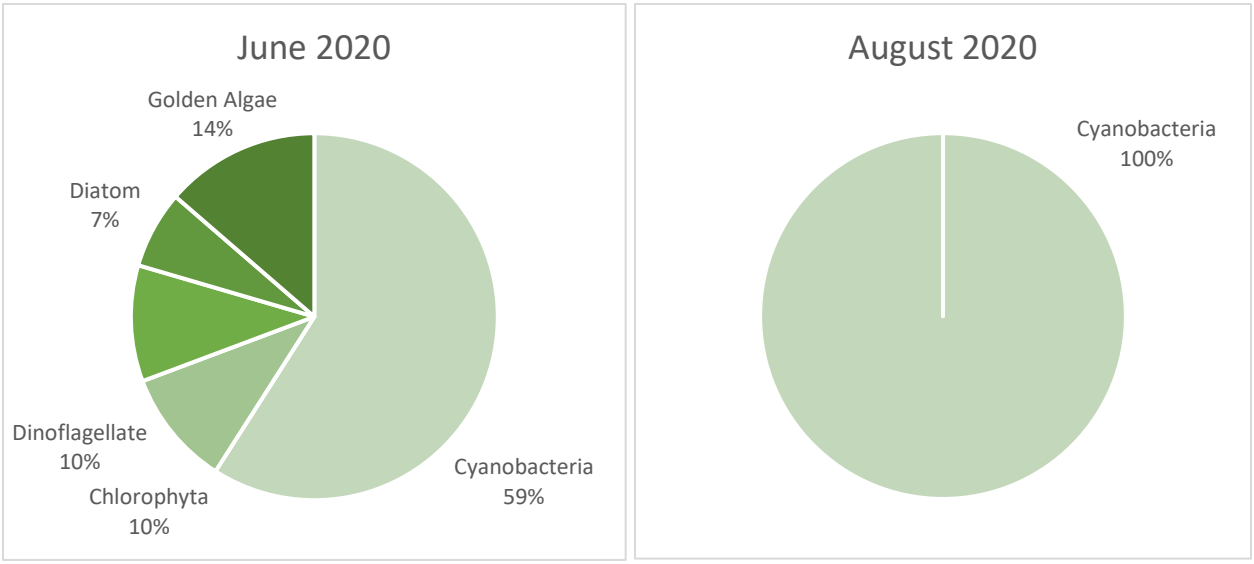


Figure 23. Phytoplankton community as relative percentage from June and August 2020 in Crystal Lake.

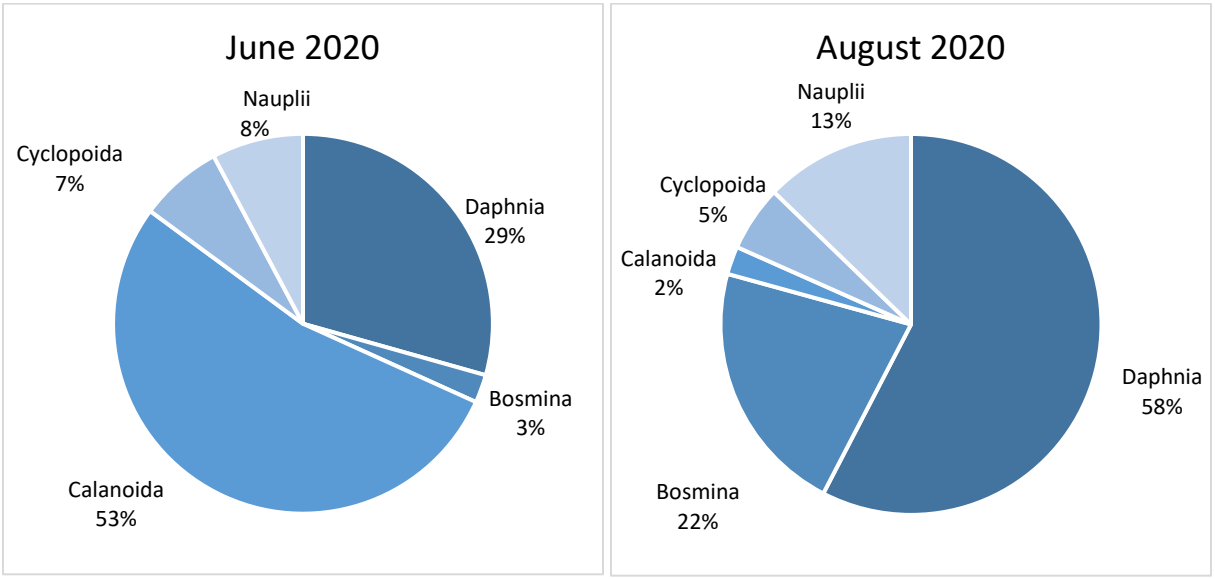


Figure 24. Zooplankton community as relative percentage from June and August 2020 in Crystal Lake.

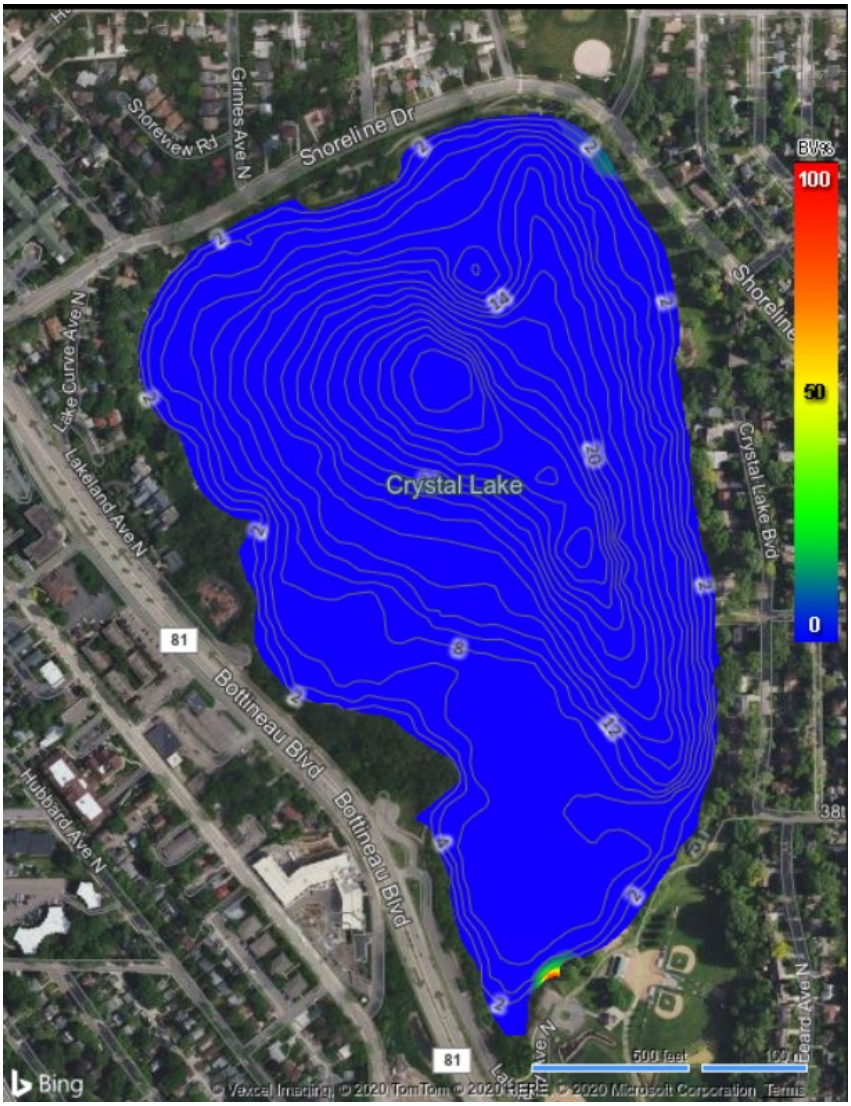


Figure 25. Biovolume heat map of Crystal Lake. In the heatmap, red indicates 100% biovolume and blue indicates 0% biovolume. Biovolume refers to the percentage of the water column taken up by vegetation.

Volunteer Stream and Wetland Monitoring

Through the RiverWatch program, high school students collect macroinvertebrates (small aquatic organisms such as insects, worms, and snails) from streams, and identify and classify them. Because these organisms are directly impacted by conditions in the stream, the type and abundance of different organisms can be an indicator of general stream health. Unfortunately, the RiverWatch program did not happen in 2020 due to the COVID-19 pandemic.

Through the WHEP program, adult volunteers monitored macroinvertebrates and vegetation in one wetland in Shingle Creek in 2020, MP-19 Webber Stormwater. The site scored Excellent for macroinvertebrates and Moderate for vegetation. See Appendix D for 2020 and historic wetland data.

Moving Forward

Routine and storm monitoring will continue on Bass and Shingle Creeks in 2021. The 65th Ave and Mattson Brook Outfalls in West Mississippi will also be monitored by the Commission.

Cedar Island Lake and Lake Success will undergo routine lake monitoring in 2021. Early and late summer SAV surveys will be done on both lakes, and a fish survey and carp population assessment are planned for Cedar Island. Phytoplankton and zooplankton community monitoring will continue. As part of the ongoing active management projects, Bass, Pomerleau, and Crystal Lakes will be monitored for water quality, SAV, and phytoplankton and zooplankton. Curly-leaf pondweed management is planned for Bass and Pomerleau. Crystal Lake will receive the first of two planned alum applications in late Spring and active carp management will commence. Volunteer monitoring through the CAMP program will continue on Schmidt, Magda, Meadow, Eagle, and Pike lakes.

Active management is expected to begin in Fall 2021 on Meadow Lake with a planned water level drawdown to consolidate the sediments and significantly reduce or eliminate invasive vegetation and fathead minnows that degrade water quality and clarity.

Appendix A: Precipitation Data

Table A1. Summary of 2020 and long-term precipitation data measured at the New Hope, MN station (Station ID: 215838).

Month	2020 Precipitation (inches)	1992-2020 Monthly Average Precipitation (inches)	Departure from Historical Average (inches)
January	0.87	1.02	-0.15
February	0.57	1.07	-0.50
March	2.57	1.84	0.73
April	1.66	3.18	-1.52
May	4.10	4.34	-0.24
June	3.47	4.55	-1.08
July	2.45	4.61	-2.16
August	5.50	4.26	1.24
September	1.03	3.25	-2.22
October	2.54	2.92	-0.38
November	0.68	1.82	-1.14
December	1.15	1.46	-0.31
TOTAL	26.6	34.3	-7.7

Appendix B: 2020 West Mississippi Stream Data

65th Avenue

Figure B1. Flow at the 65th Ave sampling station. The blue line represents flow in cubic feet per second (cfs). Daily precipitation totals in inches are represented in gray on the secondary axis.

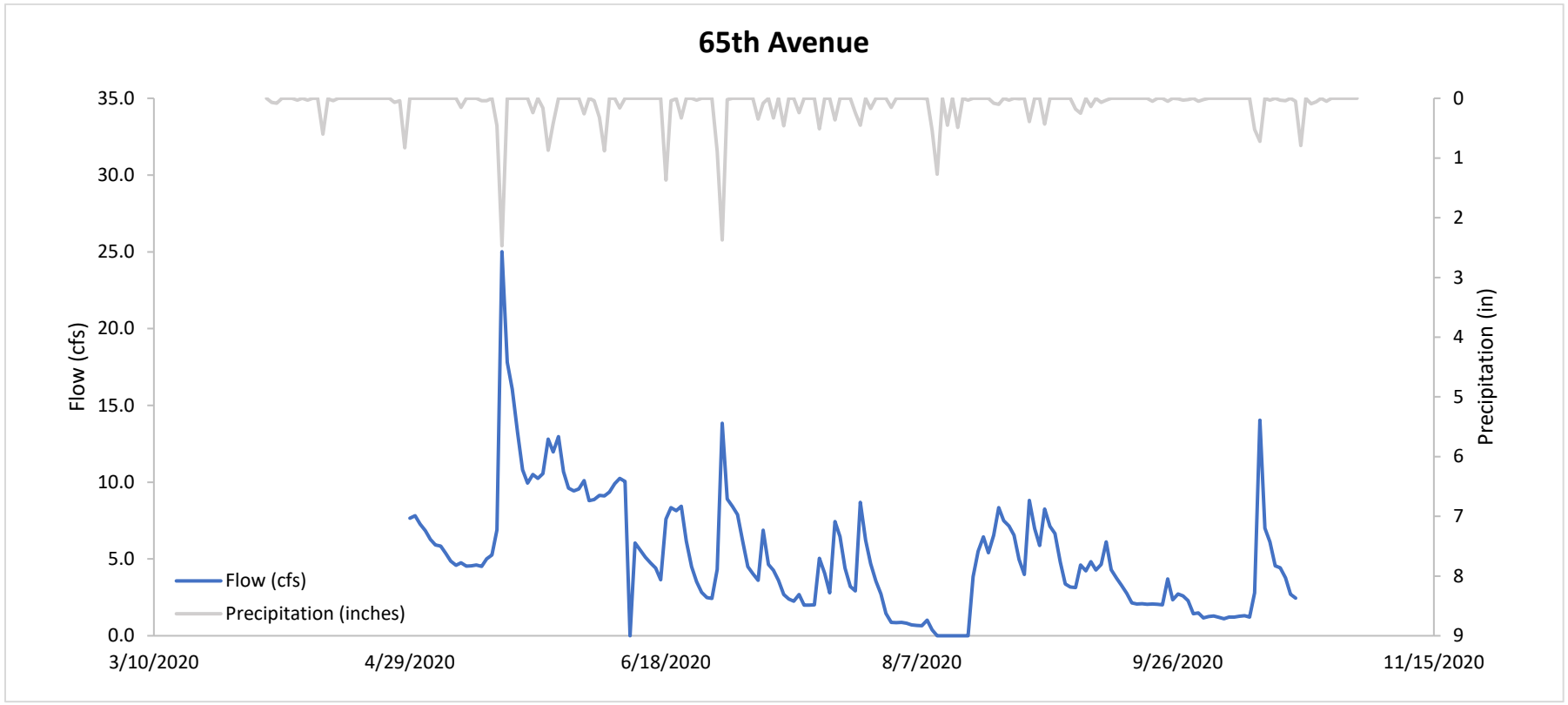


Table B1. Water quality data from the 65th Ave site measured in 2020. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DO_{sat}), pH, specific conductivity (sp. cond.), oxidation reduction potential (ORP), total phosphorus (TP), orthophosphate (orthoP), total suspended solids (TSS), chloride and Escherichia coli (E. coli).

Date	Time	Temp. [°C]	DO [mg/L]	pH	Sp. Cond. [µS/cm]	Salinity [ppt]	TP [mg/L]	OrthoP [mg/L]	TSS [mg/L]	Chloride [mg/L]	E. coli [MPN/100mL]	VSS [mg/L]	TKN [mg/L]
3/17/2020	10:35	5.6	13.96	6.8	1278	0.64	0.05	~0.01	5	207	12	3	0.88
4/15/2020	08:15	4.9	13.98	6.6	1394	0.7	0.06	0.01	3	302.9	41	~2	0.91
5/22/2020	07:50	16.2	9.04	7.2	873	0.43	0.05	0.02	4	153.8	81	~2	0.88
6/2/2020	08:10	25.2	6.39	8.1	1104	0.55	0.07	~0.01	~2	162.8	40	~1	0.95
6/16/2020	08:50	20.0	8.3	7.3	1319	0.66	0.05	0.02	3	231.4	36	~1	0.93
7/10/2020	08:40	22.1	8	7.2	1240	0.62	0.08	0.04		222.1	49		0.95
8/4/2020	08:50	16.9	9.17	7.6	1484	0.75	0.07	0.04	~2	287	61	~1	0.89
8/12/2020	10:05	17.3	8.41	7.8	522	0.25	0.16	0.03	12	95.1	1120	8	1.40
9/1/2020	08:25	17.7	8.05	8.2	630	0.31	0.11	0.03	7	103	308	4	0.94
10/6/2020	08:00	--	--	--	--	--	0.108	0.035	~2	288		~2	0.76
11/3/2020	11:45	13.7	10.11	8.24	1563	0.79	0.06	0.027	~2	258	100	~1	0.91
11/3/2020	11:46	13.7	10.11	8.24	1563	0.79	0.06	0.03	~2	263	77	~1	0.94
11/17/2020	08:25	6.8	11.85	8.18	1538	0.78	0.061	0.029	~2	363	236	~2	0.90
12/1/2020	09:10	11.89	--	--	7.91	1532	0.77	0.073	0.038	~2	271	62	~1
12/23/2020	11:00	10.07	--	--	6.51	1686	0.85	0.096	--	--	503	--	--

Table B2. Other water quality data from the 65th Ave site measured on three different dates in 2020. Parameters measured include Alkalinity, Ammonia, CBOD5-day, Chemical Oxygen Demand, Dissolved Phosphorus, Hardness (CaCO3), Nitrate/Nitrate, Nitrate/Nitrite, Nitrite/Nitrite, Sulfate, TBOD5-day, Total Cadmium, Total Chromium, Total Copper, Total Dissolved Solids, Total Lead, Total Nickel, Total Organic Carbon, and Total Zinc.

Date/Time	6/2/2020 8:10	6/16/2020 8:50	**06/18/2020 17:40	9/1/2020 8:25
Alkalinity [mg/l]	--	263	--	--
Ammonia [mg/l]	--	0.15	--	--
CBOD5-day [mg/l]	--	1.7	--	--
Chemical Oxygen Demand [mg/l]	--	23	85	--
Dissolved Phosphorous [mg/l]	--	~0.02	--	--
Hardness (CaCO3) [mg/l]	--	391	--	--
Nitrate / Nitrate [mg/l]	--	0.57	--	--
Nitrate-Nitrite [mg/l]	--	0.64	--	--
Nitrite / Nitrite [mg/l]	--	0.07	--	--
Sulfate [mg/l]	--	83.4	--	--
TBOD5-day [mg/l]	--	2	--	--
Total Cadmium [mg/l]	<0.00006	<0.00006	--	<0.00006
Total Chromium [mg/l]	~0.0002	~0.00019	--	~0.0004
Total Copper [mg/l]	~0.00053	~0.00075	--	0.0016
Total Dissolved Solids [mg/l]	--	764	--	--
Total Lead [mg/l]	<0.00026	<0.00026	--	~0.00055
Total Nickel [mg/l]	0.0016	0.0024	--	0.0012
Total Organic Carbon [mg/l]	--	5.1	--	--
Total Zinc [mg/l]	~0.0043	0.0112	--	0.0078

** Sample taken from a storm capture day

Table B3. Storm water quality data from the 65th Ave site in 2020. Parameters measured include total phosphorus (TP), orthophosphate (orthoP), total suspended solids (TSS) and Escherichia coli (E. coli).

Start Date	Time	End Date	Time	TP [mg/L]	OrthoP [mg/L]	TSS [mg/L]	E. coli [MPN/100mL]	VSS [mg/L]	TKN [mg/L]
3/19/2020	11:10	3/19/2020	12:15	0.21	0.02	40	--	16	1.6
4/28/2020	09:00	4/28/2020	16:47	0.16	0.02	46	688	18	1.4
5/16/2020	20:07	5/17/2020	03:24	0.12	0.01	31	1986	14	1.1
6/18/2020	17:40	6/18/2020	20:20	0.27	0.02	82	20100	24	1.6
6/29/2020	00:06	6/29/2020	04:51	0.11	~0.01	48	1986	14	0.92
7/7/2020	08:25	7/07/2020	09:40	0.42	0.01	126	200000	41	2.6
11/9/2020	14:15	11/9/2020	15:30	0.371	0.068	68	18300	31	2.1
11/11/2020	11:30	11/11/2020	13:35	0.166	0.054	50	9800	24	1.6

Environmental Preserve

Figure B2. Flow at the Environmental Preserve sampling station. The blue line represents flow in cubic feet per second (cfs). Daily precipitation totals in inches are represented in gray on the secondary axis. Stage height was not recorded from 5/23/19 to 6/4/19 due to instrumental error, so data is missing during this window.

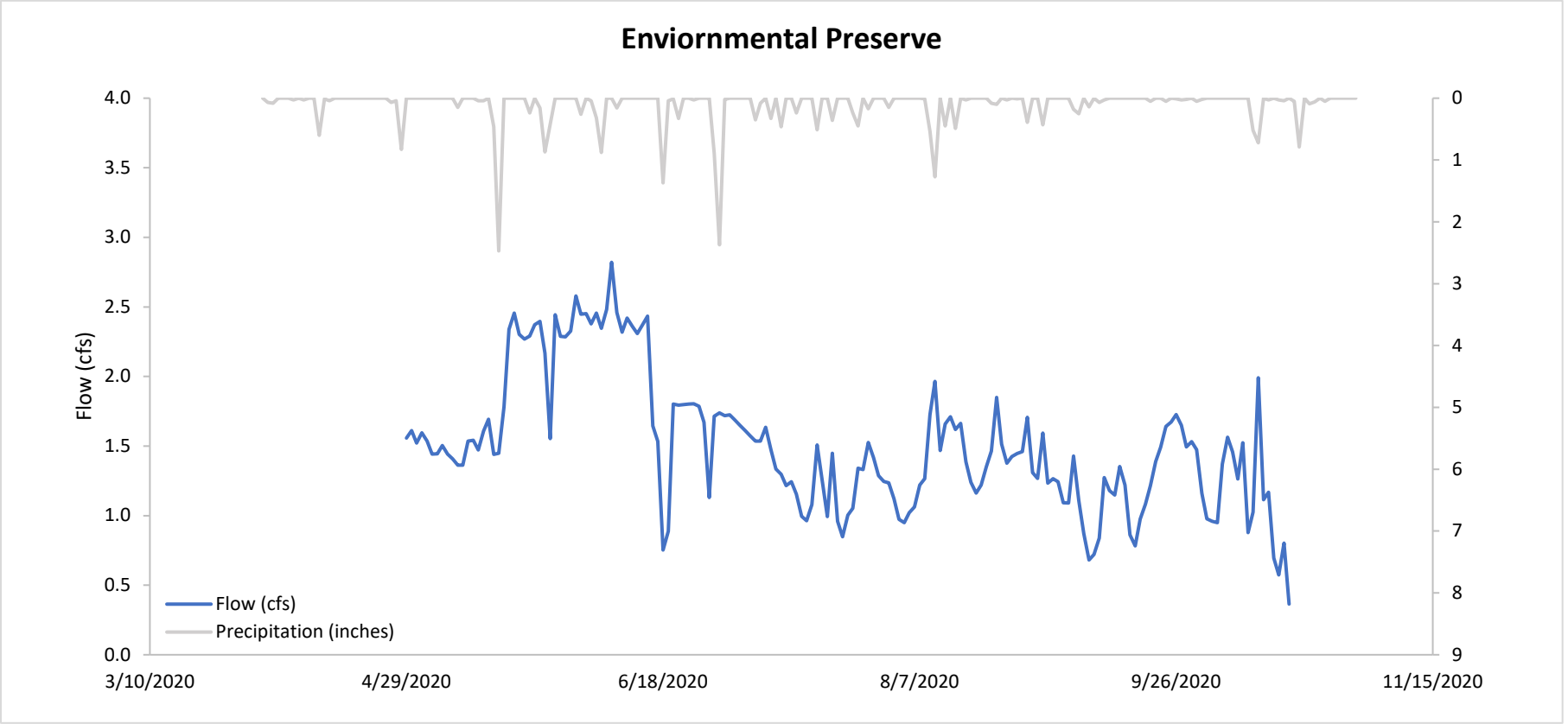


Table B4. Water quality data from the Environmental Preserve stream site measured in 2020. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DO_{sat}), pH, specific conductivity (sp. cond.), total phosphorus (TP), orthophosphate (orthoP), total suspended solids (TSS) chloride and Escherichia coli (E. coli).

Date	Time	Temp. [°C]	DO [mg/L]	DO_{sat} [%]	pH	Sp. Cond. [µS/cm]	ORP [mV]	TP [mg/L]	OrthoP [mg/L]	TSS [mg/L]	Chloride [mg/L]	E. coli [MPN/100mL]
4/24/2020	11:30	13.19	12.81	126.8	8.26	914.9	12.81	0.045	0.01	4.5	77.8	4.1
5/18/2020	14:00	16.276	9.27	94.7	9.27	820	297.5	0.073	0.017	14.6	NA	325.5
6/3/2020	07:15	16.69	6.93	71.4	7.28	909	157.3	0.07	0.024	8.8	NA	290.9
7/2/2020	10:30	23.62	7.56	89.3	7.23	421.1	414.3	0.062	0.028	6.6	NA	387.3
7/27/2020	11:00	22.3	7.37	87.9	9.1	772.4	269	.107	.062	13.1	N/A	344.8
8/27/2020	08:50	21.57	6.67	75.7	7.38	807	311.5	0.083	0.04	7.8	67.6	478.6
9/30/2020	10:30	13.682	9.32	93.3	8.37	858	85.4	.055	.025	4.2	70.7	260.3
10/27/2020	09:30	1.057	11.99	86.6	7.64	929	122.2	0.056	0.019	10.1	71.8	73.8

Table B5. Storm water quality data from the Environmental Preserve stream site measured in 2020. Parameters measured include total phosphorus (TP), orthophosphate (orthoP), total suspended solids (TSS) and Escherichia coli (E. coli).

Start Date	Time	End Date	Time	TP [mg/L]	OrthoP [mg/L]	TSS [mg/L]	E. coli [MPN/100mL]
**5/17/2020	16:00	N/A	N/A	0.101	0.02	39	1413.6
10/12/2020	08:25	10/12/2020	9:40	0.165	0.034	31	866.4
10/21/2020	02:41	10/21/2020	8:26	0.085	0.018	21.8	60.2

**storm sample was taken as a grab sample from the stream during high flow.

Table B6. Nutrient and Chemical Loading for the 65th Ave and ENVP sites calculated for monitoring period.

Site	Annual TP load (lbs)	Annual TSS load (lbs)	Annual Chloride load (lbs)
65th Ave	899	210,174	599,051
ENVP	120	22,760	13,166

* ENVP Load was calculated from April 29th – October 19th, 2020.
** 65th Avenue Load was calculated from March 12th – December 31st, 2020.

Appendix C: 2020 Shingle Creek Stream Data

OVERVIEW

Shingle Creek (AUID 07010206-506) is impaired for chloride, aquatic life (macroinvertebrate IBI), and aquatic use (*E. coli*). Bass Creek (07010206-784), a headwater stream to Shingle Creek, is impaired for chloride and aquatic life (Fish IBI). West Mississippi streams have not been assessed. The Shingle Creek and West Mississippi Third Generation Watershed Management Plan includes annual monitoring of four stream locations in the Shingle Creek Watershed, one on Basset Creek (BCP) and three on Shingle Creek (SC-3, SC-0, and USGS), and rotating monitoring of two sites in the West Mississippi Watershed (ENVP, Mattson Brook, Oxbow, and 65th Ave). The primary purpose of the stream monitoring program is to assess progress toward achieving the TMDLs and state water quality standards for the impaired streams and to track water quality of unimpaired streams. Activities included in the stream monitoring program include routine and storm water quality, flow, and conductivity monitoring. Three of the Shingle Creek sites (BCP, SC-3, and SC-0) and two rotating West Mississippi sites are monitored routinely during the growing season (April through October) for multiple water quality parameters. Shingle Creek sites are monitored once a month in the winter (November through March) for chloride concentrations. The USGS site is only monitored in the winter for chloride.

In Section 1.0, we provide an overview of the various stream sampling methodologies (Section 1.0) used to collect routine water quality (Section 1.1), storm water quality (Section 1.2), flow and load calculations (Section 1.3), and conductivity (Section 1.4) data at the stream sites. In Sections 2.0 and beyond we summarize activities and results from 2020 monitoring for each of the four sites monitored.

Results and discussions for each Shingle Creek stream can be found in the following order:

- Section 2.0 – BCP
- Section 3.0 – SC-3
- Section 4.0 – SC-0
- Section 5.0 – USGS

See Appendix B for West Mississippi streams data.

1.0 Sampling Methods

1.1 ROUTINE WATER QUALITY

Shingle Creek and West Mississippi streams are within highly urban areas but serve as important water features to the cities they flow through. The streams flow through various parks and have multiple miles of adjacent walking paths. The streams are home to many animals including muskrats, fish, crayfish, and ducks. The Minnesota Pollution Control Agency (MPCA) monitors and assesses streams around the state to determine if they meet water quality standards. The agency relies on local partners, including soil and water conservation districts, watershed districts, tribal entities, nonprofit groups, and citizens to help monitor the thousands of streams in the state. Shingle Creek Watershed Management Commission (Commission) is an active participant in aiding the MPCA in sampling and collecting information on the state of water quality of its streams. The Commission is focused on sampling total suspended solids, total phosphorus, total dissolved phosphorus, soluble reactive phosphorus, chloride, and *E. coli*. In addition to these parameters for water quality standard comparison, the Commission collects certain chemical and physical parameters on its streams.

Routine stream monitoring samples are typically collected twice per month starting in April and ending in October. For three streams (BCP, SC-3, and SC-0), water samples are collected and assessed for total suspended solids (TSS), total phosphorus (TP), total dissolved phosphorus (TDP), soluble reactive phosphorus (ortho-P), chloride, and *E. coli*. In addition to these chemical parameters, *in-situ* readings of physical parameters are also taken. A YSI or similar multimeter water quality sonde is used to collect these measurements. Parameters measured include dissolved oxygen (DO) concentration, water temperature, pH, oxidation-reduction potential (ORP), and specific conductivity. During the late fall, winter, and early spring chloride samples and physical parameters are taken at the three previously mentioned stream sites and one additional site (USGS).

Stream stage height at BCP, SC-3, SC-0, and West Mississippi monitoring sites is measured using an automated water sampler (ISCO model 6712) which is deployed in early April until late October. The ISCO water sampler is connected to a pressure transducer deployed in the stream (ISCO 720 Submerged Probe Flow Module). Stage height is periodically adjusted throughout the monitoring season using stream tape-down measurements taken in the field. Tape-down measurement are the distance to water from a known, fixed elevation in or near the stream. Stream stage height is converted to flow (discharge) measurements during data processing. The process is described in Section 1.3. Flow data are collected year-round at the USGS gage site 05288705 on Shingle Creek.

Flow data, lab samples, and *in-situ* data are used to understand the cycling of chemicals and nutrients in the stream system, identify watershed pollutant loads, and indicate areas of excess chemicals and nutrients.

1.2 STORM WATER QUALITY

Storm water quality samples are typically collected from April through October when a storm event of 0.5 inches or greater occurs. Storm samples are taken each year at BCP, SC-3, and SC-0 sites, and

at West Mississippi sites chosen for routine monitoring that year. Storm event water samples are collected using the ISCO automated water sampler at 15-minute intervals. Discrete water samples are composited and sent to the lab for analysis of TSS, TP, TDP, OP, and *E. coli.* No physical parameters are measured during storm events.

1.3 FLOW AND LOAD CALCULATIONS

ISCO-measured state height is converted to flow measurements at the end of each field season. Field staff measure streamflow using a FlowTracker Handheld IDV (San Diego, CA) periodically throughout the monitoring season. Field staff developed a relationship between stream stage height and stream flow measured in the field. This relationship is fit with a polynomial equation that relates stage height to flow for the time that the ISCO is deployed (April through October). During winter months when the ISCO is not deployed at field sites, flow at SC-0, SC-3, and BCP is linearly interpolated using data from the USGS gage on Shingle Creek.

Flow and routine water quality samples are used together to generate load calculations for various water quality pollutants. Loads were estimated as the total streamflow volume at each site multiplied by the flow-weighted mean concentration (FWMC) of a given water quality parameter. Flow weighted mean concentrations are calculated as:

$$FWMC = \frac{\sum_{l}^{n} c_i * q_i}{\sum_{l}^{n} q_i}$$

Where c_i is the pollutant concentration of the i^{th} sample and q_i is the streamflow of the i^{th} sample.

1.4 CONTINUOUS SPECIFIC CONDUCTIVITY MONITORING

Specific conductivity and temperature probes (AquaTroll 500, In-Situ Inc., Fort Collins, CO) are deployed at BCP, SC-3, and SC-0 sites year-round. Conductivity and temperature are measured by the probe in 15-minute intervals and data are downloaded periodically. A linear relationship between continuously monitored specific conductivity and chloride concentrations measured from grab samples is modeled. The linear relationship between chloride and specific conductivity allows us to estimate chloride concentrations in the stream throughout the entire year.

2.0 BCP

Table C1. Water quality data from the Bass Creek Park (BCP) stream site measured in 2020. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DO_{sat}), pH, specific conductivity (sp. cond.), oxidation reduction potential (ORP), total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS), chloride and Escherichia coli (E. coli). Note that there is no data from January and February because water was frozen at this site during sampling events.

Date	Time	Temp. [°C]	DO [mg/L]	DO_{sat} [%]	pH	Sp. Cond. [µS/cm]	ORP [mV]	TP [mg/L]	Ortho P [mg/L]	TDP [mg/L]	TSS [mg/L]	Chloride [mg/L]	E. coli [MPN/100mL]
1/14/2020	10:45	0	9.99	70.6	7.56	916.4	483					177	
2/11/2020	08:30	-0.09	9.31	65.5	6.91	1631.1	478					374	
3/10/2020	09:00	-0.032	9.47	65	7.18	1385	262					313	
4/10/2020	08:00	3.16	9.78	75.4	7.32	883.1	391					191	
4/24/2020	09:00	8.83	10.12	90.9	7.51	1587.1	346	0.043	0.003	0.016	4.8	367	201.4
5/5/2020	10:00	12.51	8.6	83.5	8.08	789.3	341	0.044	0.009	0.018	5.6		727
5/18/2020	10:45	11.58	8.06	74.2	9.18	644	353.1	0.066	0.025	0.035	4.8		866.4
6/3/2020	06:30	18.292	3.62	38.6	7.18	824	152.1	0.068	0.028	0.032	2.7		488.4
6/16/2020	09:30	18.45	4.68	51.4	7.06	773	740	0.078	0.031	0.046	1.7		344.8
7/2/2020	14:00	27.89	7.00	99.8	7.55	847	371	0.158	0.098	0.113	2.1		410.6
7/16/2020	11:30	20.716	5.76	64.4	8.35	1126	310.7	.125	.034	.043	7.8		
7/27/2020	13:30	24.54	9.25	114.9	8.91	652	252	0.16	0.086	0.098	19.5		387.3
8/11/2020	11:15	19.53	6.69	73	8.16	625	346.3	0.118	0.041	0.077	3		866.4
8/27/2020	11:10	23.61	5.84	71.6	7.78	691	291.6	0.127	0.06	0.079	2.9	117	201.4
9/10/2020	14:45	12.44	9.3	88.6	7.89	720	131.7	0.089	0.015	0.022	8.5	119	235.9
9/30/2020	10:00	13.04	5.38	53.1	8.57	1141	109.7	.117	.013	.022	8.7	141	
10/27/2020	12:30	1.011	10.66	77	4.51	1268	89.6	0.068	0.017	0.033	5.8	235	52.9
11/19/2020	08:49	2.38	8.9	67.8	7.22	1222	460					305	
12/17/2020	12:45	2.16	13.17	98.6	7.69	1980.4	398					480	

Table C2. Storm water quality data from the Bass Creek Park (BCP) stream site measured in 2020. Parameters measured include total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS) and Escherichia coli (E. coli).

Start Date	Time	End Date	End Time	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	E. coli [MPN/100mL]
5/16/2020	02:59	5/16/2020	8:44	0.173	0.024	0.04	53.8	2419.6
5/26/2020	22:36	5/27/2020	3:44	0.111	0.023	0.039	18.4	> 2419.6
6/18/2020	17:51	6/18/2020	23:49	0.069	0.058	0.069	11.4	17329
8/9/2020	12:26	8/9/2020	17:42	0.301	0.047	0.063	65	> 2419.6
8/28/2020	04:58	8/28/2020	10:48	0.23	0.073	0.074	33.8	> 2419.6
8/31/2020	04:13	8/31/2020	9:43	0.197	0.054	0.068	38	> 2419.6

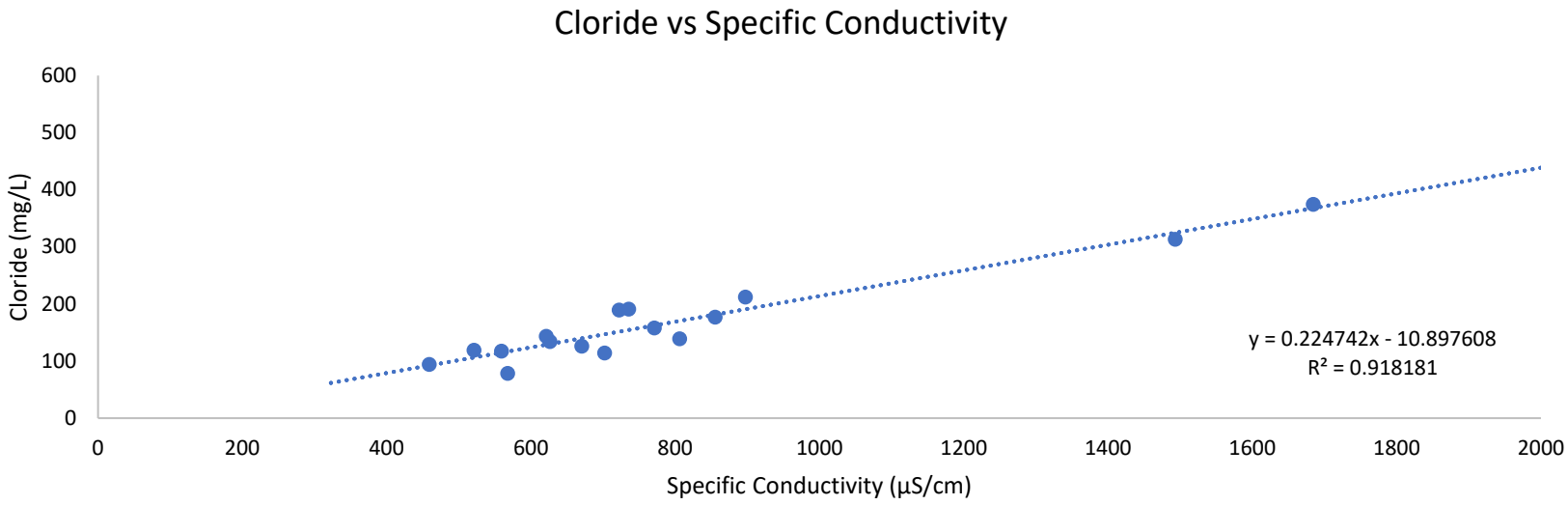


Figure C1. Relationship between probe measured specific conductivity and sampled chloride at the Shingle Creek BCP stream site from 2019-2020. Linear regression line represents the relationship between specific conductivity and chloride with an R squared value of 0.918.

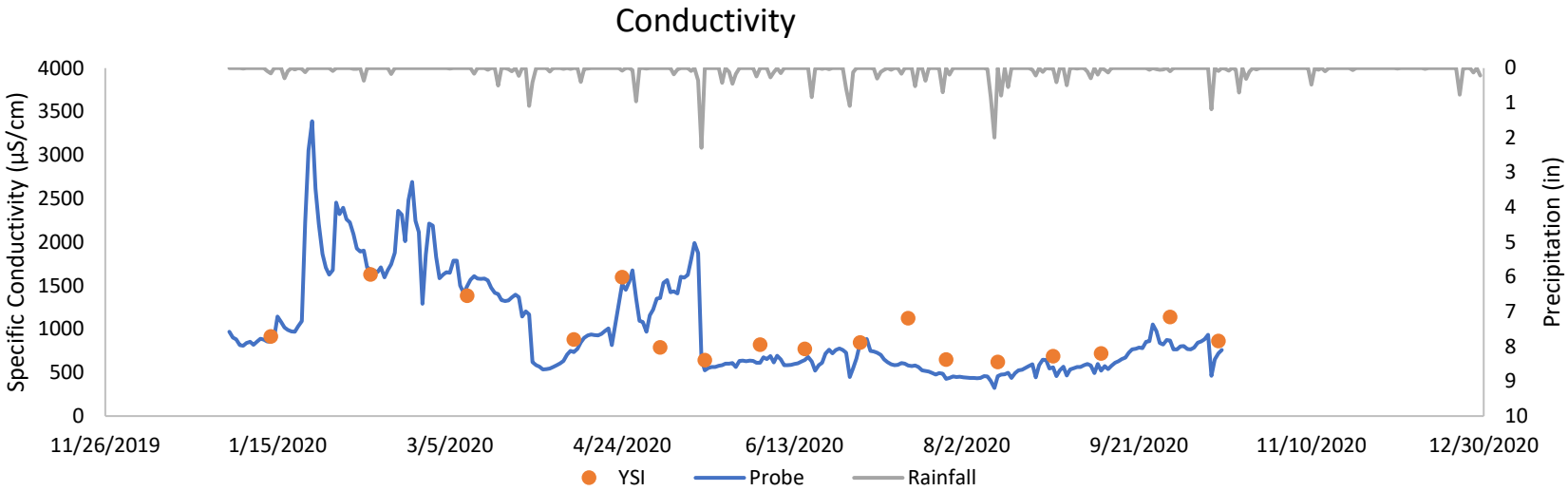


Figure C2. Continuous (AquaTroll 500) and *in-situ* (YSI) specific conductivity measurements at the BCP site in 2020.

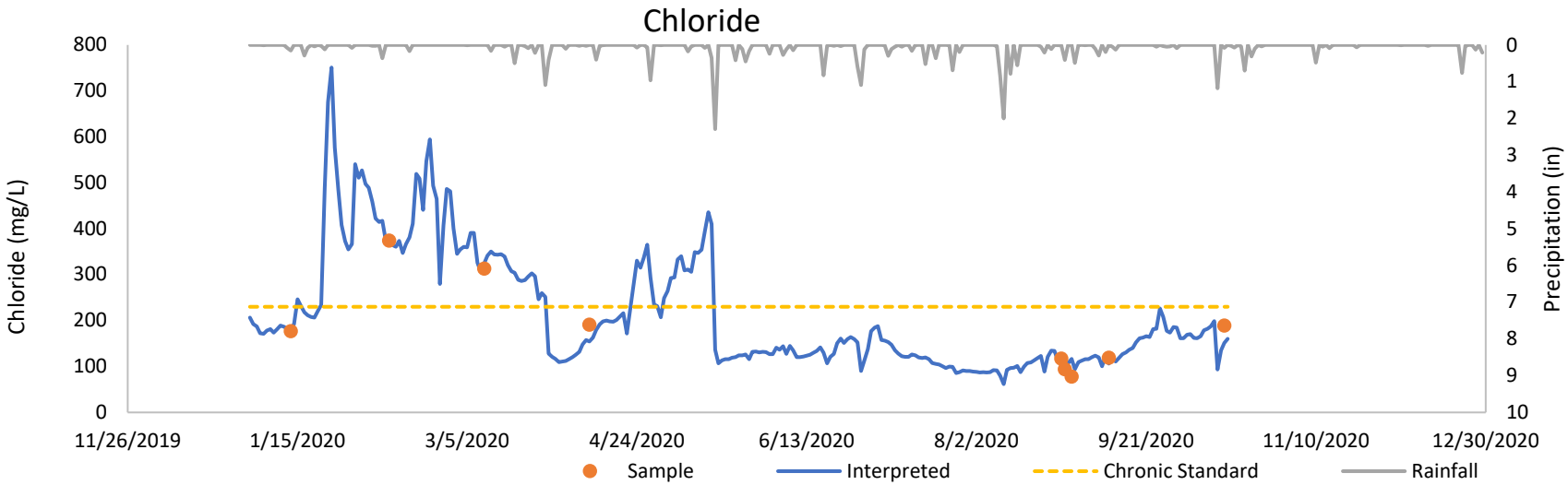


Figure C3. Interpreted and sampled chloride data from the Shingle Creek BCP stream site measured in 2020. Chloride was interpreted using the linear relationship generated between specific conductivity data and chloride at this site. The chronic standard for chloride is 230 mg/L.

Table C3. BCP historic load calculations including TP, TSS and Chloride load calculations for 2020.

Year	Flow	TP		Ortho-P		TSS		VSS		Nitrate		TKN		Chloride	
	Acre-ft	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)
2014	6,837	1,881	101	776	42	106,971	6			4,281	0.23	13,736	0.74		
2015	1,493	792	192	531	129	107,640	23.1			1,856	0.148	5,123	1.14		
2016	4,107	1,024	99	854	82	189,576	18.2					1,707	0.16		
2017	5,537	1,670	119												
2018	2,754	9,701	139												
2019	6,753	2,114	124												
2020	2,562	479	90			231,824	13.9							1,009,950	156

3.0 SC-3

Table C4. Water quality data from the Shingle Creek SC-3 stream site measured in 2020. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DO_{sat}), pH, specific conductivity (sp. cond.), oxidation reduction potential (ORP), total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS), chloride (mg/L) and Escherichia coli (E. coli). Note that there is no data from January and February because water was frozen at this site during sampling events.

Date	Time	Temp. [°C]	DO [mg/L]	DO_{sat} [%]	pH	Sp. cond. [µS/cm]	ORP [mV]	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	Chloride [mg/L]	E. coli [MPN/100mL]
1/14/2020	11:00	1.39	9.5	69.9	6.95	1344.3	545					272	
2/11/2020	09:00	1.05	8.79	63.4	7.01	1922.1	436					423	
3/10/2020	10:15	0.146	11.31	78	7.41	13.41	241.4					306	
4/10/2020	08:30	4.88	10.2	82.1	7.07	849.6	398					171	
4/24/2020	10:15	10.24	8.38	77.5	7.35	1156.9	346	0.053	0.005	0.012	5.2	188	156.5
5/5/2020	11:00	13.1	9.26	91.2	8.05	1134.8	332	0.06	0.011	0.024	2.7		135.4
5/18/2020	11:45	11.469	7.78	71.5	9.1	640	383.4	0.087	0.016	0.035	13.4		770.1
6/3/2020	06:45	19.744	4.61	50.5	6.93	921	155	0.091	0.03	0.038	3.2		260.3
6/16/2020	10:45	19.76	4.72	53.3	7.14	934	739.9	0.107	0.024	0.038	7.1		980.4
7/2/2020	13:30	24.58	5.06	68.9	7.88	722	320.9	0.124	0.066	0.068	5.6		648.8
7/16/2020	10:45	19.39	3.48	38.0	8.10	1260	307.7	.082	.027	.032	5.7		344.8
7/27/2020	12:30	23.95	5.73	70.3	8.78	532.7	263	0.162	0.019	0.036	14.6		816.4
8/11/2020	12:00	20.291	6.09	67.5	8.47	485.1	383	0.193	0.024	0.054	29		1046.2
8/27/2020	10:40	24.01	4.24	52.3	7.51	757	278.2	0.155	0.062	0.086	6.1	126	770.1
9/10/2020	14:00	11.761	7.56	70.6	7.42	639	131.8	0.172	0.022	0.035	56.4	90.1	1299.7
9/30/2020	09:30	13.456	3.61	35.7	7.88	1008	87.6	.073	.014	.01	4.3	116	
10/14/2020	12:45	11.93	5.45	52.5	6.95	556	89.8	0.126	0.026	0.054	11.6	97	1203.3
10/27/2020	11:30	1.084	10.16	73.4	7.21	1007	78.9	0.081	0.015	0.034	7	186	104.3
11/19/2020	9:15	3.25	9.52	74	7.45	1165	451					198	
12/17/2020	13:00	3.52	8.34	24.2	2.8	1361.1	3.39					150	

Table C5. Storm water quality data from the Shingle Creek SC-3 stream site measured in 2020. Parameters measured include total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS) and Escherichia coli (E. coli).

Start Date	Start Time	End Date	End Time	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	E. coli [MPN/100mL]
**5/17/2020	17:30			0.114	0.027	0.038	23.2	1203.3
6/9/2020	15:46	6/9/2020	21:16	0.166	0.041	0.07	12	980.4
6/18/2020	17:48	6/18/2020	20:33	0.319	0.048	0.076	72	24196
8/9/2020	12:19	8/9/2020	13:19	0.305	0.02	0.028	110	> 2419.6
8/28/2020	04:53	8/28/2020	7:38	0.332	0.114	0.121	59	> 2419.6
8/31/2020	01:32	8/31/2020	5:07	0.174	0.05	0.066	19.2	> 2419.6

**storm sample was taken as a grab sample from the stream during high flow

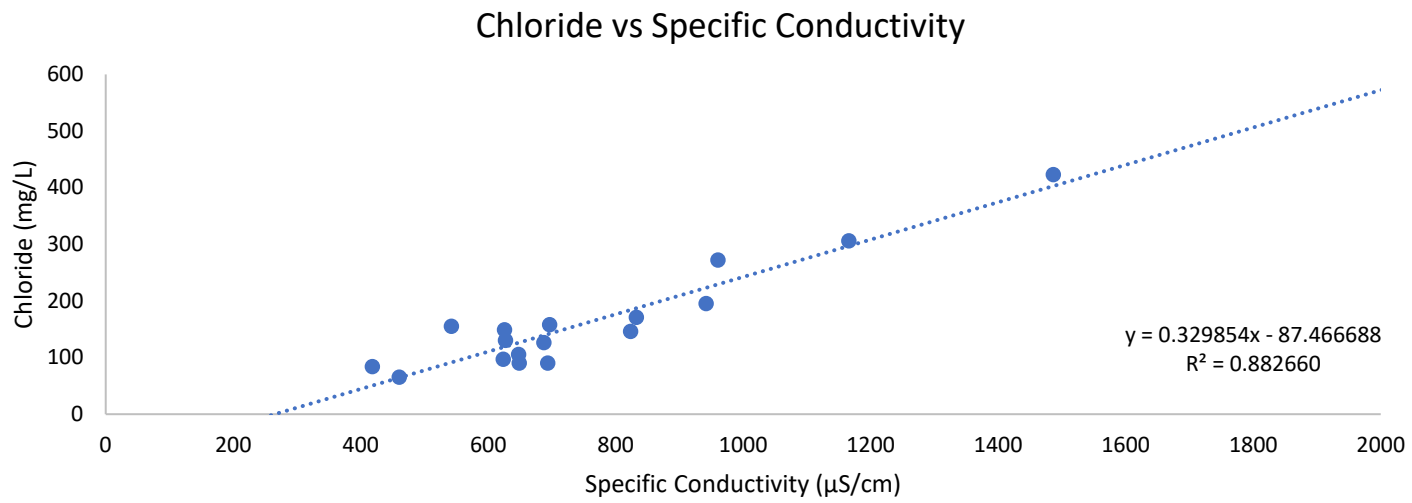


Figure C4. Relationship between probe measured specific conductivity and sampled chloride at the Shingle Creek SC-3 stream site from 2019-2020. Linear regression line represents the relationship between specific conductivity and chloride with an R squared value of 0.882.

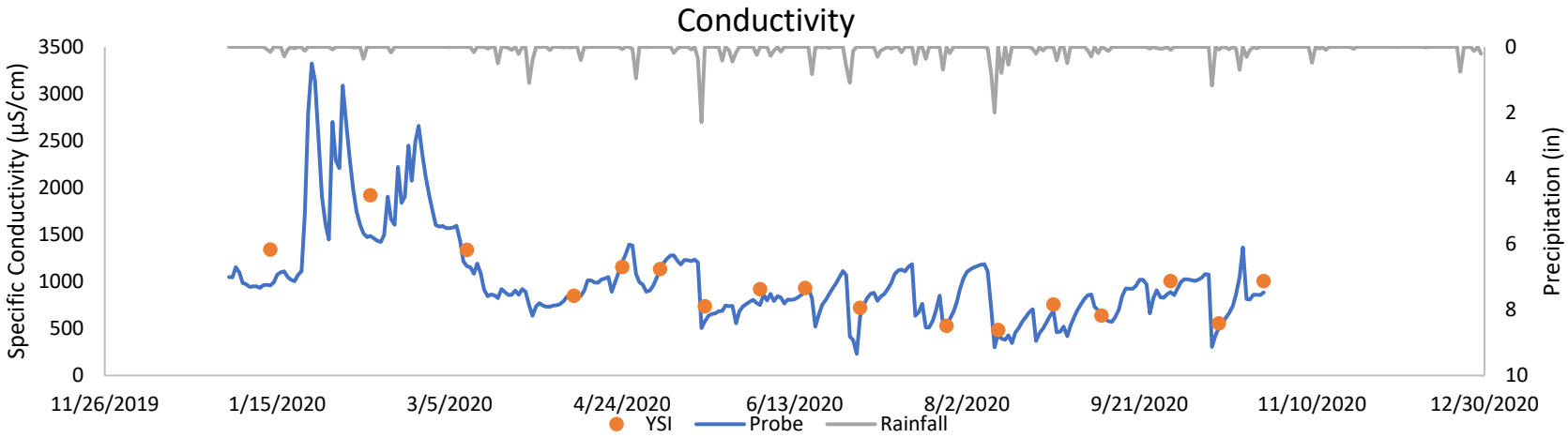


Figure C5. Continuous (Probe) and In-situ (YSI) Specific Conductivity measurements at the SC-3 site in 2020.

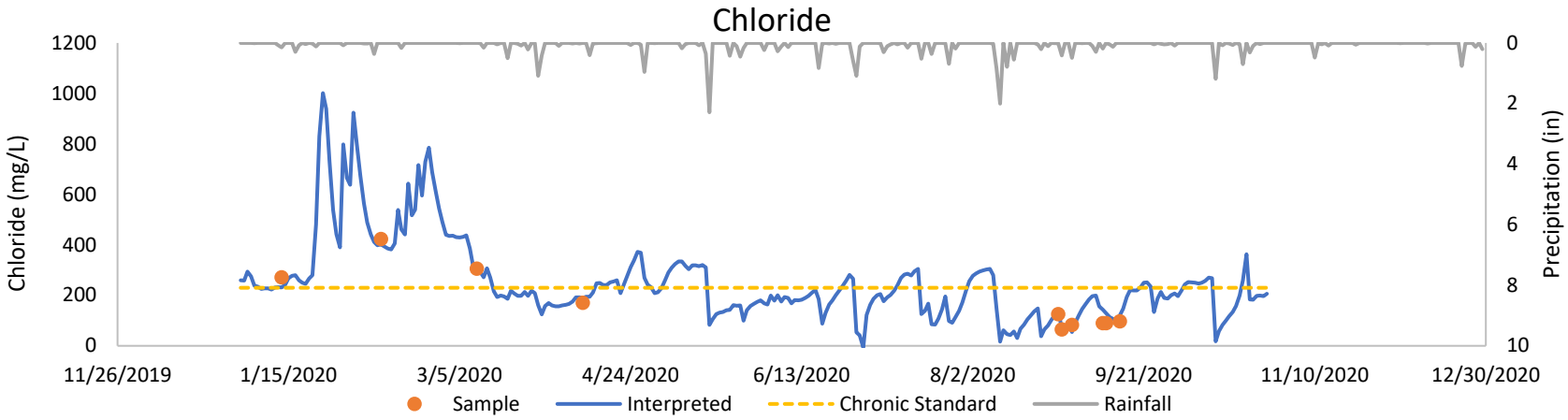


Figure C6. Interpreted and sampled Chloride data from the Shingle Creek SC-3 stream site measured in 2020. Chloride interpreted by the linear relationship generated between Conductivity data and Chloride at this site. The chronic standard for chloride is 230mg/L.

Table C6. SC-3 historic load calculations including estimated TP, TSS and chloride loads in 2020.

Year	Flow	TP		Ortho-P		TSS		VSS		Nitrate		TKN		Chloride	
	Acre-ft	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)
2004	7,355	4,189	209	1,543	77	599,657	30	255,736	13	6,173	0.31				
2005	10,616	5,500	191	2,640	92	464,200	16	215,600	7	8,800	0.30	35,200	1.22		
2006	3,843	2,200	211	880	84	451,000	43	138,600	13			20,240	1.94		
2007	6,270	2,200	129	880	52	391,600	23	105,600	6	3,960	0.23	24,200	1.42		
2008	2,962	880	109	220	27	85,800	11	92,400	11	1,540	0.19	8,580	1.07		
2009	961	220	84			33,000	13	15,400	6	440	0.17	1,320	0.51		
2010	4,799	1,980	152	660	51	391,600	30	147,400	11	4,180	0.32	17,820	1.37		
2011	10,099	3,192	116	719	26	591,218	22	211,470	8	3,326	0.12	25,419	0.93		
2012	5,147	2,024	145	615	44	287,380	21	108,114	8			12,572	0.90		
2013	7,033	4,110	215	1,012	53	633,717	33	395,899	21			43,336	2.27		
2014	11,736	5,042	158	1,594	54	983,344	31			8,865	0.28	34,023	1.07		
2015	5,159	2,334	166	1,289	75	293,355	20.9			2,101	0.15	15,950	1.14		
2016	17,247	4,301	149	3,588	108	796,091	54.7					7169	0.201		
2017	13,130	2,928	88												
2018	7,010	2,620	148												
2019	19,593	5,563	112												
2020	6,620	1,501	89			231,824	13.8							2,952,334	177

4.0 SC-0

Table C7. Water quality data from the Shingle Creek SC-0 stream site measured in 2020. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DOsat), pH, specific conductivity (sp. cond.), oxidation reduction potential (ORP), total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS), chloride and Escherichia coli (E. coli).

Date	Time	Temp. [°C]	DO [mg/L]	DO_{sat} [%]	pH	Sp. cond. [µS/cm]	ORP [mV]	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	Chloride [mg/L]	E. coli [MPN/100mL]
1/14/2020	11:30	0.6	11.35	11.35	7.6	1174.4	611					178	
2/11/2020	09:30	0.24	11.59	11.59	7.13	1476	490					235	
3/10/2020	09:30	2.134	11.08	80.7	7.31	1187	270.7					237	
4/10/2020	09:00	5.75	11.56	95.1	7.74	1007.4	391					182	
4/24/2020	13:45	15.1	18.5	190.7	8.28	1156.9	367	0.039	0.004	0.012	5.3	173	27.5
5/5/2020	11:45	14.31	12.9	130.3	8.52	1040	331	0.053	0.005	0.016	3.6		17.5
5/18/2020	12:30	12.31	8.71	81.5	9.21	517	362.5	0.091	0.015	0.029	12		517.2
6/3/2020	07:45	20.794	4.34	48.6	9.78	825	139.1	0.084	0.022	0.035	6.3		111.9
6/16/2020	11:15	19.96	5.39	61.1	7.25	1090	740.4	0.075	0.018	0.028	6		238.2
7/2/2020	11:45	29.92	4.84	59.7	6.92	711	404.7	0.114	0.062	0.063	7		435.2
7/16/2020	10:15	19.736	5.27	57.9	7.94	1175	310.3	.078	.027	.027	4.7		344.8
7/27/2020	9:00	22.63	4.36	52.2	8.71	645.9	262	0.083	0.028	0.035	6.7		1413.6
8/11/2020	13:00	21.906	6.07	69.4	8.15	428.6	326.6	0.123	0.023	0.042	12		488.4
8/27/2020	10:00	23.22	4.62	56.2	7.31	887	308	0.11	0.029	0.054	4.9	138	648.8
9/10/2020	14:45	12.377	8.64	82.3	7.66	948	135.5	0.069	0.027	0.04	5.6	110	260.3
9/30/2020	08:45	13.682	6.39	63.5	8.19	858	85.4	.073	.022	.041	2	234	
10/14/2020	12:00	12.479	6.05	59.0	7.22	595	97.3	0.114	0.016	0.038	7.8	74.2	261.3
10/27/2020	10:30	0.863	10.86	78.1	7.35	1146	107.1	0.083	0.009	0.027	10.2	207	80.5
11/19/2020	09:52	4.16	10.06	80.5	7.45	1376	386					246	
12/17/2020	13:30	0.52	11.22	80.2	8.01	1368.4	325					218	

Table C8. Storm water quality data from the Shingle Creek SC-0 stream site measured in 2020. Parameters measured include total phosphorus (TP), orthophosphate (orthoP), total dissolved phosphorus (TDP), total suspended solids (TSS) and Escherichia coli (E. coli).

Start Date	Start Time	End Date	End Time	TP [mg/L]	OrthoP [mg/L]	TDP [mg/L]	TSS [mg/L]	E. coli [MPN/100mL]
5/16/2020	21:27	5/17/2020	3:12	0.132	0.004	0.024	29.2	2419.6
5/26/2020	20:46	5/27/2020	2:20	0.132	0.005	0.027	33	> 2419.6
6/9/2020	16:50	6/9/2020	20:47	0.095	0.009	0.032	5.4	1553.1
6/18/2020	18:16	6/18/2020	19:31	0.348	0.018	0.041	91.3	> 24196
8/9/2020	12:36	8/9/2020	17:36	0.304	0.005	0.019	102	> 2419.6
8/28/2020	5:09	8/28/2020	10:39	0.258	0.073	0.085	39.5	> 2419.6
8/31/2020	4:41	8/31/2020	10:11	0.128	0.025	0.041	22.5	> 2419.6
10/12/2020	9:00	10/12/2020	9:45	0.172	0.014	0.047	21.1	> 2419.6

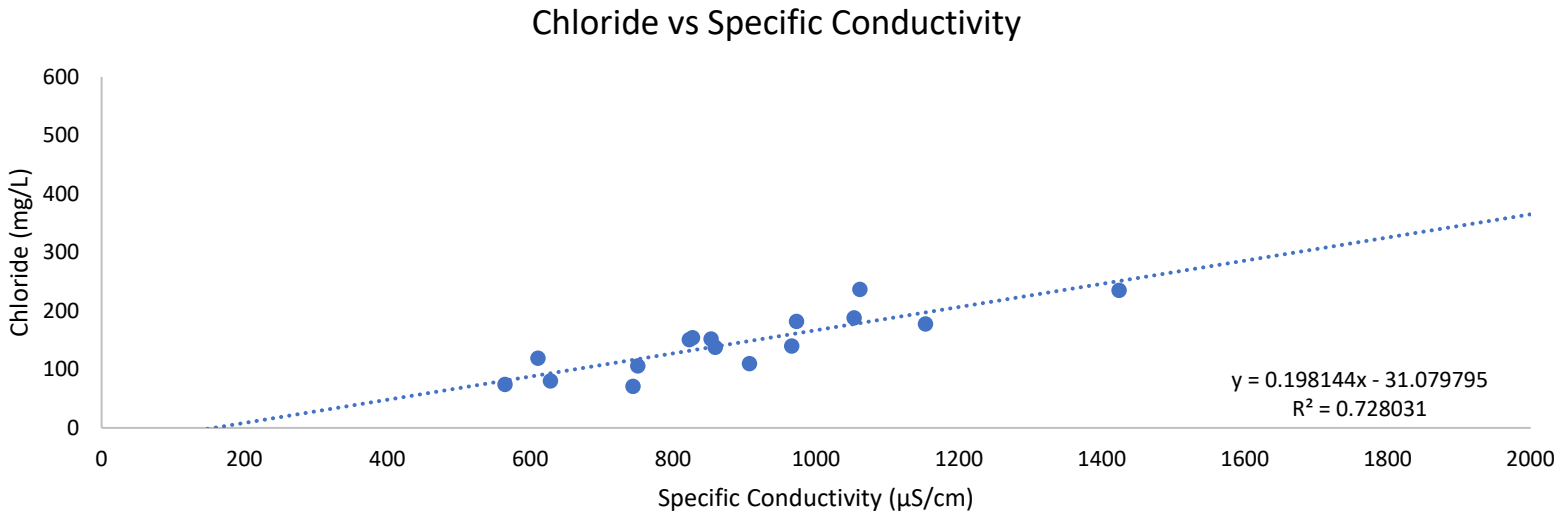


Figure C7. Relationship between probe measured specific conductivity and sampled chloride at the Shingle Creek SC-0 stream site from 2019-2020. Linear regression line represents the relationship between specific conductivity and chloride with an R squared value of 0.728.

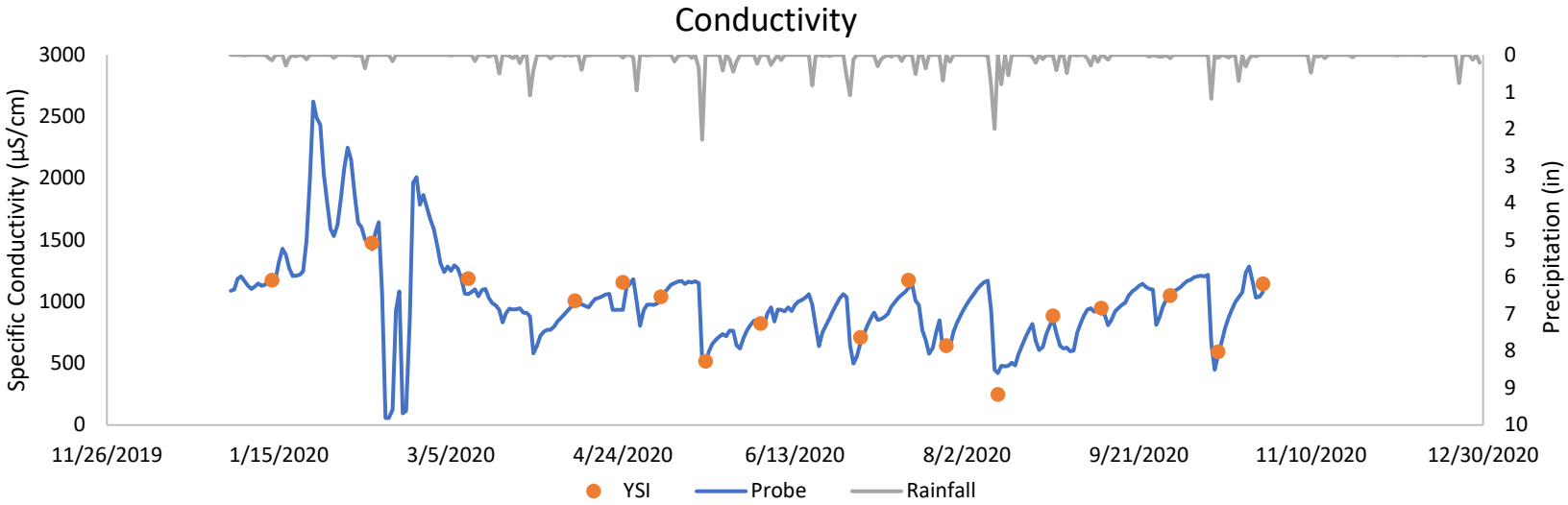


Figure C8. Continuous (Probe) and In-situ (YSI) Specific Conductivity measurements at the SC0 site in 2020.

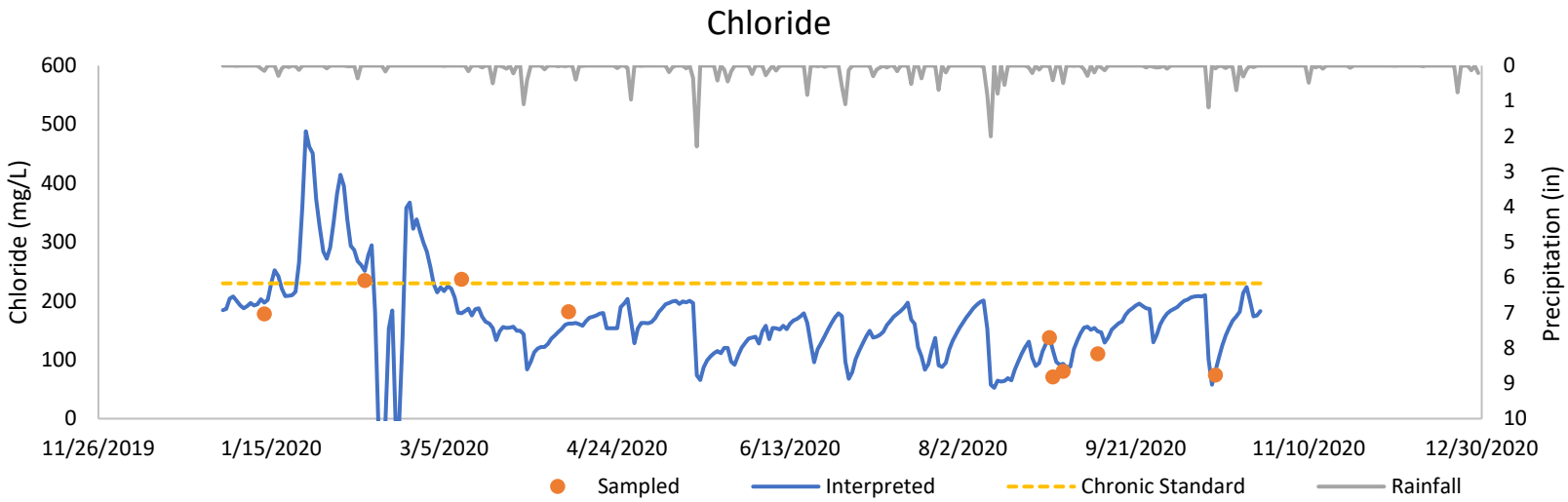


Figure C9. Interpreted and sampled Chloride data from the Shingle Creek SC-0 stream site measured in 2020. Chloride interpreted by the linear relationship generated between Conductivity data and Chloride at this site. The chronic standard for chloride is 230mg/L.

Table C9. SC-0 historic load calculations including TP, TSS and Chloride load calculations for 2020.

SC-0 Pollutant Load Trends

Year	Flow	TP		Ortho-P		TSS		VSS		Nitrate		TKN		Chloride	
	Acre-ft	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (µg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)	Load (lbs)	Conc (mg/L)
2004	8,612	3,748	160	882	38	749,572	32	308,647	13	4,409	0.19	--	--		
2005	15,367	6,820	163	1,320	32	1,577,400	38	1,031,800	25	13,420	0.32	52,800	1.26		
2006	13,255	5,060	140	1,540	43	1,095,600	30	459,800	13	--	--	39,600	1.10		
2007	11,239	3,960	130	880	29	811,800	27	431,200	14	9,240	0.30	38,720	1.27		
2008	7,950	3,080	142	660	31	367,400	17	248,600	12	6,380	0.30	25,080	1.16		
2009	3,917	880	83	220	21	231,000	22	92,400	9	1,320	0.12	5,720	0.54		
2010	7,634	3,300	159	660	32	561,000	27	233,200	11	3,740	0.18	22,000	1.06		
2011	18,023	5,814	119	1,255	26	1,098,478	22	465,297	9	14,807	0.30	54,294	1.11		
2012	7,943	3,384	157	579	27	648,520	30	286,019	13			21,219	0.98		

2013	9,916	4,382	163	511	19	660,628	24	583,448	22			36,177	1.34		
2014	17,483	5,945	125	1,131	24	1,239,189	26					55,102	1.16		
2015	8,630	2,187	113	1,679	71	683,057	29.1			4,680	0.073	23,688	1.01		
2016	17,007	4,241	148	3,538	72	785,013	58					7,069	0.309		
2017	16,149	3,601	88												
2018	9,886	2,850	114												
2019	24,763	7,001	112												
2020	14,340	3,047	84			438,045	12.1							4,726,436	131

Note: Annual flows presented in acre-feet/year, pollutant loads in pounds/year, and pollutant flow weighted mean concentrations in mg/L

5.0 USGS

Table C10. Water quality data from the United States Geological Survey (USGS) stream site measured in 2020. Parameters measured include temperature (temp.), dissolved oxygen (DO), percent saturated dissolved oxygen (DO_{sat}), pH, specific conductivity (sp. cond.), oxidation reduction potential (ORP) and chloride.

Date	Time	Temp. [°C]	DO [mg/L]	DO_{sat} [%]	pH	Sp. cond. [µS/cm]	ORP [mV]	Chloride [mg/L]
1/14/2020	11:45	0.97	9.88	71.1	7.48	1274.8	584	199
2/11/2020	09:45	1.82	10.05	72.6	6.92	1542.8	485	286
3/10/2020	09:45	2.229	10.68	78	7.29	1236	224.4	238
4/10/2020	08:45	5.79	11.01	90.7	7.63	1068.1	353	191
11/19/2020	09:40	3.66	10.01	78.8	7.43	1370	397	274
12/17/2020	13:15	3.1	9.16	70.3	8.22	1401	327	210

Appendix D: Wetland Monitoring

Both Commissions have participated in the Hennepin County Department of Environment and Energy Wetland Health Evaluation Program (WHEP) since 2006. The WHEP program uses trained adult volunteers to monitor and assess wetland plant and animal communities in order to score monitored wetlands on an Index of Biological Integrity for macroinvertebrates and for vegetation.

In 2020 the Minneapolis Park and Recreation Board staff assessed 6 sites across Hennepin County. On a scale of 1 to 30, the macroinvertebrate IBI scores ranged from a low of 5 (poor) to a high of 19 (excellent), with most of the sites in the 19-25 (excellent) range. On a scale of 1 to 35, the vegetation IBI scores ranged from 7 (poor) to 35 (excellent). This is unsurprising as most urban wetlands exhibit variable macroinvertebrate and vegetative diversity due to their altered hydrology and pollutant and sediment conveyed by storm sewers. It is not uncommon for a site to score well on one metric and poorly on the other, illustrating the difficulty of "rating" wetlands.

1.1.1 2020 Monitoring

Due to limitations from the COVID-19 pandemic, only one wetland site within the Shingle Creek and West Mississippi Watersheds was monitored in 2020. Site MP-19 is in Minneapolis (Figure D-1). The site is in Webber Park just to the West of Shingle Creek, about a kilometer above the creek outlet to the Mississippi River. Since MP-19 was last monitored in 2016, the waterbody has improved from poor to excellent condition in the invertebrate category and stayed moderate in the vegetation category (Table D-1).

Figure D-1. Wetland in Webber Park (MP-19), Minneapolis.

Table D-1. WHEP site MP-19 Webber Stormwater.

Year	2016	2020
Invertebrate	(poor)	21 (excellent)
Vegetation	(moderate)	19 (moderate)

Appendix E: 2020 Lake Monitoring

OVERVIEW

The Shingle Creek Third Generation Watershed Management Plan includes a rotating schedule of intensive monitoring on all lakes in the Shingle Creek Watershed. The primary purpose of the intensive lake monitoring program is to evaluate protection efforts for lakes that are not impaired, and to assess progress toward achieving the TMDLs and state water quality standards for all impaired lakes throughout the watershed. Activities included in the intensive lake monitoring program include water quality monitoring, aquatic vegetation surveys, and fish sampling coordinated with the Minnesota Department of Natural Resources (DNR).

In Section 1.0, we provide an overview of the various sampling methodologies (Section 1.0) used to collect water quality (Section 1.1), phytoplankton and zooplankton sampling (Section 1.2), submersed aquatic vegetation (Section 1.3), and fisheries (Section 1.4) data on the lakes within Shingle Creek watershed. In Sections 2.0 and beyond we summarize activities and results from 2020 monitoring for each of the five lakes monitored.

Results and discussions for each lake can be found in the following order:

- Section 2.0 – Eagle Lake
- Section 3.0 – Pike Lake
- Section 4.0 – Bass Lake
- Section 5.0 – Pomerleau Lake
- Section 6.0 – Crystal Lake

1.0 Sampling Methods

1.1 WATER QUALITY

Lakes are central to Minnesota's economy and our way of life, making it imperative that we protect our high-quality lakes and work to restore those with poor water quality. The Minnesota Pollution Control Agency (MPCA) monitors and assesses lakes around the state to determine if they meet water quality standards. The agency relies on local partners, including soil and water conservation districts, watershed districts, tribal entities, nonprofit groups, and citizens to help monitor the more than 10,000 lakes in the state. Shingle Creek Watershed Management Commission (Commission) is an active participant in aiding the MPCA in sampling and collecting information on the state of water quality of its lakes. The Commission is focused on sampling total phosphorus (nutrient), chlorophyll-*a* (pigment in algae), and Secchi depth (a measure of water clarity). In addition to these parameters for water quality standard comparison, the Commission collects certain chemical and physical parameters on its lakes.

Routine lake sampling occurs on a rotating basis. For a lake that is selected for sampling in a given year, water samples are typically collected twice per month starting in May and ending in September. For all lakes, surface water samples are collected and assessed for total phosphorus (TP), soluble reactive phosphorus (ortho-P), total suspended solids (TSS), and chlorophyll-*a* (chl-*a*). In some of the deeper lakes, a hypolimnetic (deep) water sample is collected and tested for TP and ortho-P. In addition to these chemical parameters, a physical profile of the lake is assessed in the deepest part of the lake. A profile typically consists of measurements at the water's surface and at each meter below the surface throughout the entire water column. A YSI or similar multimeter probe is used to collect these measurements. Parameters measured include dissolved oxygen (DO), dissolved oxygen percent saturation, temperature, pH, oxidation reduction potential (ORP) and specific conductivity. Additionally, a Secchi disk reading is taken during every assessment to record the relative level of water transparency.

Lake profiles are used to better understand the chemical and nutrient cycling processes occurring within the lake, in addition to the stressors that may be contributing to biological impairments. The surface water chemical information is used for multiple reasons, one of which is to compare to the North Central Hardwood Forest (NCHF) ecoregions water quality standards established by the MPCA (Table 1.1).

Table 1.1. MPCA water quality standards for the NCHF ecoregion by lake type.

Lake Type	TP (ug/L)	Chl-*a* (ug/L)	Secchi (m)
Deep	40	14	1.4
Shallow	60	20	1.0

1.2 PHYTOPLANKTON AND ZOOPLANKTON SAMPLING

The phytoplankton and zooplankton communities are a key part of the lake ecosystem. They represent the base of the food chain and are often indicators of nutrient regimes and water quality.

We began routine sampling for phytoplankton and zooplankton communities in 2020 by sampling each lake in early and late summer.

Both phytoplankton and zooplankton samples are taken by towing a plankton net with a known mesh size and net diameter vertically through the water column. The sample is transferred to a bottle and a known volume is subsampled for identification. Plankton were identified to the genera classification.

Five different phytoplankton genera were identified in Shingle Creek lakes in 2020: Cyanobacteria, Chlorophyta, Dinoflagellate, Diatom, and Golden Algae. Cyanobacteria are commonly known as blue green algae and have the potential to form toxic blooms which are detrimental to human and ecosystem health. Cyanobacteria are indicative of nutrient rich, calm water. Cyanobacteria are not a preferred food source for zooplankton and they out compete other phytoplankton which are more important to the food chain. Chlorophyta are commonly known as green algae, they are prolific in mid-summer when harmful algae blooms (HABs) are not present. Green algae are a good sink for dissolved nutrients and are an important food source for zooplankton. Dinoflagellates are ubiquitous in freshwater lakes; they are an important part of the food chain and are indicative of low nutrients. Diatoms are most prevalent in the early growing season and they are a very important part of the food chain. Golden algae are similar to diatoms but are more uncommon in freshwater systems and can be found in the benthos.

Changes in phytoplankton composition are important for understanding:

- Pre and post management; indications of management impacts on water quality and all trophic cascades.
- Seasonal changes in nutrients and mixing regimes
- Food chain health throughout the growing season
- Risk of HAB formation

The most common composition change in a healthy lake ecosystem will shift from diatoms in the early spring to green algae in mid-summer to cyanobacteria in late summer. However, it is important to note that in healthy system that no one genera should be the only one represented. One hundred percent of one genera indicates an imbalance in the ecosystem in which one genera was able to completely out compete the others.

1.3 SUBMERSED AQUATIC VEGETATION

In healthy lake ecosystems aquatic vegetation will grow throughout the littoral area (< or = 15 feet depth) and consist of a diverse native community (Figure 1.1). A well vegetated littoral area promotes and facilitates the health of a lake's ecosystem by providing critical spawning, foraging and nursery habitat for aquatic insects, amphibians, birds, and fishes. The littoral area is also important for human recreation and aesthetic enjoyment.

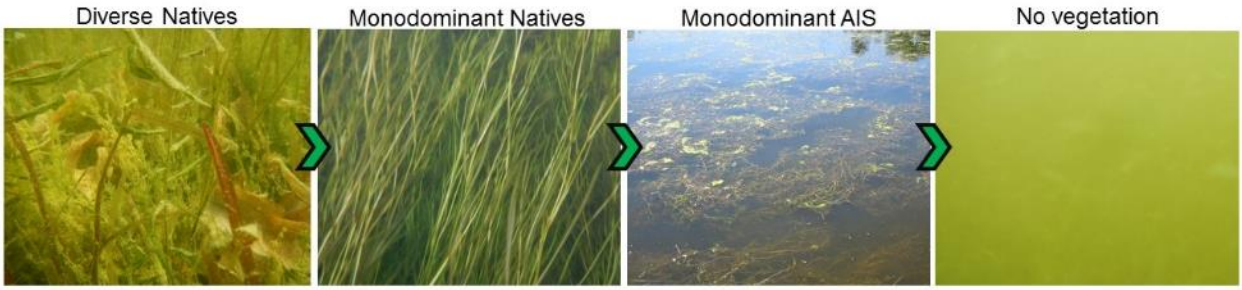


Figure 1.1. Biotic community health continuum portrayed using submersed aquatic vegetation.

The relative health of the SAV community can be assessed with the DNR's Floristic Quality Index (FQI). The FQI is an assessment tool used to determine the biological health of the SAV community. The FQI utilizes species richness and the habitat specificity (C-score) of each species identified to score community health (Equation 1.1). C-score is an index of how desirable or tolerant a group of species is, and DNR standard C-Scores range from 1 to 10 (with 1 being the worst and 10 being the best). FQI scores are compared to a threshold for context and classification of biological impairment status. Lakes with greater FQI scores and taxa richness are typically comprised of diverse native communities with abundant plant growth across the entire littoral area. As health begins to deteriorate within the lake, we typically see a reduced diversity, introduction of invasive species, increasing monodominant communities, and decreased growth across the entire littoral area. Extremely degraded lakes become void of plant growth and become dominated by phytoplankton and/or harmful algae blooms. The biological thresholds for deep lakes in the Central Hardwood Forest ecoregion are a FQI score of 18.6 and 12 taxa. The biological thresholds for shallow lakes in this ecoregion are 17.8 and 11, respectively.

Equation 1.1. Definition of the DNR's Floristic Quality Index (FQI).

$$FQI = \overline{C_{Score}} * \sqrt{No.\,of\ Species}$$

To assess the presence, abundance, and health of the submersed aquatic vegetation (SAV) community, two point-intercept surveys are typically conducted: late spring (typically May or June) and late summer survey (typically July or August). Late spring surveys are primarily conducted to understand the presence and distribution of *Potamogeton crispus* (curly-leaf pondweed, CLP), a plant with high spring growth and early growing season senescence. Late summer surveys provide the greatest assessment of SAV community, abundance, and spatial distribution. Therefore, if a single survey is conducted on a lake, targeting the late summer survey timeframe is recommended.

To sample the SAV community, computer software is used to overlay a grid of points (distance between points is lake specific) across the entire lake. The resulting points serve as predetermined sampling locations. To limit sampling of vegetation where it is not expected to grow, all deep lakes within Shingle Creek are capped to a maximum sampling depth of 20 feet or more (lake specific), therefore, all sampling points in depths beyond the designated cap are removed from the sampling grid. This results in a lake specific number of sampling locations, however, the sampling protocol and reporting of each lake is similar and allows comparisons to be made across systems.

At each survey location a double sided weighted 14-tine rake is thrown from the boat, allowed to sink, and pulled across the lake bottom to represent approximately 1 m^2 of lake area. We refer to this process as a rake toss. For each rake toss, vegetation is removed from the rake, identified to the

species level, placed in a perforated bucket, weighed and assigned a proportion of the total biomass based on visual approximation (i.e. 80% of total weight was curly-leaf pondweed and 20% of total weight was coontail). All biomass values are reported in wet weights (kg).
**Note: Lily species, duckweed species, and filamentous algae are not included in any biomass measurements due to difficulty in collecting a representative sample with the sample rake, however, their locations and C-Score values are recorded and factored into the lake FQI score.*

We developed a model to estimate the total SAV biomass within the lake. Depth was stratified into four intervals (0-5, 5-10, 10-15, >15 feet) to more accurately account for spatial variation in vegetation growth and improve model accuracy. For each species we calculate a depth interval specific frequency of occurrence, an average rake toss biomass, and a depth interval lake area. Multiplying these three parameters results in a species-specific total biomass/depth interval. All species-specific depth interval biomasses are then summed within each depth interval to calculate depth specific biomasses and all depth intervals are summed to calculate a total lake biomass (Equation 1.2). The total lake biomass estimation uses the individual surveyed data point information to extrapolate coverage estimates across the entire basin. This is not meant to serve as an exact biomass calculation, rather, this estimate is useful to 1) make relative comparisons to other observed species, 2) be used to compare to future sampling efforts, and 3) provide general information to assist aquatic vegetation management planning.

Continuous sonar readings were also collected during each survey trip using a Lowrance HDS Sonar/GPS unit. This data was processed using CiBioBase software (https://www.cibiobase.com/) to map water depth and vegetation biovolume. Biovolume differs from biomass in that it provides context to vegetation water column saturation. The higher the biovolume the more saturated the water column is with vegetation. Sonar readings in depths <2 feet are subject to extreme 'sonar noise' and therefore are not always accurate. Additionally, sonar readings do not detect surface floating vegetation (i.e. pad part of Lily species, duckweed).

Equation 1.2. Definition of total in-lake submersed aquatic vegetation biomass.

$$Total\ Lake\ Biomass = \sum ([Depth\ Interval]\ (\overline{Species\ Biomass} * Species\ \%\ Occurence * Basin\ Area))$$

1.4 FISHERIES SURVEYS

Fish communities are sampled using various techniques and equipment to target specific aspects of the fish community or due to the type of system being sampled. During the 2020 Shingle Creek lakes monitoring season we used one survey technique/assessment method to assess the fisheries communities (Section 1.4.1).

1.4.1 Common Carp Population Evaluation (Lakes of Water Quality Concern)

The common carp (*Cyprinus carpio*) is a widespread aquatic invasive species that can have deleterious effects on lake ecosystems. Common carp uproot aquatic vegetation, resuspend lake bottom sediments and increase available nutrients that can fuel algal growth leading to ecosystem degradation. Significant water quality degradation has been shown to begin at common carp densities of 100 kg/hectare (89 lbs./ acre) (Bajer 2012). Efforts aimed at restoring water quality that do not reduce the presence of common carp have limited success in long term restoration,

therefore, survey efforts are used to determine common carp densities and whether there is a need for carp management. Common carp population assessments implement boat electrofishing techniques that target the carp population within a lake. Carp are targeted along shoreline habitats with captured carp total length measured, weighed, and tallied. A regression model is then used to extrapolate the abundance and density of common carp with the lake. Inputs into the regression model include the amount of time fished (shocking time), the total number of fish captured, and total biomass captured.

2.0 Eagle Lake

2.1 INTRODUCTION & SAMPLING OVERVIEW

Eagle Lake is located in the city of Maple Grove within Hennepin County, MN. Eagle Lake is classified as a deep lake and has an approximate surface area of 296 acres, 199 acres of littoral area (i.e., area less than 15 feet deep), 5.1 miles of shoreline, and a maximum depth of 34 feet. The list below summarizes the year in which each type of sampling was most recently performed on Eagle Lake:

- Water Quality - 2020
- SAV – 2020
- Phytoplankton/Zooplankton - 2020
- Fisheries – Not assessed
- Carp – Not assessed

2.2 WATER QUALITY

Water was collected biweekly from early May through mid-September 2020 for a total of 11 samples. Surface TP measurements remained below the State's deep lake standard of 40 ug/L for most of the monitoring season (Figure 2.2.1). Chlorophyll-a and Secchi depth measurements remailed below the standard during the beginning of the monitoring season, but measurements exceeded the State standards late summer.

Historic data show similar patterns as 2020 monitoring data; average yearly TP concentrations are typically below or near the state standard, while chlorophyll and Secchi depth exceed the state standard (Figure 2.2.1). The most recent trend analysis for Eagle Lake indicates an increasing (improving) trend in Secchi depth and a decreasing (improving) trend in TP concentrations (Wenck 2020). TP samples taken from the hypolimnion followed a similar pattern to previous years, with peak TP concentrations occurring in August and then decreasing during the rest of the monitoring season (Figure 2.2.3). The decrease in hypolimnion TP concentrations near the end of the monitoring season may indicate the ability of lake sediments to re-bind P under oxygenated conditions as lakes mix in the fall.

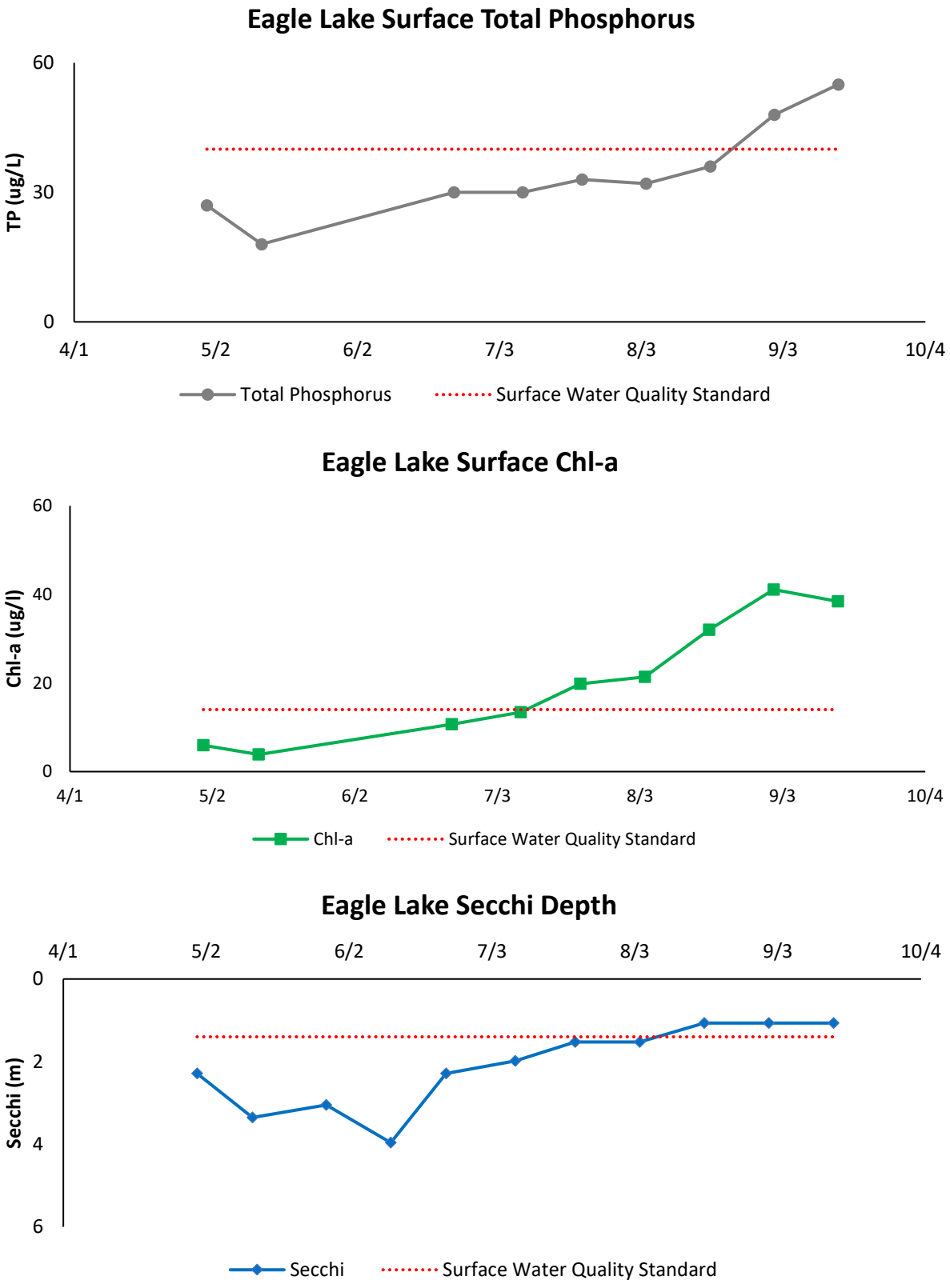


Figure 2.2.1. Seasonal TP, chl-*a*, and Secchi measurements and standards.

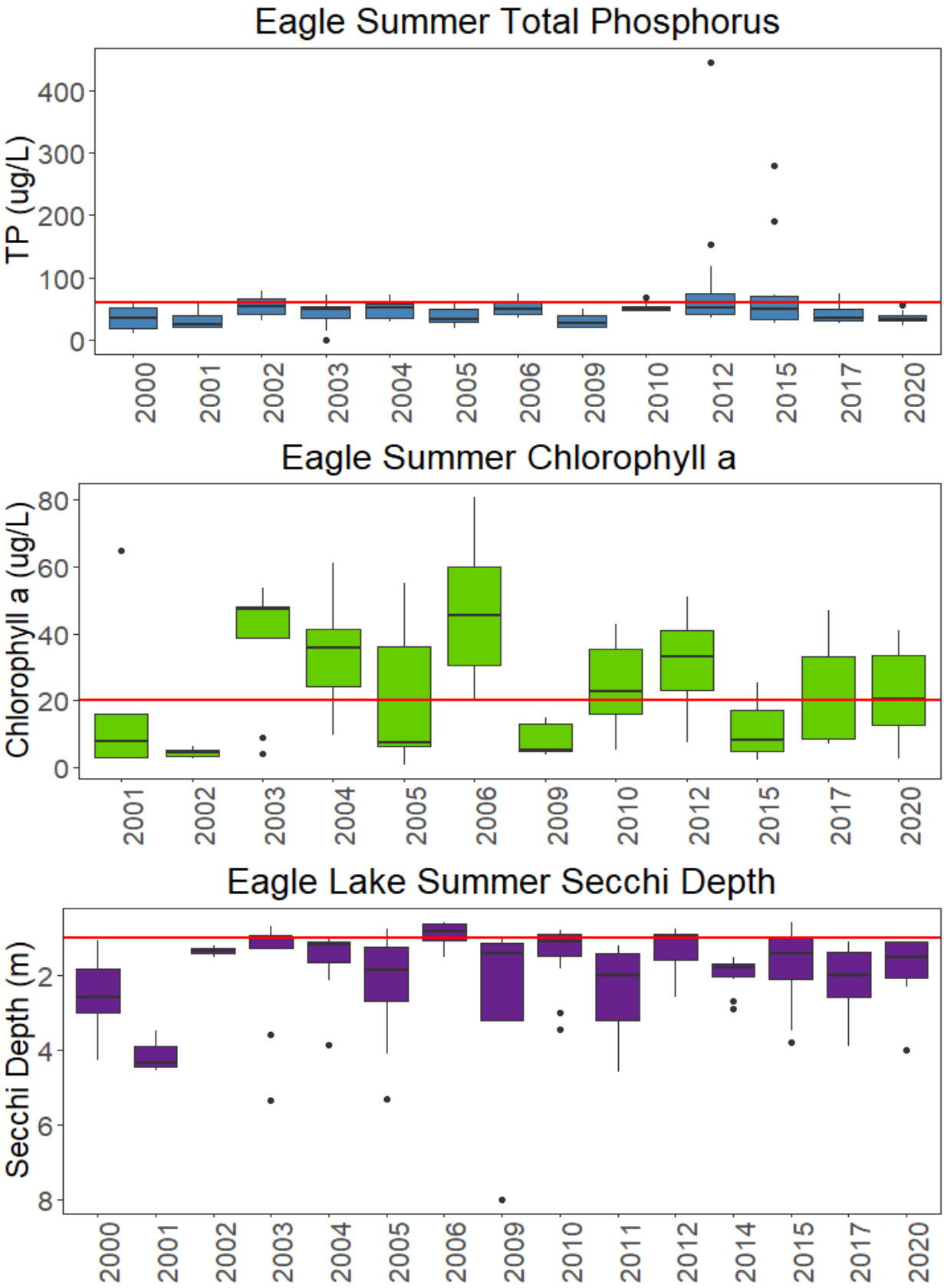


Figure 2.2.2. Annual growing season averages for total phosphorus, chlorophyll-*a*, and Secchi depth, with shallow lake standards in red for reference.

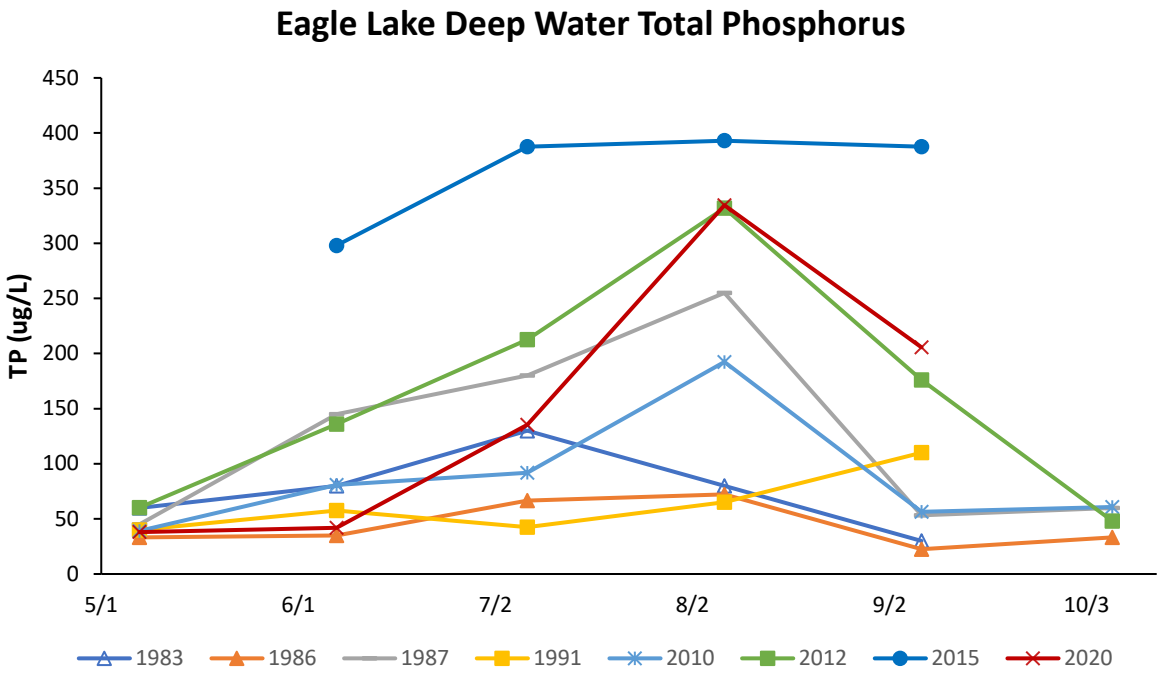


Figure 2.2.3. Eagle Lake historic total phosphorus concentrations in the hypolimnion.

2.3 PHYTOPLANKTON AND ZOOPLANKTON

Phytoplankton and zooplankton composition were measured in June and August 2020 to compare the relative percentages of each genera and changes throughout the season.

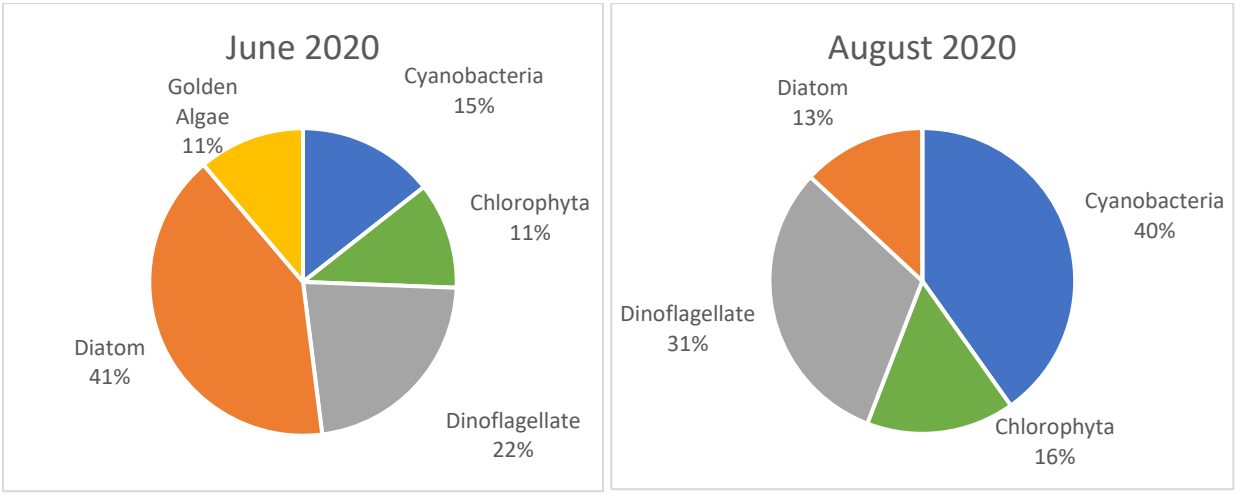


Figure 2.3.1: Phytoplankton relative percentage from June and August 2020.

Eagle lake experienced a shift in phytoplankton dominance from diatoms and golden algae (similar genera) to cyanobacteria later in the summer. Dominance of diatoms and golden algae are good food sources to fish and zooplankton. With the warmer water temperature in August, there was a shift to slight dominance of cyanobacteria. This is a typical composition shift in a healthy freshwater ecosystem. Diatoms and golden algae are competitive in colder water and cyanobacteria are more competitive in warmer water and high nutrients. Cyanobacteria at 40% abundance is dominant but is not indicative of a cyanobacteria bloom.

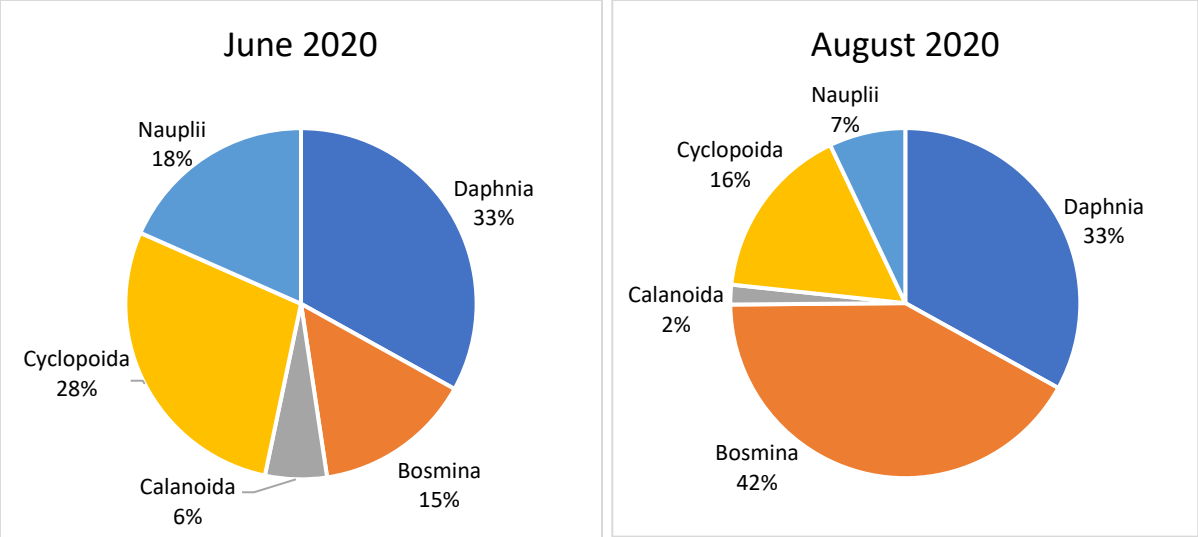


Figure 2.3.2: Zooplankton relative percentage from June and August 2020.

In June, daphnia, and cyclopoida dominate the zooplankton make up in Eagle lake. However, as the summer progresses, a higher percent of the organisms are bosmina. Bosmina are smaller and tend to be out competed early in the season, but later in the season can thrive as the food source shifts (Heiskary 2016). Bosmina can survive on poorer quality food sources like the cyanobacteria that we see increasing later in the season in Eagle lake.

2.4 SUMERGED AQUATIC VEGETATION

Point intercept aquatic vegetation surveys were conducted on June 19, 2020 and August 13, 2020 to document the spring and summer submersed aquatic vegetation in Eagle Lake. (These surveys will be referred to as the spring and summer surveys.) During the spring survey, the lake had 64% vegetative cover, with 84 of the 131 survey points containing vegetation. The lake had higher vegetative cover during the summer survey, with 58% vegetative coverage, or 73 of 126 survey points covered in vegetation (Table 2.3.1). Eagle lake is classified as a deep lake that is mostly littoral, with 199 of its 296 acres in the littoral zone (i.e., in water less than 15 feet deep).

Table 2.3.1. Survey statistics.

Index	Result	
	6/19/2020	8/13/2020
Total Points	131	126
Littoral Points	112	110
Total Vegetated Points	84	73
% Littoral Points with Vegetation	75%	66%

During both surveys, biovolume, or the volume of water occupied by vegetation, was highest in shallow areas (Figure 2.3.1). Biomass and species richness showed the same trend (Table 2.3.2). For instance, areas between 0 and 5 feet had more than ten times the biomass than the areas at 5 to 10 feet (Table 2.3.2). Further, during the spring survey, 19 species were observed in 0 to 5 feet versus only five species in 5 to 10 feet (Table 2.3.2), during the summer survey species observations

followed a similar trend with 22 species observed in 0 to 5 feet and 6 in depths of 5-10 feet (Table 2.3.2). Two species were discovered at a depth of 11.2 feet and none in depths greater than 15 feet during the spring survey, while no vegetation was observed in water depths greater than 10 feet during the summer survey. This is a natural trend due to light limitation. However, in more pristine lakes with greater clarity, this transition is more gradual, with light reaching depths greater than 15 feet, and consequently vegetation growing in these greater depths.

Table 2.3.2. Comparison of community composition with depth.

Depth (ft.)	Lake Acres (acres)	6/19/2020				8/13/2020			
		Sample points at this depth (#/%)		Species Observed (#)	Biomass (kg)	Sample points at this depth (#/%)		Species Observed (#)	Biomass (kg)
0-5 ft.	112	68	52	18	127,601	60	48	22	148,975
5-10 ft.	36	20	15	5	10,687	26	21	6	19,771
10-15 ft.	49	24	18	2	328	24	19	0	0
>15 ft.	100	19	15	0	0	16	12	0	0

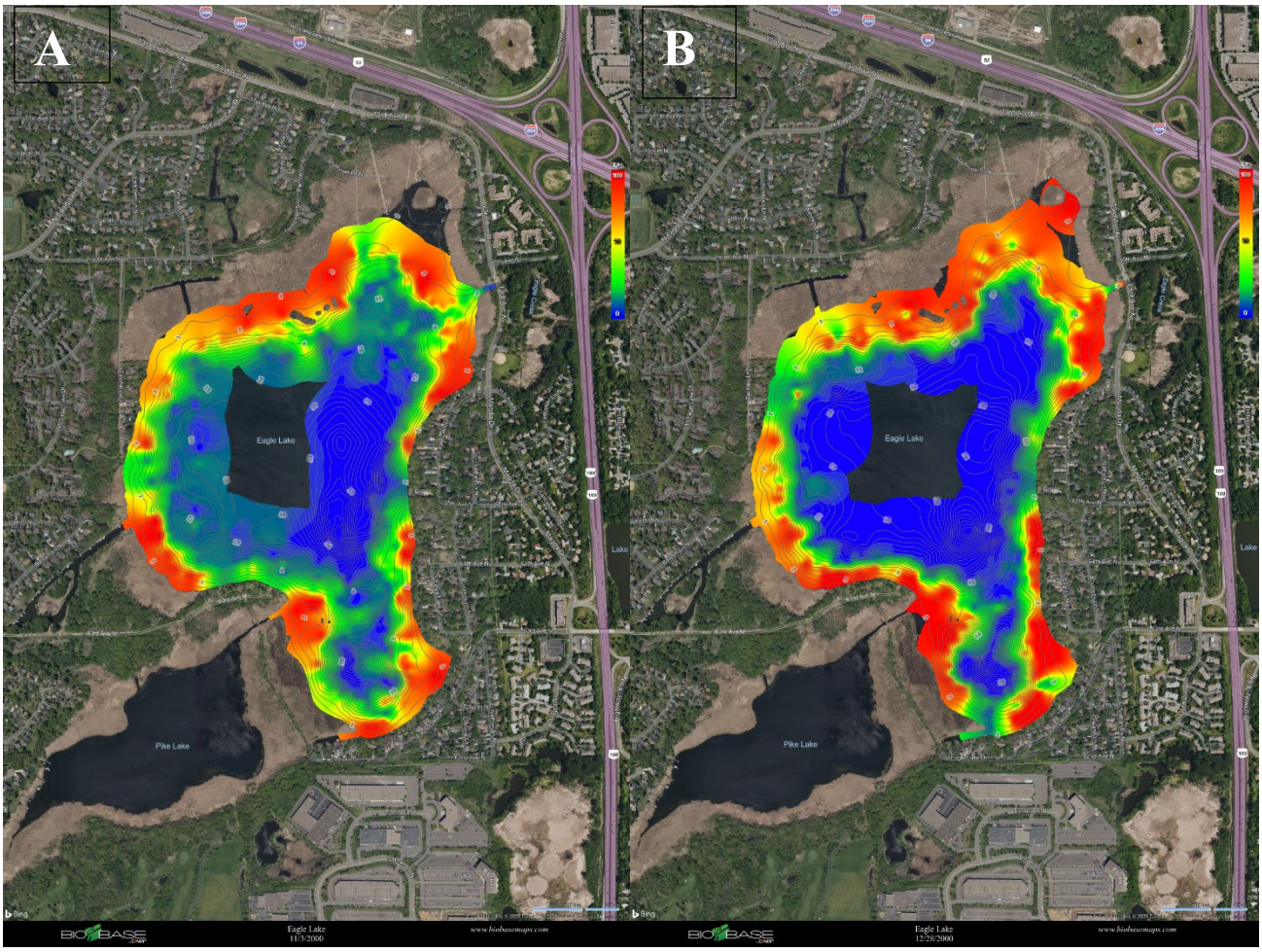


Figure 2.3.1. Biovolume heat maps for Eagle Lake during the June (A) and July (B) 2020 surveys. In the heatmaps, red indicates 100% biovolume and blue indicates 0% biovolume. Biovolume refers to the percentage of the water column taken up by vegetation.

Eagle Lake's June survey showed that the lake has great diversity, with 18 observed taxa, a C-score of 5.3, and an FQI of 22.6 (Table 2.3.3). The spring survey values exceed the Central Hardwood Forest Ecoregion deep lake standards, of 12 observed taxa and an FQI of 18.6. (Table 2.3.3) Species composition in Eagle lake did not include any dominant species (>50% occurrence) (Table 2.3.4). The most abundant species during the spring survey was coontail and it was present at an occurrence of 44%. (Table 2.3.5). Coontail is native but thrives in eutrophic waters and often grows in undesirable, monodominant stands. It was also one of two species observed at depths greater than 10 feet (Table 2.3.5). The second most abundant species, which was also observed at depths greater than 10 feet, was flat stem pondweed which had an occurrence of 37% in the spring. The only non-native species found during the surveys was curly-leaf pondweed (CLP), CLP is often detrimental to native vegetation abundance and water quality. It has a competitive advantage in that it grows under the ice before other native plants can establish in the spring, therefore occupying the nutrients and available space before natives can establish natives early in the growing season. In addition, it senesces in the mid-summer and releases its nutrients back into the water which can create water quality issues. CLP had an occurrence of 14% (Table 2.3.4). Desirable native plants were less dominant, but also established throughout the lake, such as star duckweed (27% occurrence) and yellow water lily (10% occurrence). Thirteen other native submerged and emergent plants were observed during the spring survey. Including muskgrass, waterweed, water star grass, lesser duckweed, northern watermilfoil, bushy pondweed, white water lily, Illinois pondweed, soft stem bullrush, sago pondweed, greater bladderwort, water celery, and

watermeal. There plants were rarely observed, with occurrences at less than 8% of the survey locations (Table 2.3.4) and in water no greater than 10 feet. (Table 2.3.5). Even though several species were observed rarely, it is encouraging to see high species diversity.

Table 2.3.3. Species diversity statistics.

Index	Result*	
	6/19/2020	8/13/2020
Observed Taxa	18	23
Average C-score	5.3	5.8
Lake Floristic Quality Index (FQI)	22.6*	27.0*

*The standards for number of taxa and FQI in Eagle Lake are 12 and 18.6, respectively.

During the July survey the lake further increased its observed taxa to 23 species and therefore an increased FQI of 27.0, again exceeding the Central Hardwood Forest Ecoregion deep lake standards, of 12 observed taxa and an FQI of 18.6. (Table 2.3.3). Like the spring survey the species composition during the summer survey in Eagle lake did not include any dominant species (>50% occurrence) (Table 2.3.4). Coontail remained the most common with a 44% lake wide occurrence (Table 2.3.4). Flat stem pondweed, a native favorable species, had the second highest occurrence, observed at 32% of the lake, slightly lower than in the spring. Five taxa including southern naiad, Fries pondweed, narrowleaf pondweed, arrowhead, and greater duckweed, were not observed in the spring but were observed in the summer and all were observed to be rare (<8% occurrence) (Table 2.3.4). Many of the species that were observed in the spring survey as rare (<8% occurrence) increased in occurrence throughout the lake during the summer survey, lesser duckweed, white water lily, greater bladderwort, water celery, and watermeal all increased in occurrence by five to twelve percentage points. Only five species observed as rare in the spring decreased in occurrence muskgrass, waterweed, water star grass, northern watermilfoil, and yellow water lily decreased by one to four percent occurrence (Table 2.3.4). Other species observed were star duckweed, bushy pondweed, Illinois pondweed, soft stem bullrush, which ranged in occurrence from 2% to 25% and are all favorable (Table 2.3.4). Furthermore, no species were observed in depths greater than 10 feet, likely because water clarity decreased in summer months (Section 2.2) and thus light limitation increased (Table 2.3.5). As expected, CLP was only observed at 2% occurrence in the summer survey, because it senesces after spring. That said, it is encouraging that in the lower abundance of CLP, favorable native plants are able to persist in higher occurrences. Sago pondweed was the only species observed in the spring that was not again observed during the summer survey (Table 2.3.4).

Table 2.3.4. Species occurrence during 2020 surveys.

Common Name	Scientific Name	% Lake Occurrence	
		6/19/2020	8/13/2020
Coontail	*Ceratophyllum demersum*	44	44
Muskgrass	*Chara sp.*	8	7
Waterweed (Canadian)	*Elodea canadensis*	2	1
Water Star Grass	*Heteranthera dubia*	2	1
Duckweed (lesser)	*Lemna minor*	2	10
Duckweed (star)	*Lemna trisulca*	27	25
Northern watermilfoil	*Myriophyllum sibiricum*	5	1

Bushy pondweed	*Najas flexilis*	2	2
Southern naiad	*Najas guadalupensis*	--	2
Yellow waterlily	*Nuphar variegata*	10	9
White waterlily	*Nymphaea odorata*	7	15
Curly-leaf pondweed	*Potamogeton crispus*	14	2
Illinois pondweed	*Potamogeton illinoensis*	5	6
Fries pondweed	*Potamogeton friesii*	--	2
Narrowleaf pondweed species	*Potamogeton sp.*	--	2
Flat-stem pondweed	*Potamogeton zosteriformis*	37	32
Arrowhead	*Sagittaria sp.*	--	1
Soft-Stem bulrush	*Schoenoplectus tabernaemontani*	1	3
Duckweed (greater)	*Spirodela polyrhiza*	--	2
Sago Pondweed	*Stuckenia pectinata*	1	--
Greater Bladderwort	*Utricularia vulgaris*	4	9
Water celery	*Valliseria americana*	3	15
Watermeal	*Wolffia sp.*	1	8

Table 2.3.5. SAV species occurrence by depth.

Common Name	% Occurrence by Depth							
	6/10/2020				7/30/2020			
	0-5	5-10	10-15	>15	0-5	5-10	10-15	>15
Coontail	75	25	4	--	77	27	--	--
Muskgrass	15	5	--	--	15	--	--	--
Waterweed (Canadian)	3	--	--	--	2	--	--	--
Water Star Grass	3	--	--	--	2	--	--	--
Duckweed (lesser)	4	--	--	--	20	--	--	--
Duckweed (star)	49	10	--	--	45	12	--	--
Northern watermilfoil	10	--	--	--	2	--	--	--
Bushy pondweed	3	--	--	--	5	--	--	--
Southern naiad	--	--	--	--	2	4	--	--
Yellow waterlily	19	--	--	--	32	--	--	--
White waterlily	13	--	--	--	17	--	--	--
Curly-leaf pondweed	16	35	--	--	3	4	--	--
Illinois pondweed	9	--	--	--	12	--	--	--
Fries pondweed	--	--	--	--	3	--	--	--
Narrowleaf pondweed species	--	--	--	--	2	4	--	--
Flat-stem pondweed	57	45	4	--	58	15	--	--
Arrowhead	--	--	--	--	2	--	--	--
Soft-Stem bulrush	2	--	--	--	5	--	--	--
Duckweed (greater)	--	--	--	--	5	--	--	--
Sago Pondweed	2	--	--	--	--	--	--	--
Greater Bladderwort	7	--	--	--	18	--	--	--
Water celery	6	--	--	--	32	--	--	--
Watermeal	2	--	--	--	17	--	--	--

In conclusion, species richness and FQI met the Central Hardwood Forest Ecoregion deep lake standards in both the spring and summer surveys, and the lake appears to be in good vegetative health with a good mix of native aquatic submerged, aquatic emergent, and floating leaf species. CLP was the only non-native species found during both surveys and appeared at a relatively moderate rate compared to other native SAV in the lake. Due to high recreational use on Eagle Lake, it is recommended to continually monitor the SAV community to detect any future negative changes to the plant community and to ensure the long term ecosystem and vegetative community health and continually provide recreational opportunities for citizens using the lake.

3.0 Pike Lake

3.1 INTRODUCTION & SAMPLING OVERVIEW

Pike Lake is located in Maple Grove within Hennepin County, MN. Upper Pike is classified as a shallow lake and has an approximate surface area of 57 acres, of which 55 are littoral (i.e., area less than 15 feet deep), and a maximum depth of 22 feet. The list below summarizes the year in which each type of sampling was most recently performed on Pike Lake:

- Water Quality - 2020
- SAV – 2020
- Phytoplankton/Zooplankton - 2020
- Fisheries – Not assessed
- Carp – Not assessed

3.2 WATER QUALITY

The lake was monitored once per month from late May through mid-September 2020 for a total of 11 samples. Surface TP and chlorophyll-*a* concentrations in Pike Lake were in good condition early in the season but declined in later summer and exceeded the eutrophication standards (Figure 3.2.1). Water clarity was consistently high throughout the entire monitoring season. Both surface TP and chlorophyll-*a* peaked during the last sampling of the season in mid-September, indicating an algae bloom related to phosphorus availability. TP samples taken from the hypolimnion were high throughout the monitoring season and indicate the potential of internal phosphorus loading from lake sediments (Figure 3.2.3).

Water quality in 2020 was comparatively good compared to historic data (Figure 3.2.2). Secchi depth was noticeably deeper in 2020 that recent years. TP and chlorophyll concentrations are historically at or slightly above the shallow lake standard. The most recent trend analysis shows a decreasing (improving) trend in Pike Lake TP concentrations (Wenck 2020).

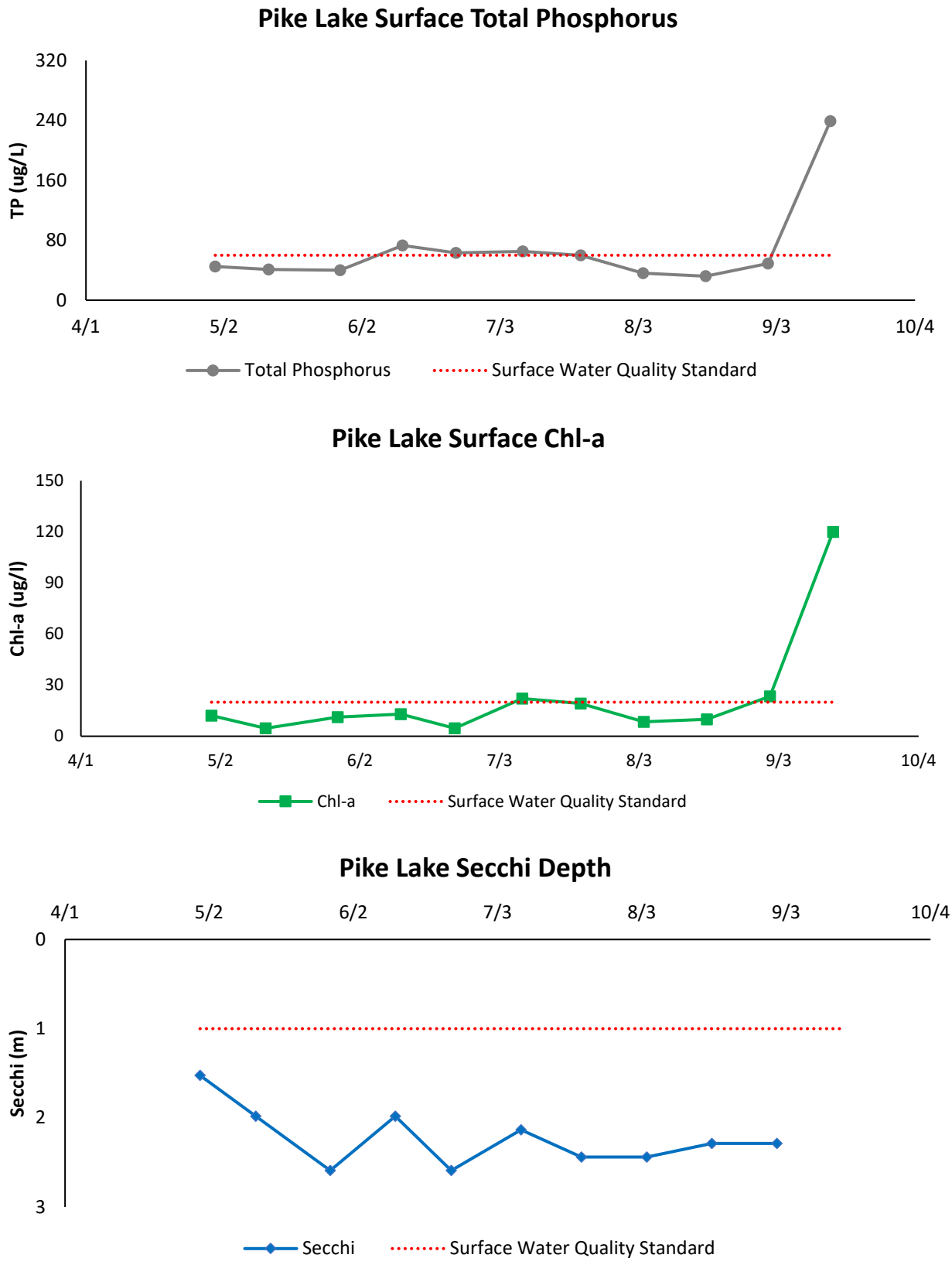


Figure 3.2.1. Seasonal TP, chl-*a*, and Secchi measurements and standards.

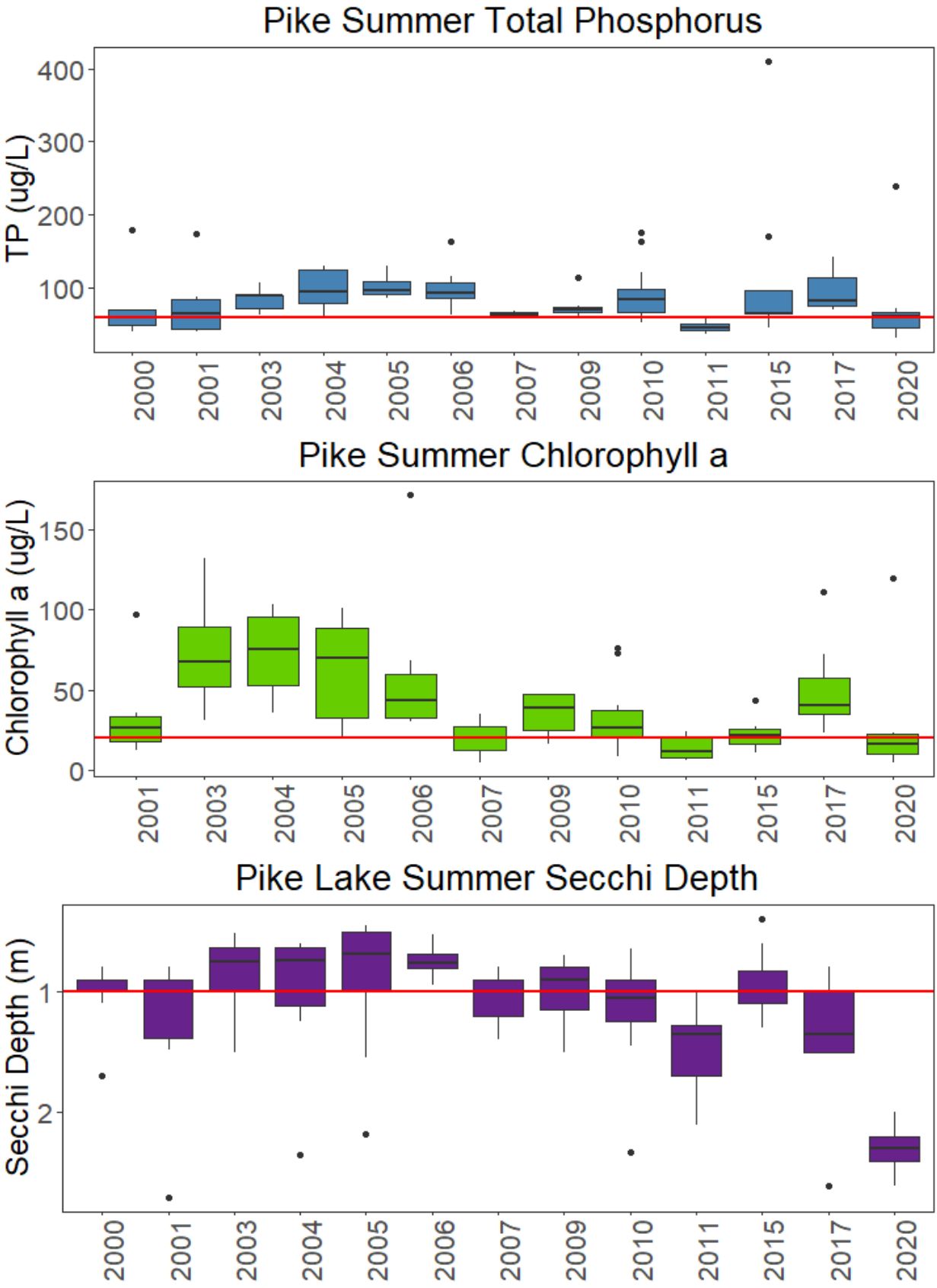


Figure 3.2.2. Annual growing season averages for total phosphorus, chlorophyll-*a*, and Secchi depth, with shallow lake standards in red for reference.

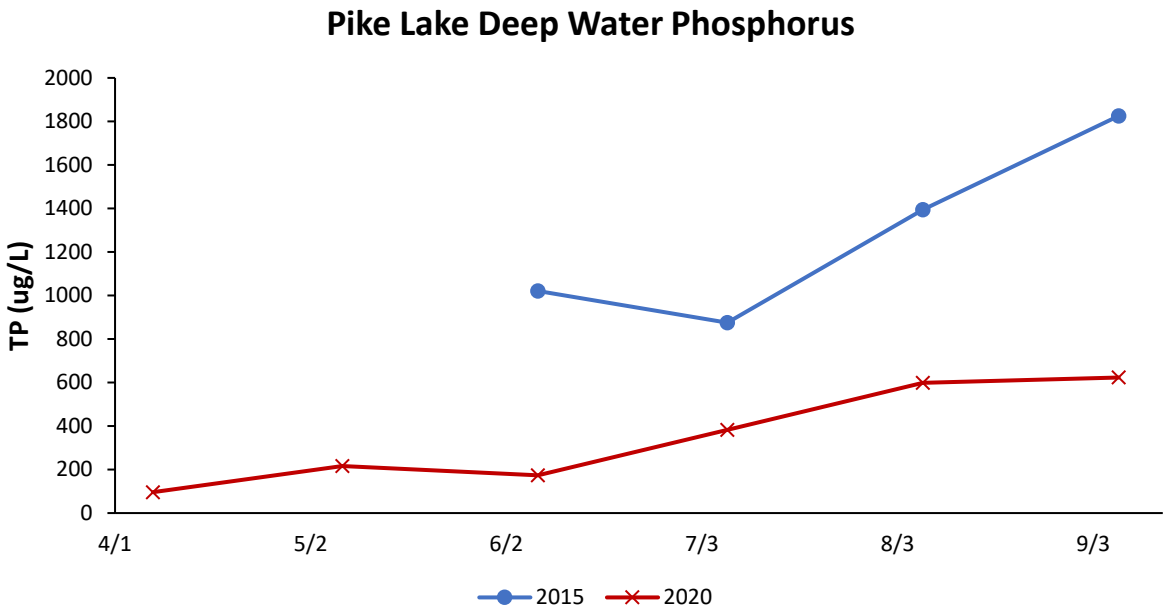


Figure 3.2.3. Pike Lake historic and 2020 total phosphorus concentrations in the hypolimnion.

3.3 PHYTOPLANKTON AND ZOOPLANKTON

Phytoplankton composition was measured for two samples in June and August 2020 to compare the relative percentages of each genera.

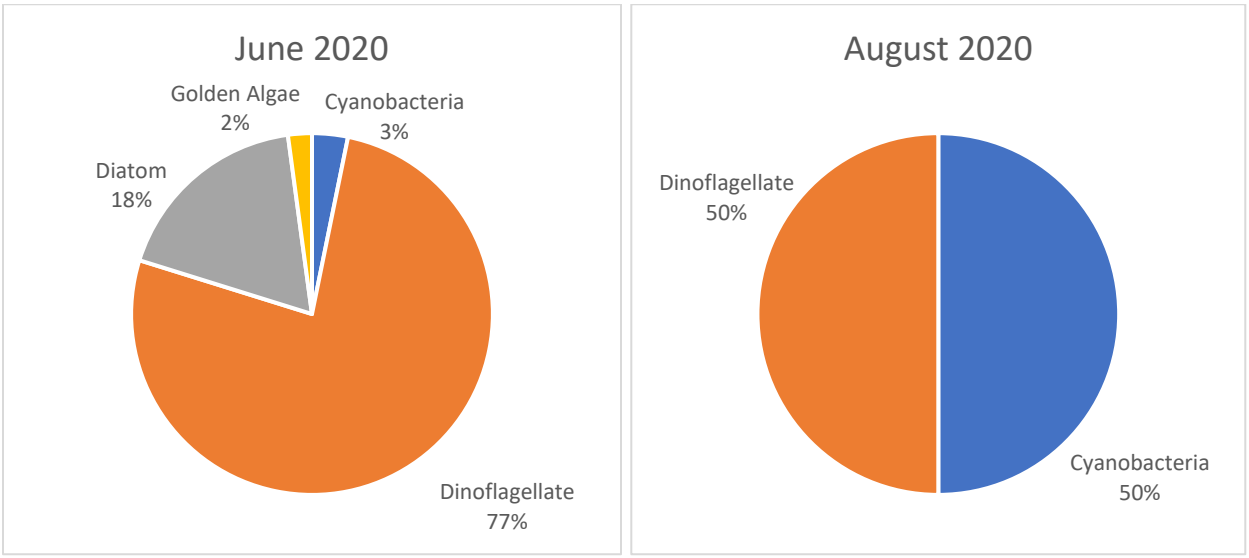


Figure 5.3.1: Phytoplankton relative percentage from June and August 2020.

Pike lake was dominated by the dinoflagellates and rotifers in June 2020. Rotifers are a great food sources and are indicative of lower nutrients and cooler waters. In August 2020, the sample had very low concentrations of phytoplankton with only a few rotifers and cyanobacteria present in equal abundance. The low concentration of rotifers compared to the June sample shows a collapse in the population, probably due to warmer temperatures.

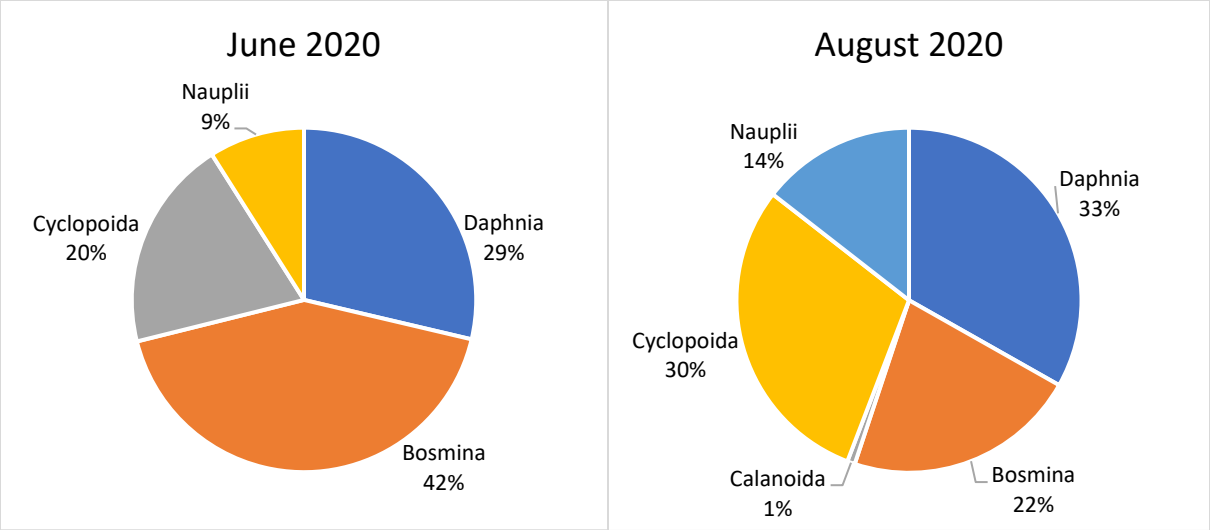


Figure 5.3.2: Zooplankton relative percentage from June and August 2020.

Pike Lake was dominated by bosmina and daphnia in June and saw a slight increase in daphnia and cyclopoida going into August. The balance of zooplankton in the late season indicates a plentiful food source even if the food is mostly cyanobacteria and dinoflagellate, such that there is less competition among groups.

3.4 SUMERGED AQUATIC VEGETATION

Point intercept aquatic vegetation surveys were conducted on June 16, 2020 and August 12, 2020 to document the spring and summer submersed aquatic vegetation in Pike Lake. (These surveys will be referred to as the spring and summer surveys.) During the spring survey, the lake had 58% vegetative cover, with 60 of the 106 survey points containing vegetation. The lake had similar vegetative cover during the summer survey, with 58% vegetative coverage, or 63 of 108 survey points covered in vegetation (Table 3.3.1). Pike lake is classified as a shallow lake and is mostly littoral, with 55 of its 57 acres in the littoral zone (i.e., in water less than 15 feet deep).

Table 3.3.1. Survey statistics.

Index	Result	
	6/16/2020	8/12/2020
Total Points	106	108
Littoral Points	103	105
Total Vegetated Points	60	63
% Littoral Points with Vegetation	58%	58%

During both surveys, biovolume, or the volume of water occupied by vegetation, was highest in shallow areas (Figure 3.3.1). Biomass and species richness showed the same trend (Table 3.3.2). For instance, areas between 0 and 5 feet had more than three times the biomass than the areas at 10 to 15 feet (Table 3.3.2). Further, during the spring survey, 11 species were observed in 0 to 5 feet versus only four species in 10 to 10 feet (Table 3.3.2), during the summer survey species observations followed a similar trend with 11 species observed in 0 to 5 feet and five in depths of 10-15 feet (Table 3.3.2). Two species were discovered at a depth of 13.1 feet and none in depths greater than 15 feet during the spring survey, similarly in the summer survey two species were observed at a maximum depth of 12.6 feet. This is a natural trend due to light limitation. However, in

more pristine lakes with greater clarity, this transition is more gradual, with light reaching depths greater than 15 feet, and consequently vegetation growing in these greater depths.

Table 3.3.2. Comparison of community composition with depth.

Depth (ft.)	Lake Acres (acres)	6/16/2020				8/12/2020			
		Sample points at this depth (#/%)		Species Observed (#)	Biomass (kg)	Sample points at this depth (#/%)		Species Observed (#)	Biomass (kg)
0-5 ft.	112	15	14	11	103,582	39	36	11	38,576
5-10 ft.	36	43	41	11	65,456	25	23	9	44,364
10-15 ft.	49	45	42	4	8,385	41	3	5	12,464
>15 ft.	100	3	3	0	0	3	3	0	0

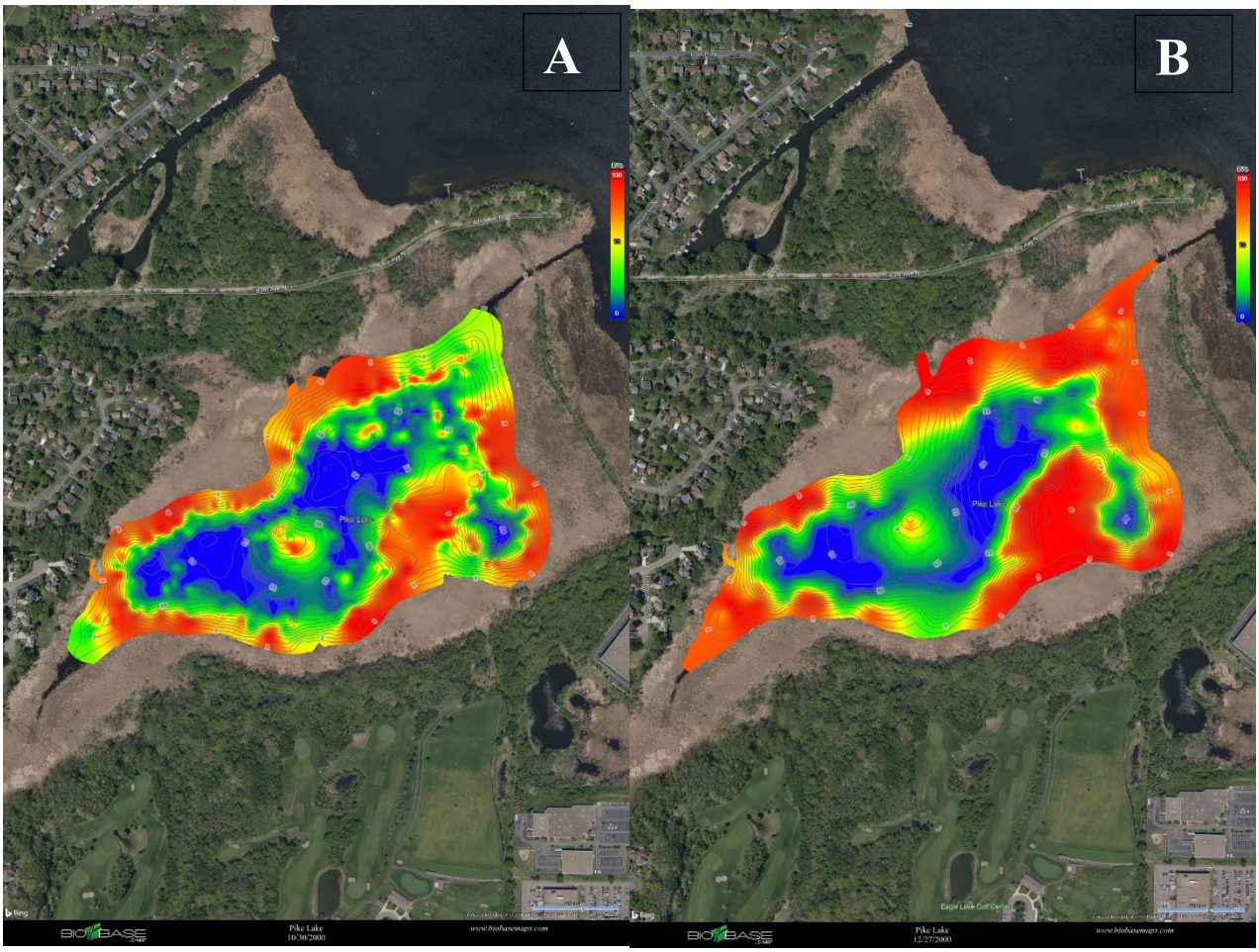


Figure 3.3.1. Biovolume heat maps for Pike Lake during the June (A) and July (B) 2020 surveys. In the heatmaps, red indicates 100% biovolume and blue indicates 0% biovolume. Biovolume refers to the percentage of the water column taken up by vegetation.

Pike Lake's June survey showed that the lake has good diversity, with 12 observed taxa, a C-score of 4.75, and an FQI of 16.5 (Table 3.3.3). While the taxa surpassed the standard, the FQI value still fell slightly short of the Central Hardwood Forest Ecoregion shallow lake standards, which require an FQI of 17.8. Coontail was a dominant species during the June survey with an observed occurrence of 55% (Table 3.3.4). Coontail is native but thrives in eutrophic waters and often grows in undesirable, monodominant stands. It was also one of only four species observed at depths greater than 10 feet (Table 3.3.5). Desirable native plants were established throughout the lake, such as flat stem pondweed (24% occurrence), white water lily (13% occurrence) and floating leaf species, lesser duckweed (21% occurrence) and watermeal (21% occurrence). Waterweed, both Eurasian and northern water milfoil, sago pondweed, star duckweed, and yellow water lily were rarely observed, with occurrences at less than 9% of the survey locations (Table 3.3.4). Even though several species were observed rarely, it is encouraging to see high species diversity. Curly-leaf pondweed (CLP), a non-native species that is detrimental to other vegetation and water quality. CLP had an occurrence of 19% throughout the lake and was the only invasive species observed in Pike Lake during either survey (Table 3.3.4).

Table 3.3.3. Species diversity statistics.

Index	Result*	
	6/16/2020	8/12/2020
Observed Taxa	12	12
Average C-score	4.75	5.41
Lake Floristic Quality Index (FQI)	16.5*	18.8*

*The standards for number of taxa and FQI in Pike Lake are 11 and 17.8, respectively.

During the summer survey both species richness and FQI slightly exceeded the Central Hardwood Forest Ecoregion standards, which require 11 observed taxa and an FQI of 17.8. The survey found 12 observed taxa, a C-score of 5.41, and an FQI of 18.8 (Table 3.3.3). A greater number of native species were observed in the summer as well as no observations of non native species. Interestingly, coontail remained the single dominant species in the summer survey at 57% occurrence. Non rooted and floating plants had the next highest occurrences in the lake with watermeal occurring at 33% of the sample points, lesser duckweed occurring at 31% of the points and star duckweed occurring at 28% of the sample points. Other prevalent species were, white water lily, and flat stem pondweed, which ranged in occurrence from 17% to 23% and are both favorable (Table 3.3.4). Muskgrass, waterweed, Eurasian and northern water milfoil, yellow waterlily, and greater bladderwort were observed to be rare during this survey (<10% occurrence) (Table 3.3.4). As expected, CLP was not observed in the summer survey, because it senesces after spring. That said, it is encouraging that in the absence of CLP, favorable native plants are able to persist in high occurrences.

Table 3.3.4. Species occurrence during 2020 surveys.

Common Name	Scientific Name	% Lake Occurrence	
		6/16/2020	8/12/2020
Curly-leaf pondweed	*Potamogeton crispus*	19	--
Muskgrass	*Chara sp.*	--	2
Coontail	*Ceratophyllum demersum*	55	57
Waterweed (Canadian)	*Elodea canadensis*	7	6
Northern Water Milfoil	*Myriophyllum sibiricum*	1	1
Eurasian Water Milfoil	*Myriophyllum spicatum*	3	3
White Waterlily	*Nymphaea odorata*	13	23
Yellow Waterlily	*Nuphar variegata*	8	6
Duckweed (star)	*Lemna trisulca*	9	28
Duckweed (lesser)	*Lemna minor*	21	31
Flat-stem pondweed	*Potamogeton zosteriformis*	24	17
Sago Pondweed	*Stuckenia pectinata*	2	--
Greater Bladderwort	*Utricularia vulgaris*	--	1
Watermeal	*Wolffia sp.*	21	33

Table 3.3.5. SAV species occurrence by depth.

Common Name	% Occurrence by Depth							
	6/16/2020				8/12/2020			
	0-5	5-10	10-15	>15	0-5	5-10	10-15	>15
Curly-leaf pondweed	40	30	2	--	--	--	--	--
Muskgrass	--	--	--	--	3	4	--	--
Coontail	87	84	20	--	92	84	12	--
Waterweed (Canadian)	27	7	--	--	13	4	--	--
Northern Water Milfoil	--	2	--	--	3	--	--	--
Eurasian Water Milfoil	7	5	--	--	8	--	--	--
White Waterlily	47	16	--	--	62	4	--	--
Yellow Waterlily	7	16	--	--	15	--	--	--
Duckweed (star)	20	12	2	--	56	24	5	--
Duckweed (lesser)	53	33	--	--	72	16	2	--
Flat-stem pondweed	53	35	4	--	23	27	5	--
Sago Pondweed	13	--	--	--	--	--	--	--
Greater Bladderwort	--	--	--	--	--	4	--	--
Watermeal	53	33	--	--	77	20	2	--

In conclusion, both species richness and FQI slightly surpassed the Central Hardwood Forest Ecoregion shallow lake standards during the summer survey, and the spring vegetation community nearly met the standards coming close with 12 observed taxa compared to the standard of 11 and an FQI of 16.5 compared to the standard of 17.8. It appears that Pike lake is at a very stable point

currently, with not much change between the spring and summer surveys and with both surveys meeting or nearly meeting the shallow lake standards. In addition, the CLP abundance is relatively low and sensed by late summer, and it does not appear to be causing any major impairments to water quality or recreation.

4.0 Bass Lake

4.1 INTRODUCTION & SAMPLING OVERVIEW

Bass Lake is located in the city of Plymouth within Hennepin County, MN. Bass Lake is classified as a shallow lake and has an approximate surface area of 176 acres, 148 acres of littoral area (i.e., area less than 15 feet deep), 3.2 miles of shoreline, and a maximum depth of 31 feet. The list below summarizes the year in which each type of sampling was most recently performed on Bass Lake:

- Water Quality – 2020
- Phytoplankton/Zooplankton - 2020
- SAV – 2019
- Fisheries - 2017
- Carp – 2017

Bass Lake received an alum treatment on May 15, 2019 to mitigate internal phosphorus loading (Figures 4.1.1 and 4.1.2). Alum was applied to a 35-*a*cre area of the lake that consisted of all parts of the lake 14 feet and deeper. Alum was applied at 789 gallons/acre. The second alum treatment occurred in September 2020 following the monitoring season. Alum was applied at the same dose as in 2019.

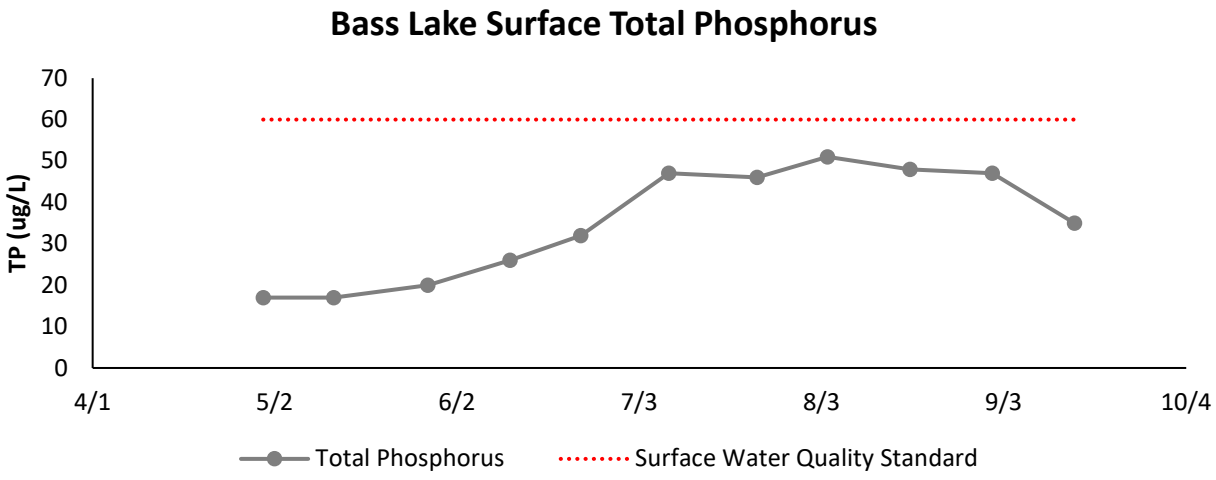
Figure 4.1.1. A barge applies alum to Bass Lake.

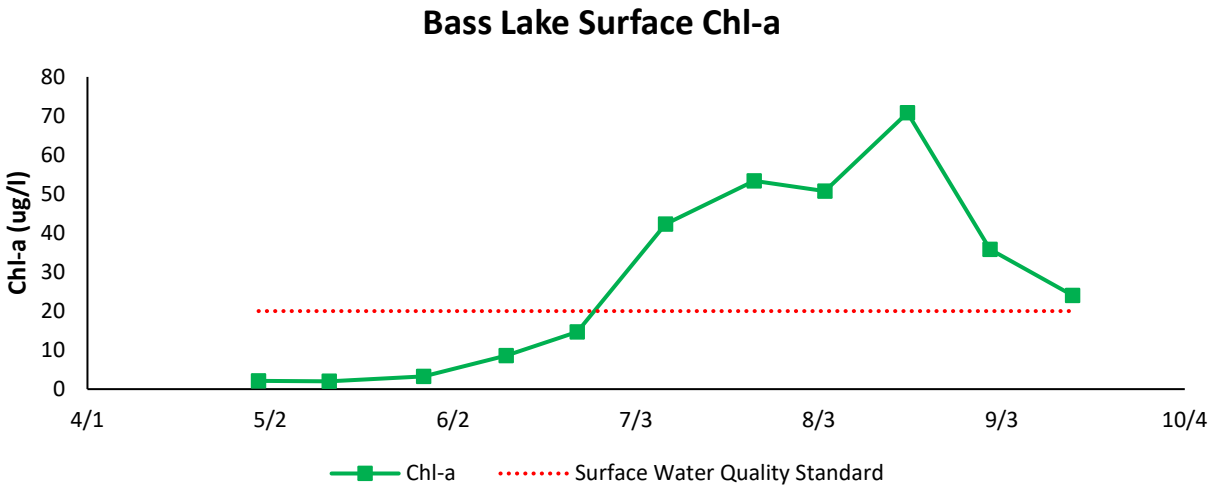
Figure 4.1.2. The alum application barge.

4.2 WATER QUALITY

Water was collected twice per month from early May through mid-September in 2020 for a total of 11 sampling events. Surface TP in Bass Lake remained below the shallow lake standard during the entire monitoring season in 2020 (Figure 4.2.1). Chlorophyll-*a* concentrations and Secchi depth declined in mid-summer and exceeded the eutrophication standards, indicating a mid-summer algae bloom. Chlorophyll-*a* and Secchi depth were beginning to improve during the last lake sampling in mid-September.

Water quality in Bass Lake has exceeded eutrophication standards historically; however, there appears to be a significant impact of the 2019 alum treatment on water quality. The most recent trend analysis on Bass Lake showed a decreasing (improving) trend in TP concentrations (Wenck 2020). TP samples taken from the hypolimnion in 2020 remained low throughout the monitoring season, similar to 2019 monitoring data, indicating the efficacy of the 2019 alum treatment (Figure 4.2.3). The Bass Lake inlet monitored by Three Rivers Parks shows high TP concentrations, suggesting that there may still be a significant watershed load of P to the lake (Figure 4.2.4).





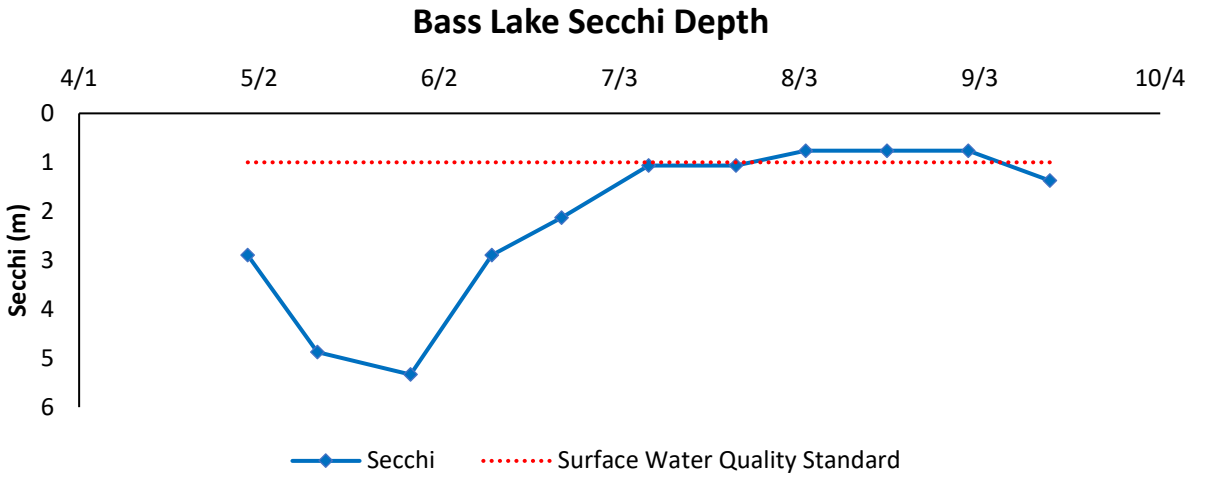


Figure 4.2.1. Seasonal TP, chl-*a*, and Secchi measurements and standards.

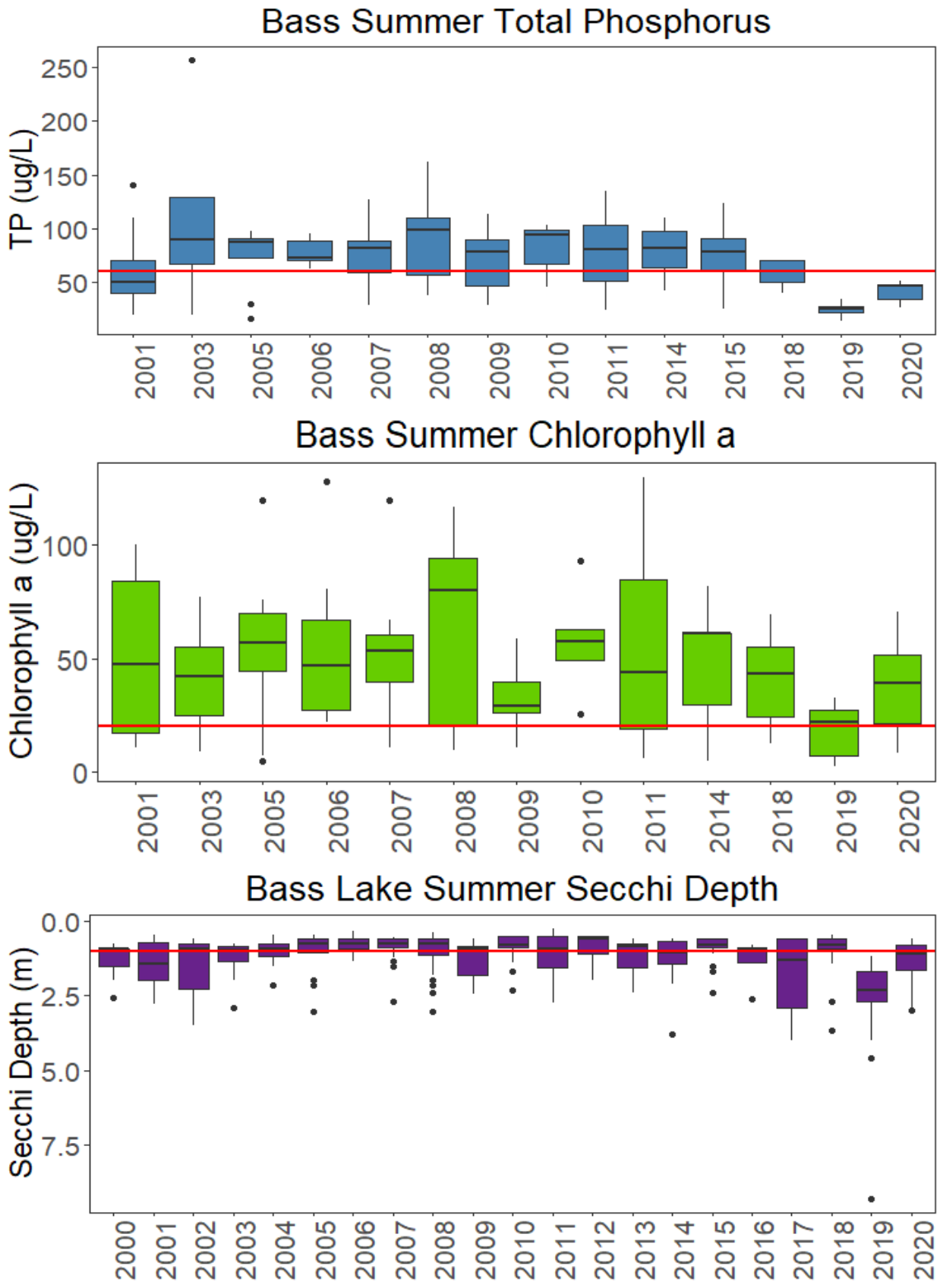


Figure 4.2.2. Annual growing season averages for total phosphorus, chlorophyll-*a*, and Secchi depth, with shallow lake standards in red for reference.

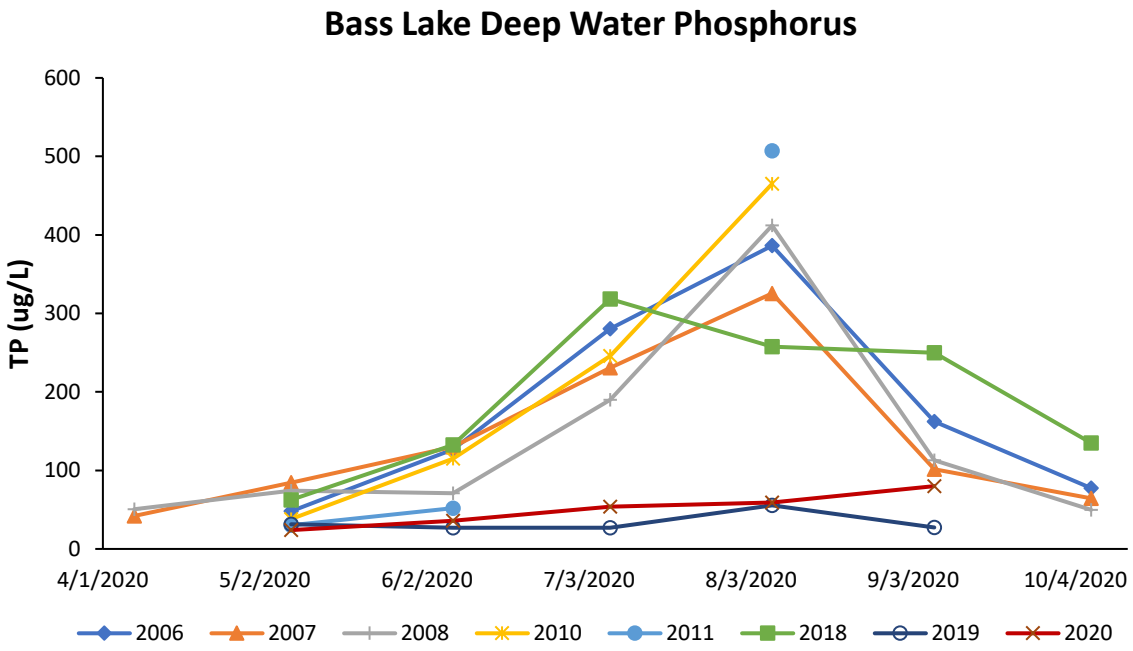


Figure 4.2.3. Hypolimnetic (deep) total phosphorus (TP) throughout the summer in several years from 2006 to 2020. Due to alum inactivation of sediment, in 2019 and 2020, phosphorus does not appear to accumulate in the hypolimnion over the summer.

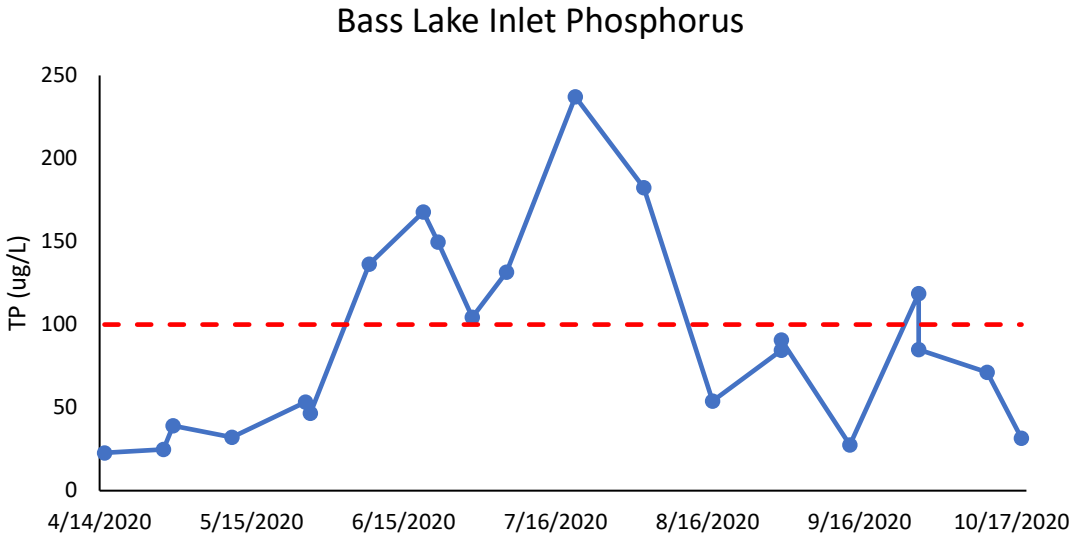


Figure 4.2.4. Total phosphorus (TP) throughout the summer at sampling station BL3, an inlet to Bass Lake (data was collected by Three Rivers Park District).

4.3 PHYTOPLANKTON AND ZOOPLANKTON

Phytoplankton composition was measured for two samples in June and August 2020 to compare the relative percentages of each genera.

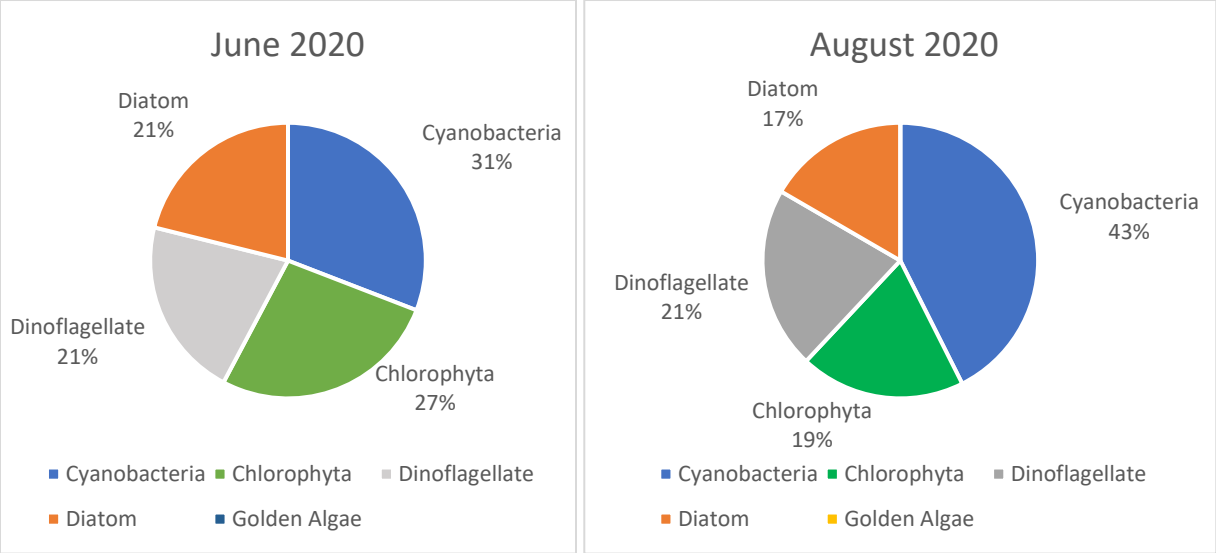


Figure 4.3.1: Phytoplankton relative percentage from June and August 2020.

In June 2020, there was an even distribution of all of the phytoplankton genera which is indicative of a healthy food chain. With the warmer water temperature in August, there is a slight shift in the relative percentages of diatoms and green algae to a slight dominance of cyanobacteria. This is a typical composition shift as cyanobacteria are more competitive in warmer water but is not indicative of a cyanobacteria bloom.

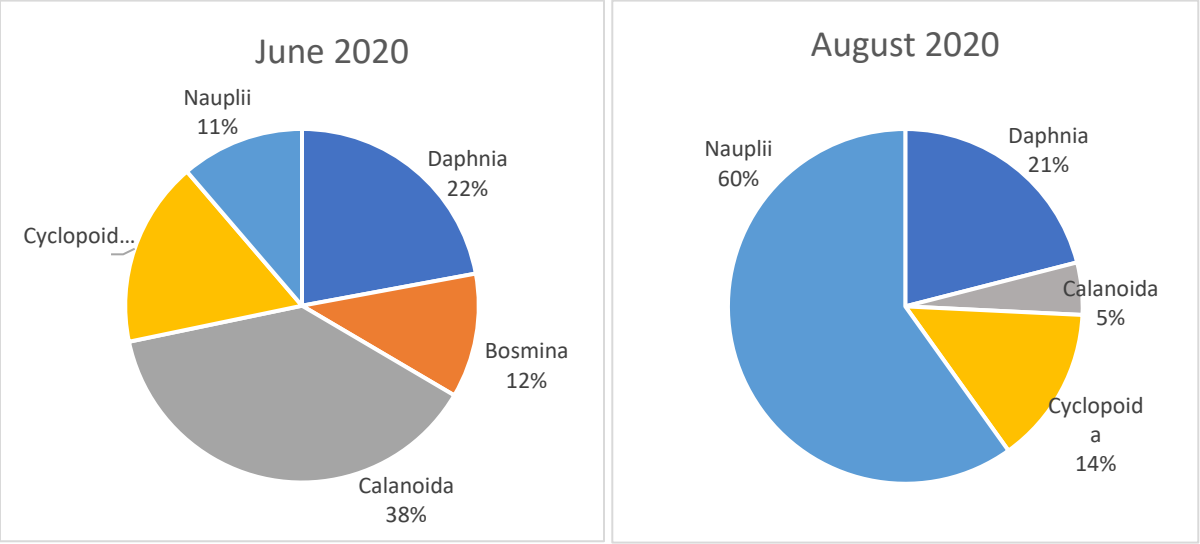


Figure 4.3.1: Zooplankton relative percentage from June and August 2020.

In June 2020, Calanoids were the predominate zooplankton in Bass lake. However, as the summer progressed Nauplii became the dominate species at 60%. Nauplii are the egg stage of many species of zooplankton. The large percentage of the egg stage may indicate that the timing or location of sampling occurred after a fresh hatch.

4.4 SUBMERSED AQUATIC VEGETATION

A point-intercept aquatic vegetation survey was not conducted on Bass Lake during the 2020 monitoring season. However, in an ongoing effort to combat curly leaf pondweed (CLP) a CLP delineation was conducted on April 16, 2020 to document and determine the extent of CLP in Bass lake and consider future management options (Figure 4.4.1). Three distinct treatment areas were delineated and treated.

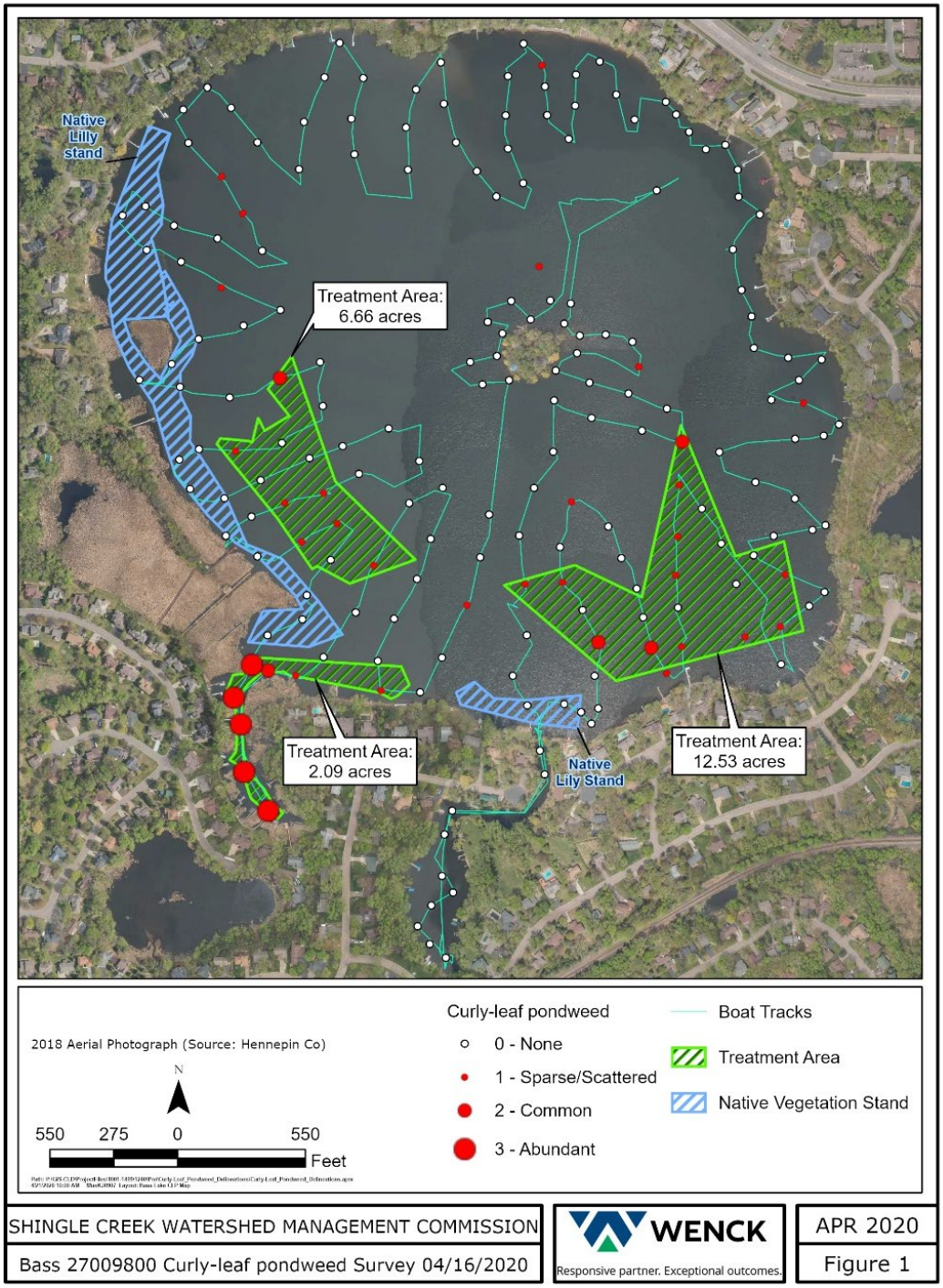


Figure 4.4.1: 2020 Bass Lake CLP Delineation

5.0 Pomerleau Lake

5.1 INTRODUCTION & SAMPLING OVERVIEW

Pomerleau Lake is located in the city of Plymouth within Hennepin County, MN. Pomerleau Lake is classified as a deep lake and has an approximate surface area of 30.5 acres, 21 acres of littoral area (i.e., area less than 15 feet deep), 0.78 miles of shoreline, and a maximum depth of 26 feet. The list below summarizes the year in which each type of sampling was most recently performed on Pomerleau Lake:

- Water Quality – 2020
- Phytoplankton/zooplankton – 2020
- SAV – 2019
- Fisheries – 2004
- Carp – 2018

Pomerleau Lake also received an alum treatment on May 13, 2019 to mitigate internal loading (Figure 5.1.1). Alum was applied to a 14-*a*cre area of the lake seven feet and deeper. Alum was applied at 1,374 gallons/acre. Pomerleau Lake received a second dose of alum in September 2020 following the monitoring season. Alum was applied to the same area and at the same dose as in 2019.

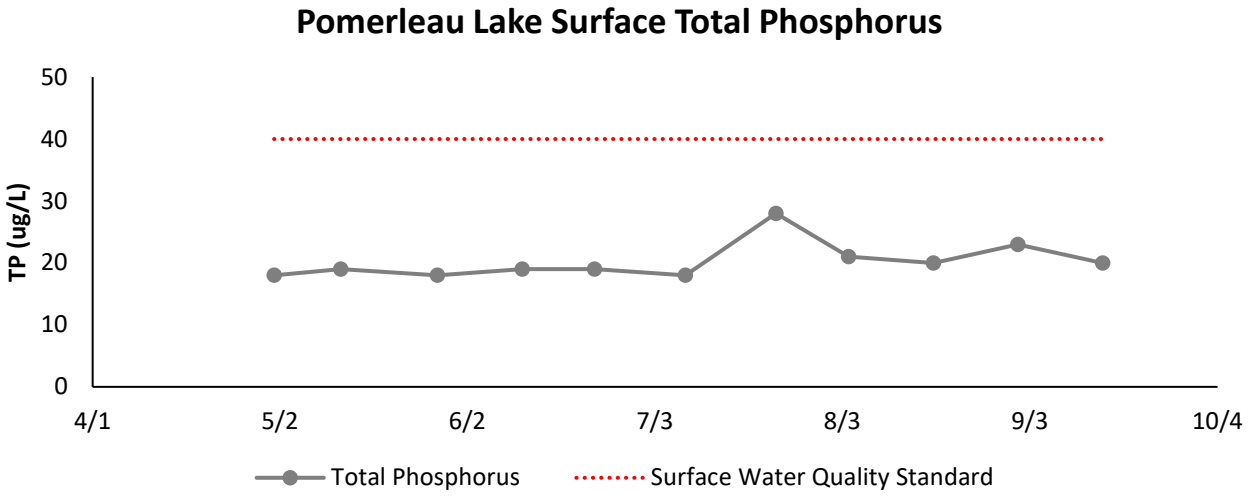
Figure 5.1.1. Photos from the alum treatment on Pomerleau Lake in May 2019.

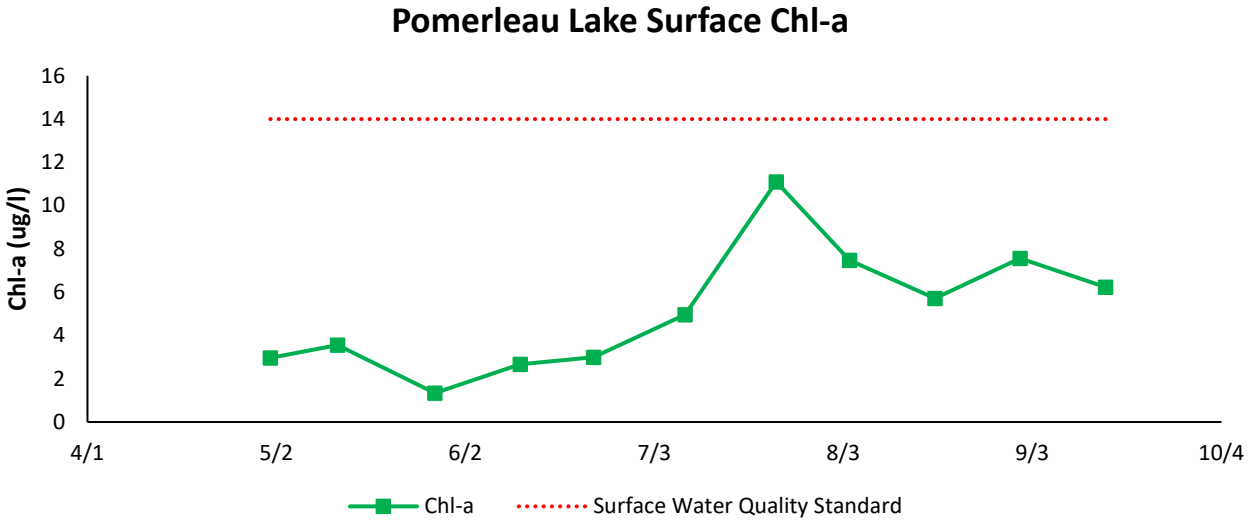
5.2 WATER QUALITY

Water quality was monitored twice per month from early May through mid-September in 2020for a total of 11 samples. Likely as a result of the May 2019 alum treatment, water quality was still substantially improved from past summers. All three eutrophication standards (total phosphorus, chlorophyll-*a*, and Secchi depth) were met throughout the growing season; not a single data point exceeded standards (Figure 5.2.1).

Historic data show that eutrophication standards have generally not been met, although water quality has appeared to improve in recent years, with 2017-2020 growing season surface water averages generally meeting standards (Figure 5.2.2). Although 2017 and 2018 water quality were already improved compared to past seasons it is clear, based on hypolimnetic (deep) total phosphorus data, that the May 2019 alum

treatment was the likely cause of the improved water quality in 2019. Whereas in past years, hypolimnetic total phosphorus concentrations increased throughout the season—a signature of internal loading from sediments—in 2019, hypolimnetic phosphorus concentrations did not increase (Figure 5.2.3). Hypolimnetic P remained low in 2020. This is a sign that alum inactivated sediment phosphorus and prevented it from getting released into the water column, where it could mix into surface waters and cause algae blooms.





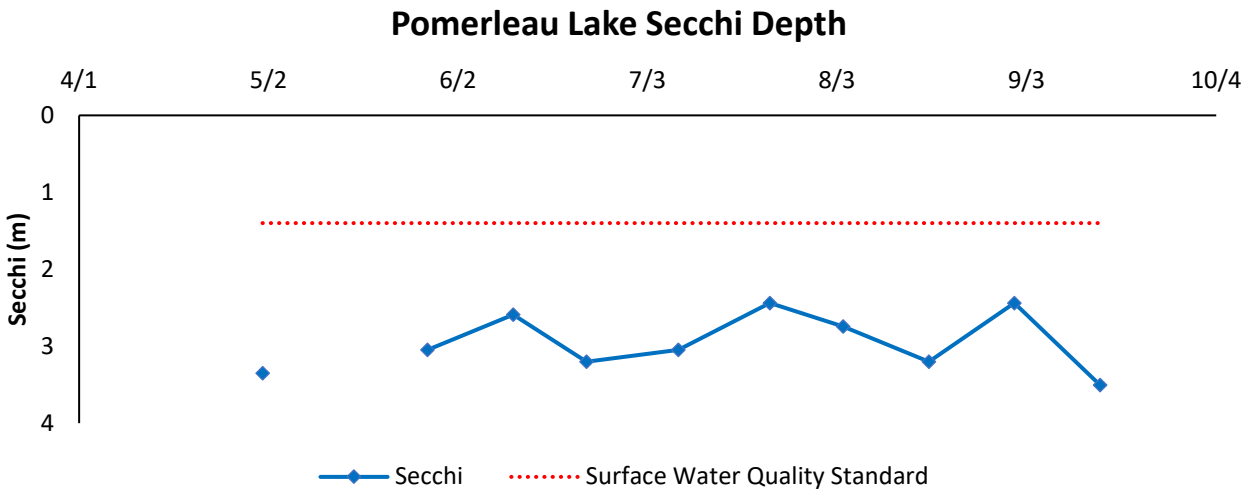


Figure 3.2.1. Seasonal TP, chl-*a*, and Secchi measurements and standards.

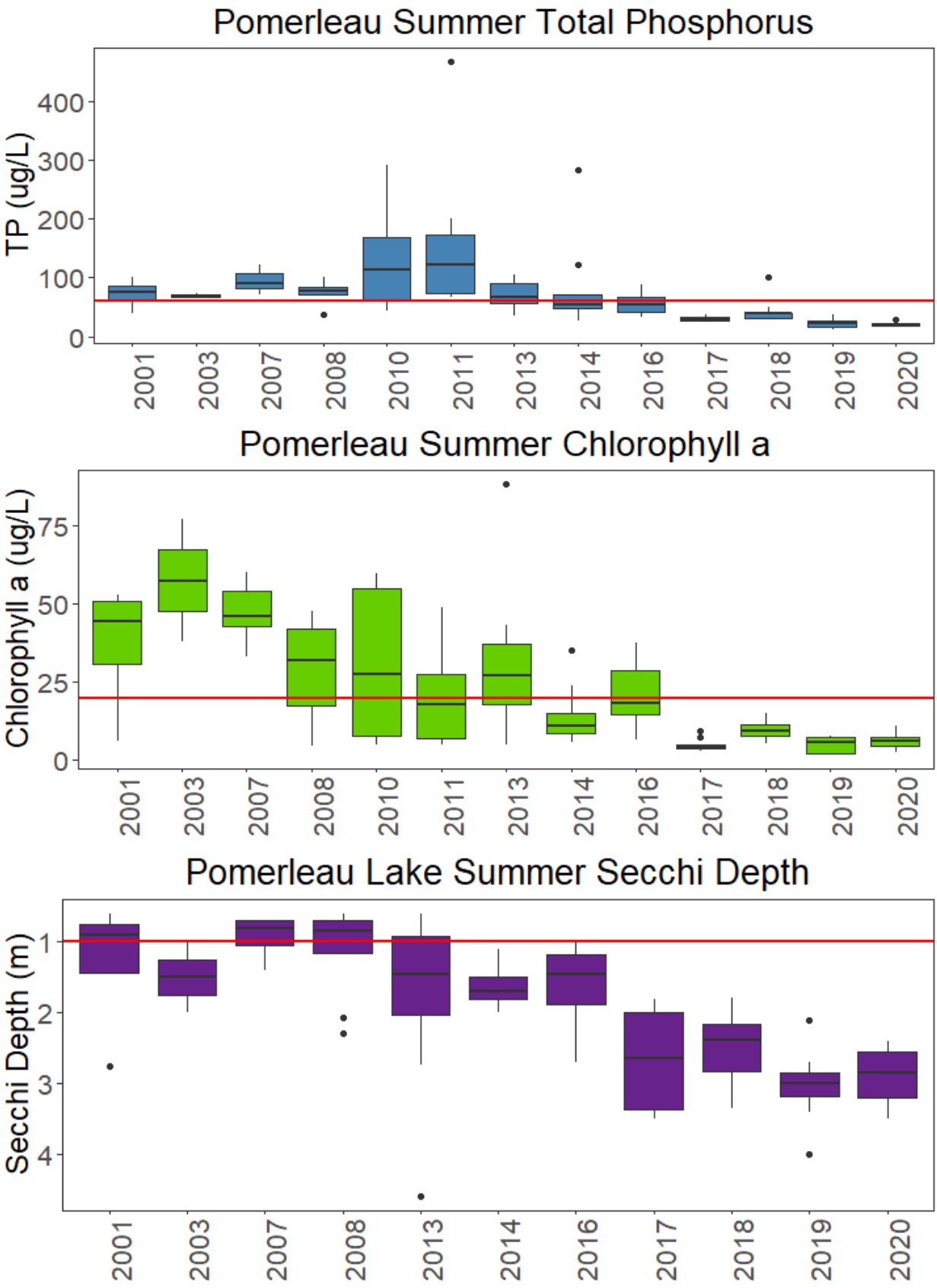


Figure 5.2.2. Annual growing season averages for total phosphorus, chlorophyll-*a*, and Secchi depth, with shallow lake standards in red for reference.

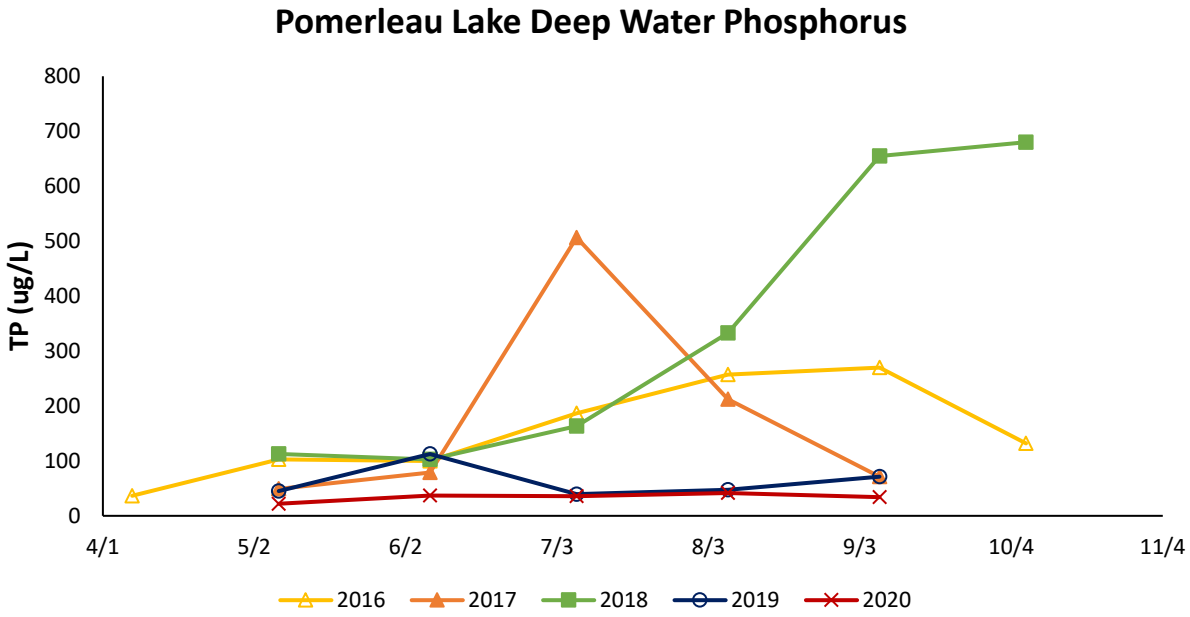


Figure 5.2.3. Hypolimnetic (deep) total phosphorus (TP) throughout the summer in 2016 through 2020. Due to alum inactivation of sediment, in 2019 and 2020, phosphorus does not appear to accumulate in the hypolimnion over the summer.

Figure 5.2.4. Wenck staff using a Van Dorn sampler to pull a hypolimnetic (deep) water sample from Pomerleau Lake on 7/30/19.

5.3 PHYTOPLANKTON AND ZOOPLANKTON

Phytoplankton and zooplankton composition was measured for two samples in June and August 2020 to compare the relative percentages of each genera.

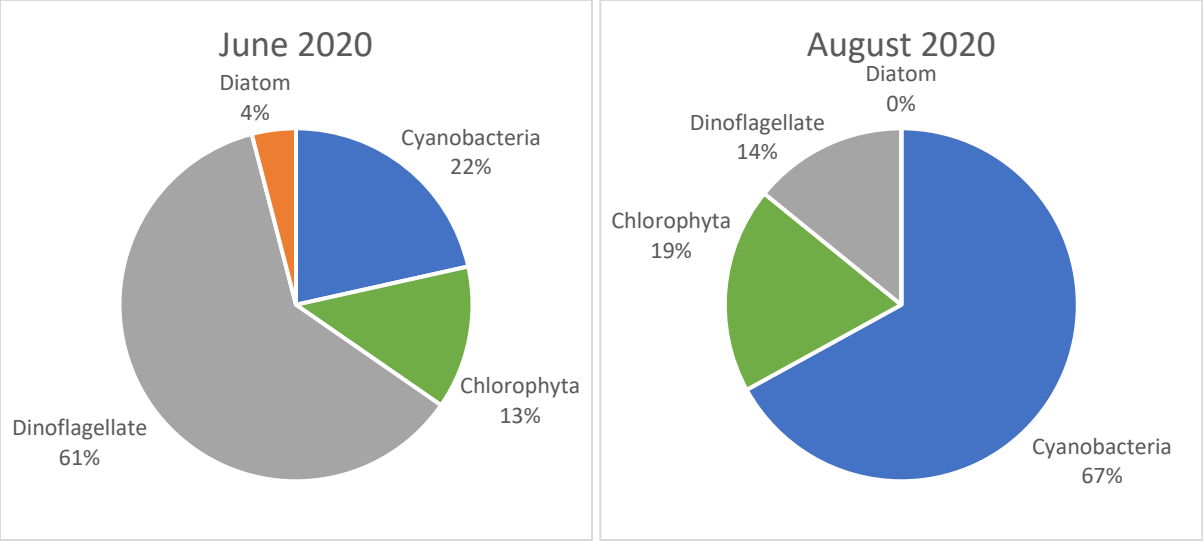


Figure 3.3.1: Phytoplankton relative percentage from June and August 2020.

Pomerleau lake experienced a shift in phytoplankton dominance from dinoflagellates that are competitive in cooler lower nutrient water to cyanobacteria that dominate in warm nutrient rich waters. Dominance of dinoflagellates are advantageous for fish and zooplankton. However, 67% dominance of cyanobacteria can be indicative of a HAB.

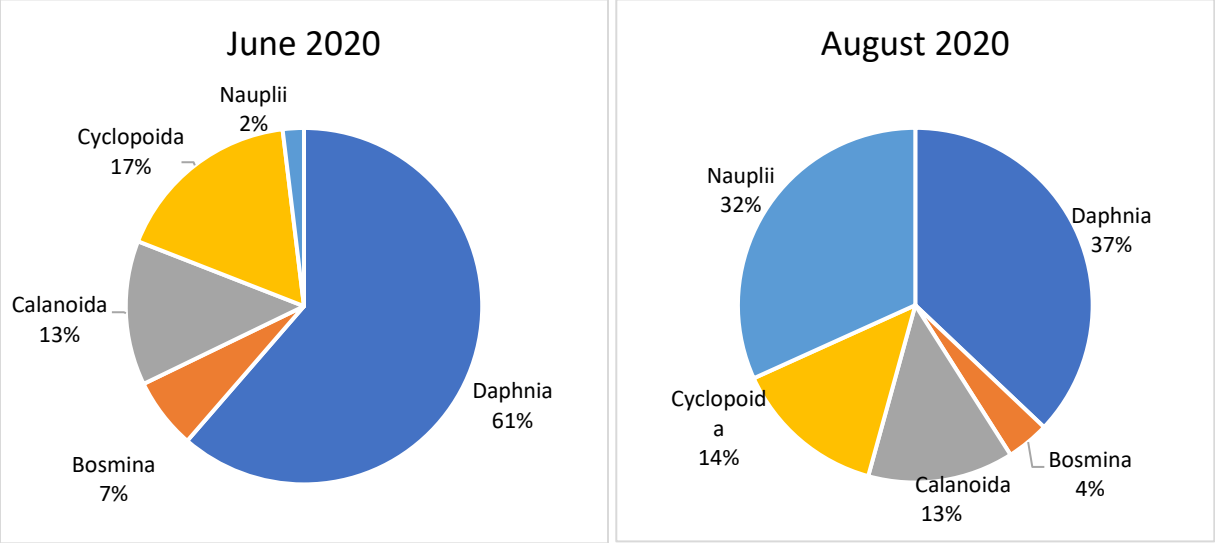


Figure 3.3.2: Zooplankton relative percentage from June and August 2020.

In June, Daphnids started out as the predominate species in Pomerleau which tends to be typical in early season when food is abundant, and predation is low. As the summer progresses Nauplii (egg stage zooplankton) become more predominate indicating the reproductive health is good. The egg stage also does not feed and therefor can survive easier than feeding stages of zooplankton when the food source is poor - like the cyanobacteria seen predominate in August.

5.4 SUBMERSED AQUATIC VEGETATION

A point-intercept aquatic vegetation survey was not conducted on Pomerleau Lake during the 2020 monitoring season. However, in an effort to continually monitor curly leaf pondweed (CLP) a CLP delineation was conducted on April 15, 2020 to document and determine the extent of CLP in Pomerleau lake and provide data to guide future management options (Figure 5.4.1).

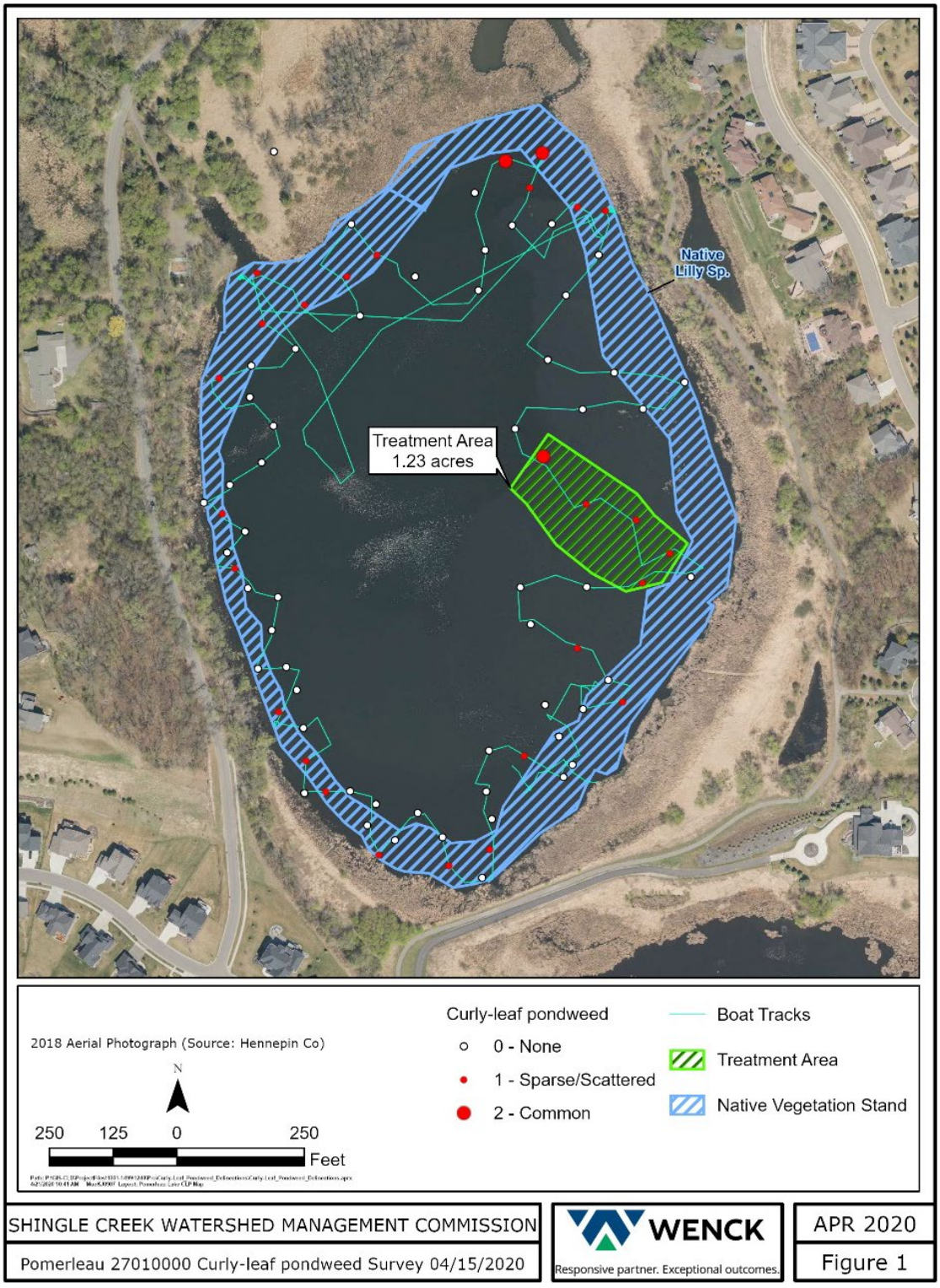


Figure 5.4.1: Pomerleau Lake CLP Delineation.

6.0 Crystal Lake

6.1 INTRODUCTION & SAMPLING OVERVIEW

Crystal Lake is in Robbinsdale, MN within Hennepin County. Middle Twin Lake is classified as a deep lake and has an approximate surface area of 79 acres, 53 acres of littoral area (i.e., area less than 15 feet deep), an average depth of 9.8 feet, and a maximum depth of 39 feet. The list below summarizes the year in which each type of sampling was most recently performed on Crystal Lake:

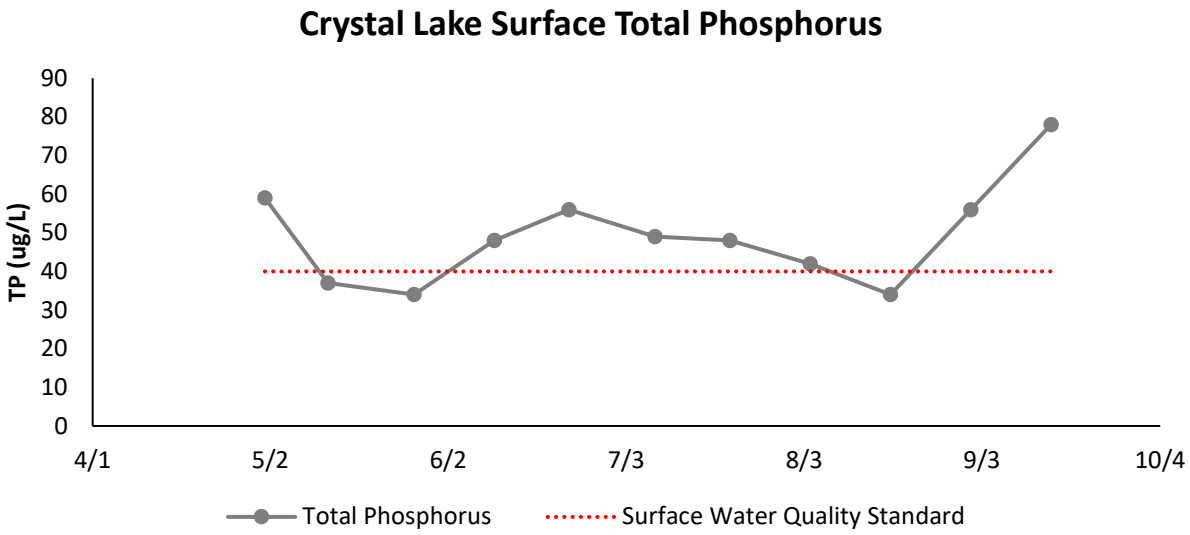
- Water Quality - 2020
- SAV – 2020
- Phytoplankton/Zooplankton - 2020
- Fisheries – not assessed
- Carp – 2020

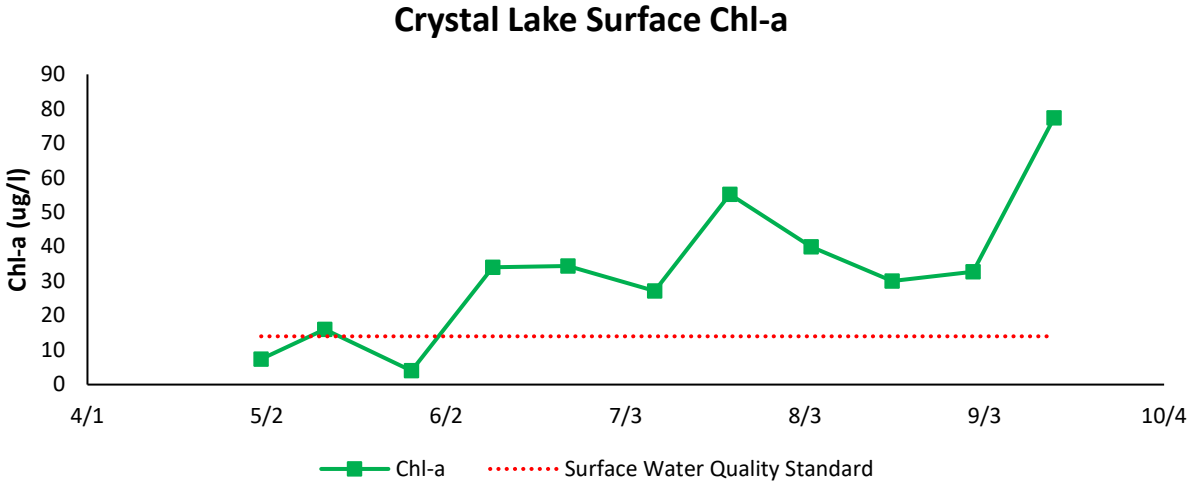
6.2 WATER QUALITY

The lake was monitored biweekly early May through mid-September in 2020 for a total of 11 samples. Crystal Lake water quality was generally poor, and exceed the eutrophication standards during most sampling events (Figure 6.2.1). Peak TP and chlorophyll concentrations occurred in mid-September indicating an algae bloom driven by the availability of phosphorus.

Historic water quality data from Crystal Lake show the lake generally does not meet the deep lake standards (Figure 6.2.2). Average monitoring season TP concentrations have been below the impairment threshold the last two years; however, chlorophyll and Secchi depth do not meet standards. Deep water phosphorus concentrations are higher than at the surface (Figure 6.2.3). In 2020, deep water TP concentrations peaked in August, indicating the release of phosphorus from lake sediments under low oxygen conditions. The most recent trend analysis done on Crystal Lake water quality data indicates an increasing (degrading) trend in TP concentrations.

An alum application planned for 2021 will help address the lake's internal loading and help improve water clarity.





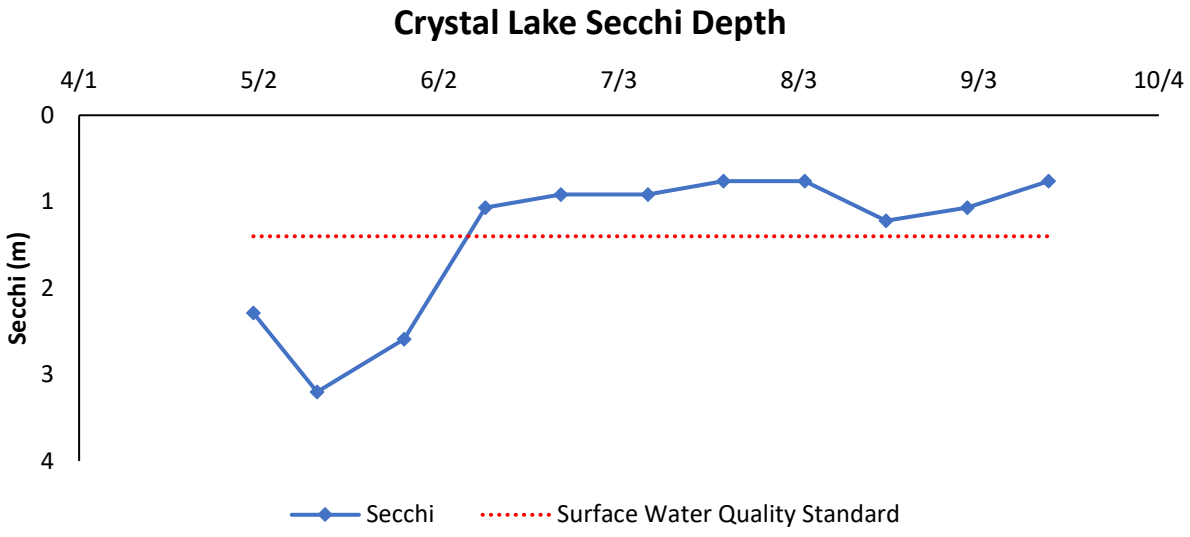
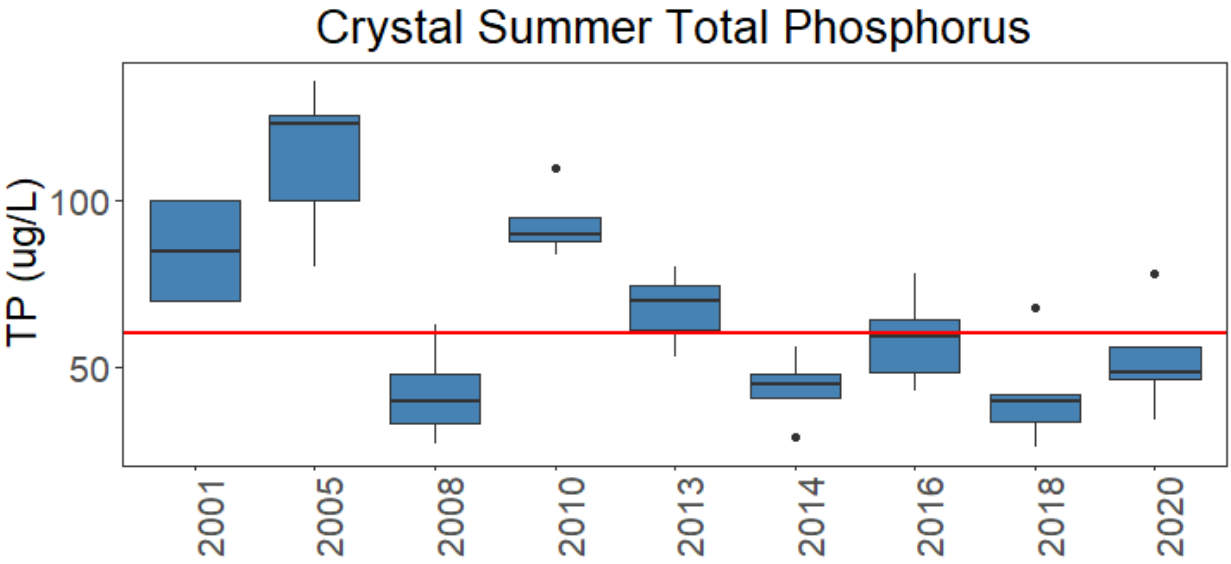
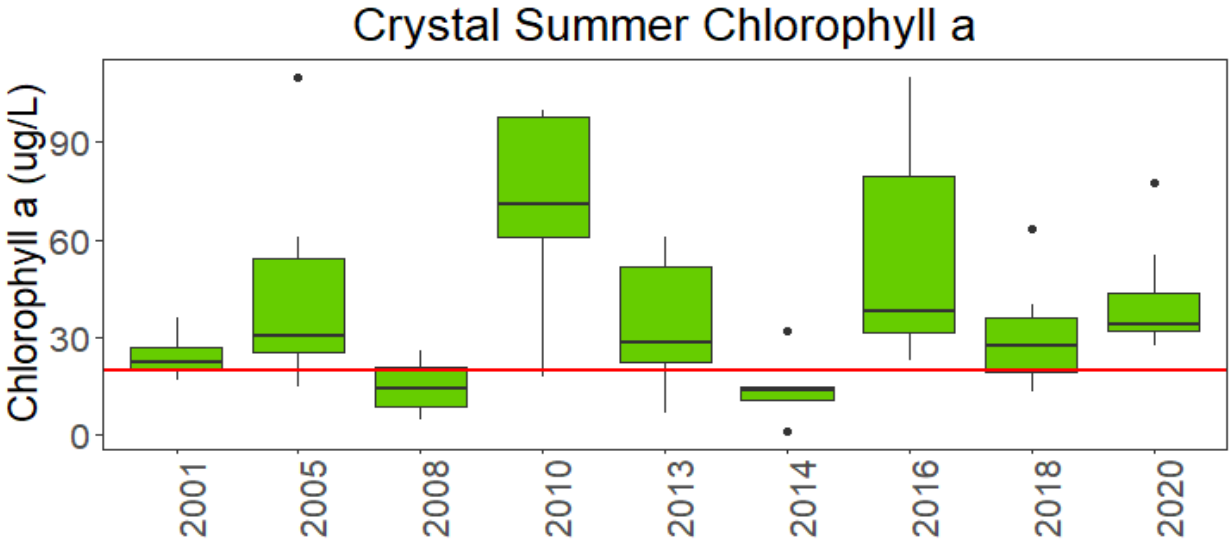


Figure 6.2.1. Seasonal TP, chl-*a*, and Secchi measurements and standards.


Crystal Summer Total Phosphorus
TP (ug/L)
100
50
2001
2005
2008
2010
2013
2014
2016
2018
2020


Crystal Summer Chlorophyll a
Chlorophyll a (ug/L)
90
60
30
0
2001
2005
2008
2010
2013
2014
2016
2018
2020

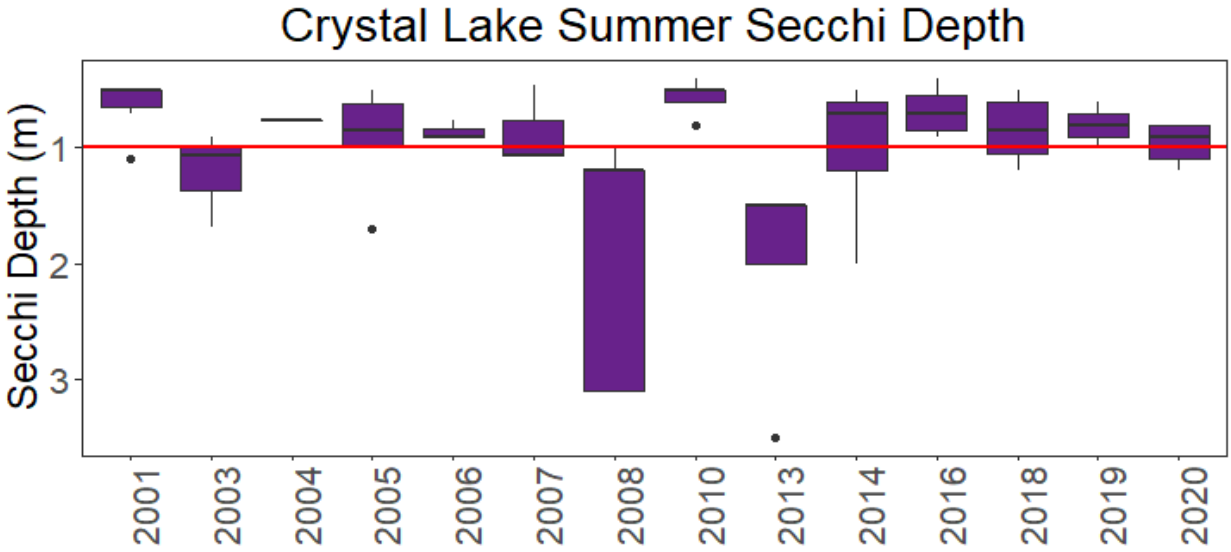

Crystal Lake Summer Secchi Depth
Secchi Depth (m)
1
2
3
2001
2003
2004
2005
2006
2007
2008
2010
2013
2014
2016
2018
2019
2020

Figure 6.2.2. Annual growing season averages for total phosphorus, chlorophyll-*a*, and Secchi depth, with shallow lake standards in red for reference.

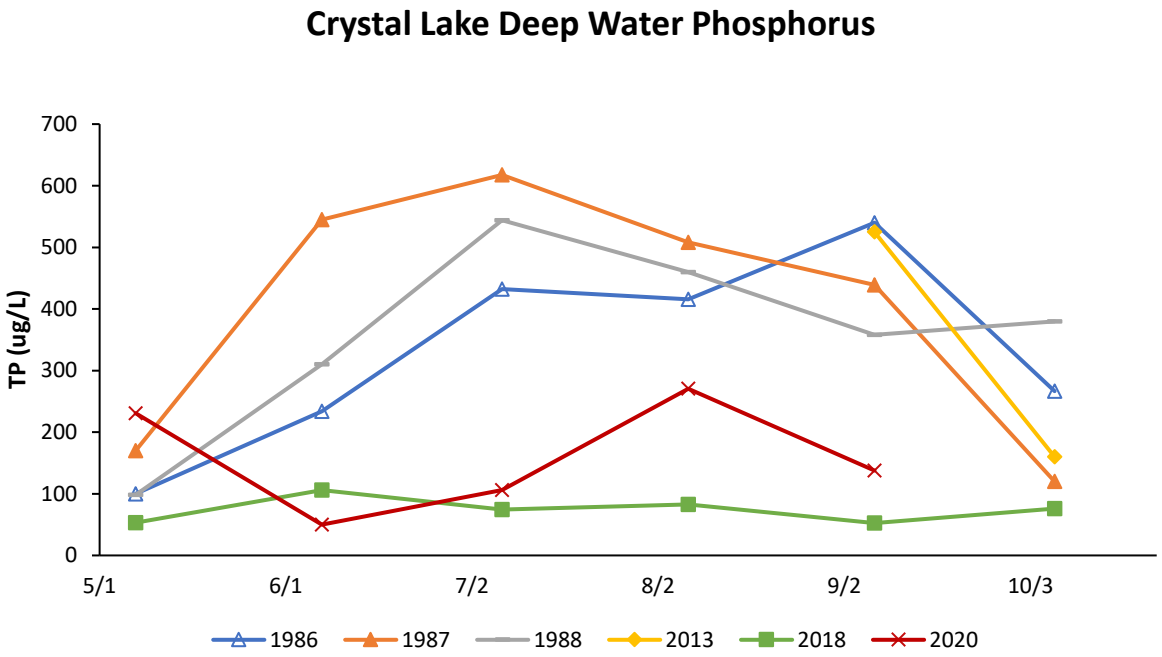


Figure 6.2.3. Hypolimnetic (deep) total phosphorus (TP) throughout the summer for available years.

6.3 PHYTOPLANKTON AND ZOOPLANKTON

Phytoplankton and zooplankton composition were measured for two samples in June and August 2020 to compare the relative percentages of each genera.

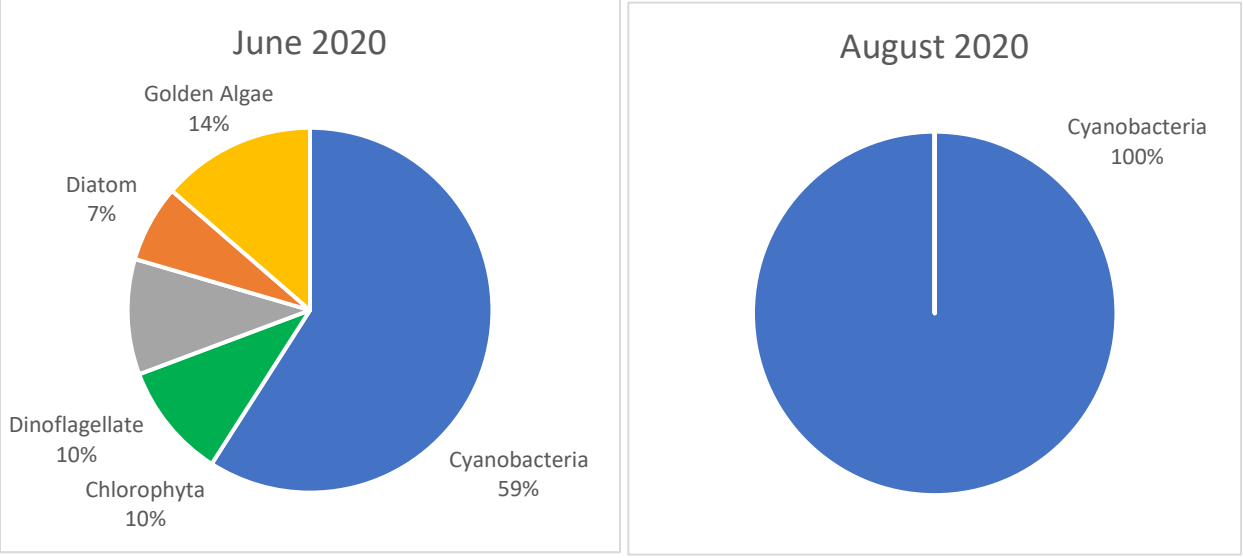


Figure 6.3.1: Phytoplankton relative percentage from June and August 2020.

Crystal lake experienced a large *Microcystis* bloom in the summer of 2020. Cyanobacteria was already dominate in June and that dominance increased to 100% in August. In August 2020, the only

species of phytoplankton identified was *Microcystis* in very high concentrations. *Microcystis* is a common bloom forming cyanobacteria that is capable of producing toxins, especially if it is the only cyanobacteria species.

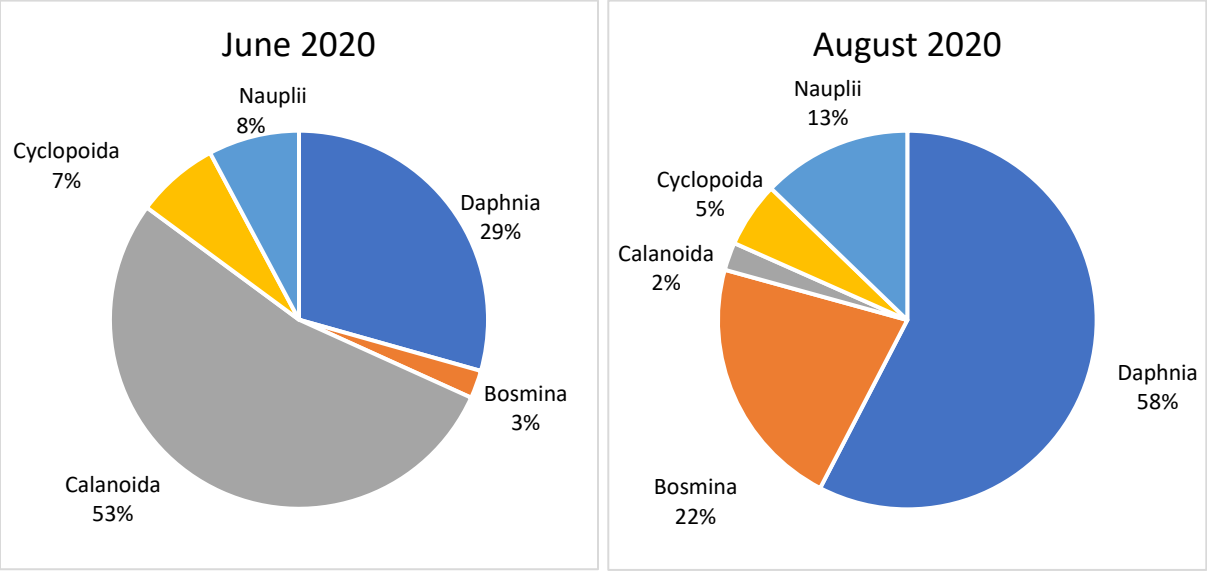


Figure 6.3.2: Zooplankton relative percentage from June and August 2020.

In June, a high percentage of Calanoids are preasent as well as Daphnia. As the season progresses a higher percent of daphnia are found present. Daphnia can graze on poor-quality food like cyanobacteria, explaining their abundance in late summer.

6.4 SUMERGED AQUATIC VEGETATION

A point-intercept aquatic vegetation survey was conducted on June 10, 2020 to document the late summer submersed aquatic vegetation in Crystal Lake. A total of 88 survey points were assessed, and 7 of these points were vegetated (Table 6.4.1). Crystal Lake is classified as a deep lake, with a maximum depth of 39 feet, while 53 of its 79 acres are in the littoral zone (i.e., water less than 15 feet deep). All 7 vegetated points were observed in the littoral zone, and the littoral zone was 12% covered in vegetation.

Table 6.4.1. Survey statistics.

Index	Result	Index	Result
Total Points	88	Vegetated Points	7
Littoral Points	57	Littoral Points with Vegetation	12%

Biovolume, or the volume of water occupied by vegetation, was extremely low or void of any aquatic plant life. (Figure 6.4.1). Biomass and species richness showed the same trend (Table 6.4.2). One species was observed in 0 to 5 feet and two in the 5 to 10 foot range (Table 6.4.2). No vegetation was observed in water depths greater than 7.5 feet.

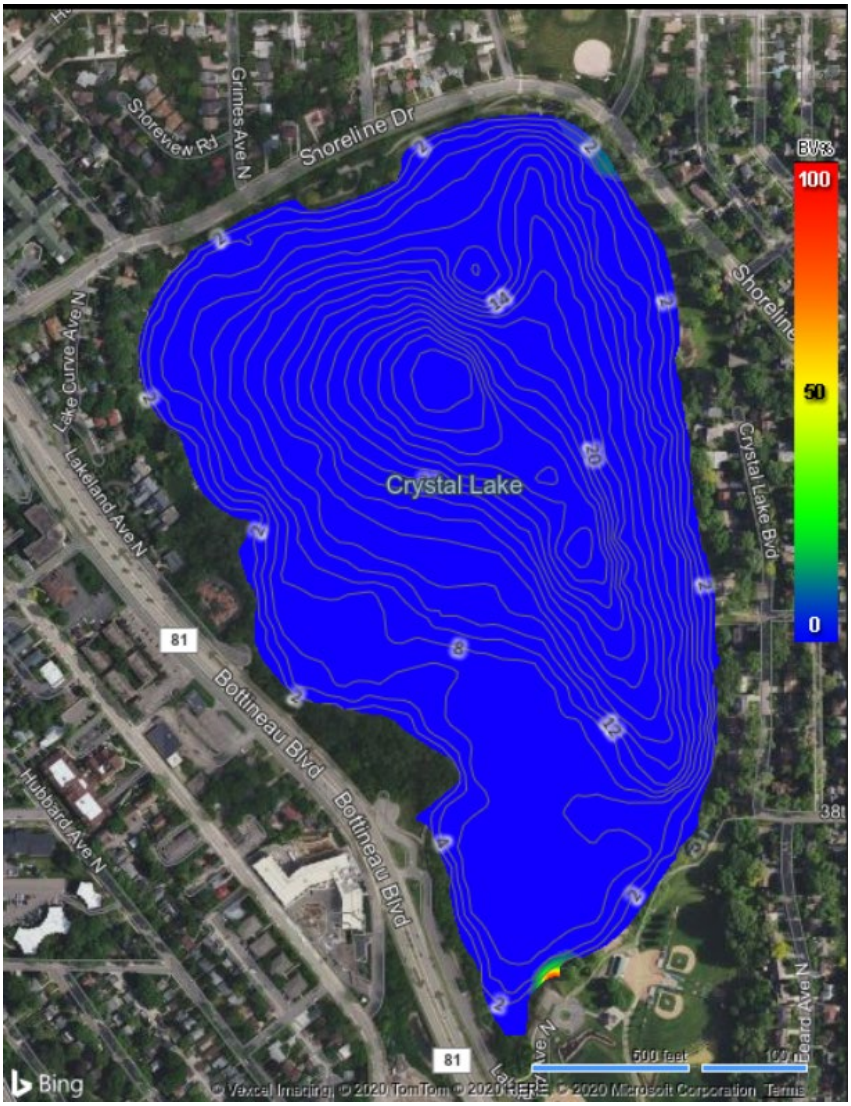


Figure 6.4.1. Biovolume heat map of Crystal Lake. In the heatmap, red indicates 100% biovolume and blue indicates 0% biovolume. Biovolume refers to the percentage of the water column taken up by vegetation.

Table 6.4.2. Comparison of community composition with depth.

Depth (ft.)	Lake Area (acres)	Sample points at this depth (#/%)		Species Observed (#)	Estimated Lake wide Biomass (kg)
0- 5	21	8	9	1	<1
5- 10	15	34	38	2	67
10- 15	18	15	17	0	0
> 15	25	31	35	0	0

Aquatic vegetation species richness of Crystal Lake was low and did not have high enough quantity or quality of species to meet deep lake standards for the Central Hardwood Forest Ecoregion (Table

6.4.3). Two species were observed in the lake, which is below the deep lake species richness standard of 12. These observed species had an average C-score of 4.5 (Table 6.4.3). Floristic quality index (FQI), an index based on the number of species observed and quality (i.e., C-score) of each species, was 6.4, which is below the deep lake FQI standard of 18.6 (Table 6.4.3).

Table 6.4.3. Species diversity statistics.

Index	Result*
Observed Taxa	2
Average C-score	4.5
Lake Floristic Quality Index (FQI)	6.4

*The standards for number of taxa and FQI in Crystal Lake are 12 and 18.6, respectively.

Species composition on Crystal lake did not include any dominant species (>50% occurrence). Curly leaf pondweed (CLP) an aquatic invasive species and white water lily, a native emergent aquatic species were the only observed species in the 2020 aquatic vegetation survey (Table 6.4.4, Figures 6.4.2). Curly leaf pondweed was found in two locations in the lake in depths between 6 to 7.5 feet and had a littoral occurrence of 3.5% and white water lily was observed in depths of 3.9 to 6.6 feet with a littoral occurrence of 10.5%. Percent occurrence is defined as the number of survey points at which a plant species was observed divided by the total number of points surveyed on a lake or within a specific depth range (Table 6.4.4).

Table 6.4.4. SAV species occurrence by depth on 6/10/2020.

Common Name	Scientific Name	% Lake Occurrence by Depth		
		0-5 ft.	5-10 ft.	10-15 ft.
Curly Leaf Pondweed	*Potamogeton crispus*	25	0	--
White waterlily	*Nymphaea ordata*	12	6	--

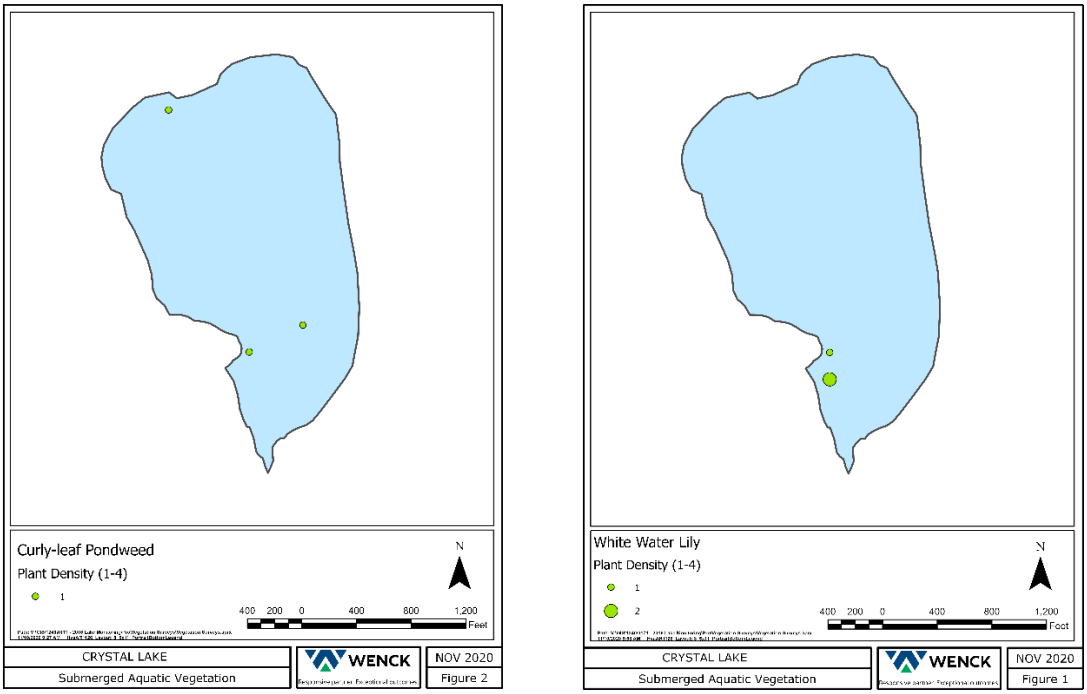


Figure 6.4.2. Distribution and density of Curly-leaf pondweed and white waterlily in Crystal Lake

Crystal Lake did not have native rooted or unrooted submerged aquatic vegetation during the 2020 survey. The only rooted submerged aquatic species was CLP. CLP, an aquatic invasive species, has the potential to negatively impact water quality and recreation when present in great abundance. CLP grows under ice, which means populations can reach maximum growth in May and June, when growth of most native vegetation is still hindered by short day length. This attribute gives CLP an extreme competitive advantage, causing it to form dense stands that shade out other native species and prevent them from sprouting. CLP's early season grown leads to senescence in early summer. This means that as the plant senesces and is decomposed by bacteria, the nutrients stored in its stems and leaves are released into the water column and may promote algae blooms. It will be important to continually monitor the SAV community on Crystal lake to ensure a nuisance level of CLP does not establish.

6.5 CARP POPULATION ASSESSMENT

The abundance and biomass density of common carp populations present in Crystal Lake were assessed in 2020. The purpose of the surveys was to provide initial estimates of carp biomass to inform carp management strategies on the lake. All field work for these assessments was performed following all regulations regarding aquatic invasive species management under MNDNR special research permit #29790. The population present in Crystal Lake exceeded biomass density thresholds known to be problematic at the time of sampling (95% confidence).

Seventy-nine common carp were captured during 1 hour of electrofishing (79 catch per unit effort, CPUE). Carp sampled had an average total length of 17.7 inches and weight of 2.05 lbs (Figures 6.5.1 and 6.5.2). With this CPUE, we estimated a common carp population in Crystal Lake of 12,011

individuals and an average biomass density of 311 lbs/acre (Table 6.5.1). The lower bound of the 95% confidence interval for average biomass density was 129.2 lbs/acre; above the threshold for water quality impairment (89 lbs/acre). Common carp in Crystal Lake are likely contributing to impaired water quality through their behavior of bottom feeding. During bottom feeding, carp uproot vegetation and facilitate the release of sediment phosphorus to the water column.

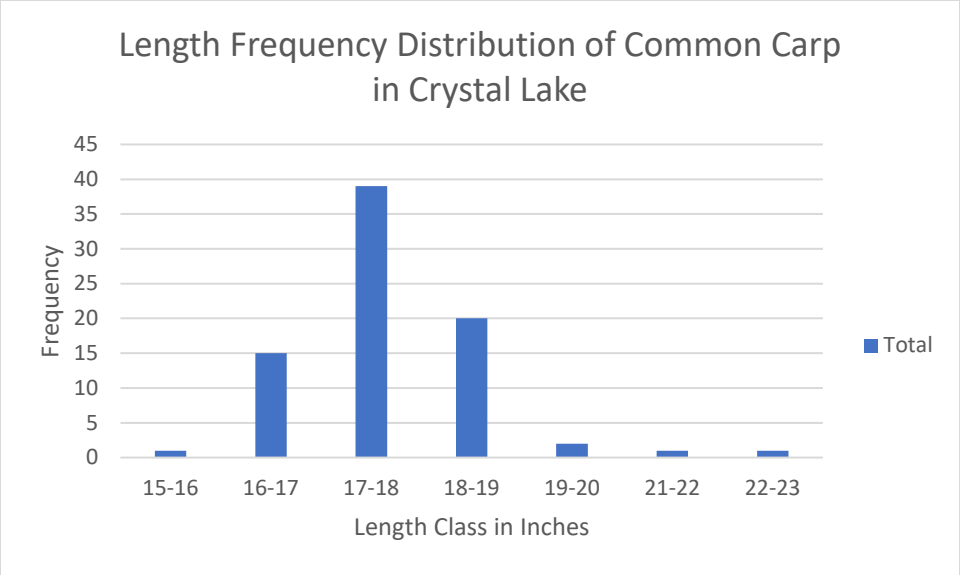


Figure 6.5.1. Length Frequency Distribution of Common Carp in Crystal Lake

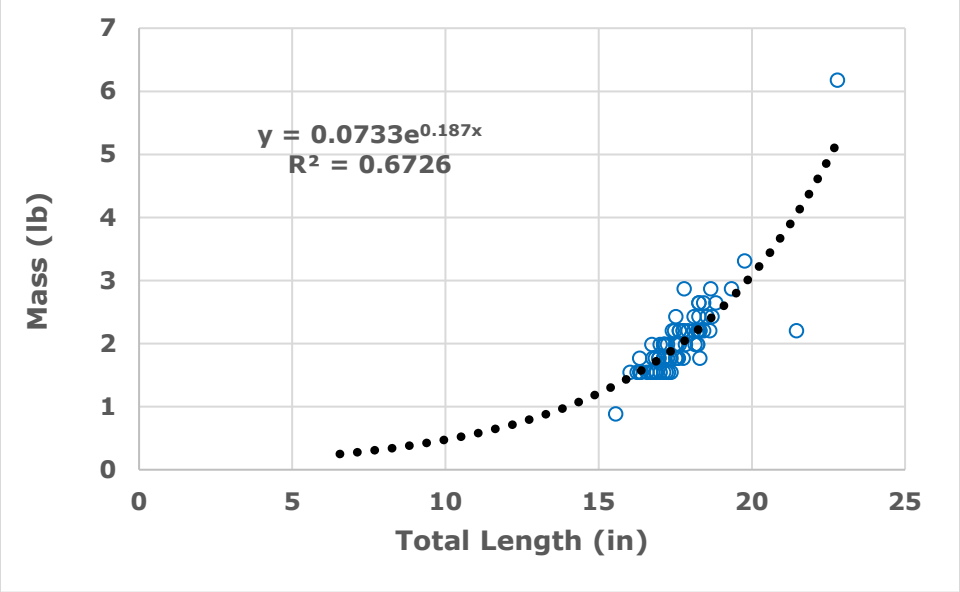


Figure 6.5.2. Length/weight regression of Common carp sample from Crystal Lake

Table 6.5.1. Common Carp electrofishing Survey Results for Crystal Lake.

Lake	Crystal Lake
Size (acre)	79.1
Sample Date	9/16/2020
# Sampled	79
# Transects	3
E-fish Time (hour)	1.0
Average Length (in)	17.7
Average Weight (lb)	2.051
CPUE Transect 1 (carp/hr)	105
CPUE Transect 2 (carp/hr)	60
CPUE Transect 3 (carp/hr)	72
Average Catch Per Unit Effort (carp/hr)	79.0
CPUE 95% Confidence (+/-)	46.6
Estimated Density (carp/acre)	152
Estimated Population Size (Abundance)	12,011
Biomass Present (lb)	24,641
Average Biomass Density (lbs/acre)	311
ABD 95% Confidence (+/- lbs/acre)	183.7
Critical WQ Threshold (lb/acre)	89

7.0 References

Bacigalupi, J., and Treml, M. "10,000 Lakes-> 4 Indices: The Minnesota Fish IBI Tool." 145th Annual Meeting of the American Fisheries Society. AFS, 2015.

Bajer, P.G., and Sorensen, P.W. "Using boat electrofishing to estimate the abundance of invasive common carp in small Midwestern lakes." North American Journal of Fisheries Management 32.5 (2012): 817-822.

Heiskary, S., Hirsch, J., and Rantala, H. "Minnesota Department of Natural Resources, Special Publication 178." Patterns in Phytoplankton and Zooplankton in Minnesota Lakes. (2016).

Schlagenhaft, T. "Minnesota Department of Natural Resources, Section of Fisheries, Special Publication 147." Manual of instructions for lake survey (1993).

Schupp, Dennis H. An ecological classification of Minnesota lakes with associated fish communities. Minnesota Department of Natural Resources, Section of Fisheries, 1992.

WENCK now part of Stantec

To: Shingle Creek/West Mississippi WMO TAC and Commissioners

From: Ed Matthiesen, P.E.
Diane Spector

Date: April 2, 2021

Subject: Brooks Garden Partnership Cost Share

Recommended TAC/ Commission Action	Consider the application for $30,000 in Partnership Cost Share funding.

At the April 8, 2021 Technical Advisory Committee meeting the TAC will hear a request from the City of Brooklyn Park and Metro Blooms on behalf of Boisclair Corp., for improvements at Brooks Garden, and affordable housing community in Brooklyn Park. Eighty-three percent of the residents in the complex identify as African American or African immigrants. Similar to other multifamily residential facilities that Metro Blooms, the City, and Boisclair have collaborated on, the partners are working with residents in the community and various funding agencies to incorporate sustainable designs and grounds upgrades on their property.

This site is located on 69th Avenue in Brooklyn Park, at the border with the City of Brooklyn Center. Private channels, likely the remnants of an old agricultural ditch, run along the north and east side of the property, crosses under Unity Avenue, and meanders through the Mallard Creek townhome development in Brooklyn Center before discharging into Shingle Creek in the reach that will be restored this year through the Connections II project.

The partnership is requesting $30,000 in Partnership Cost Share funding to help install a series of rain gardens to capture and infiltrate or treat runoff from impervious surface on site, including roofs, pavement, and a new play area.

The Partnership Cost Share program account at the end of 2020 had an Encumbered balance of about $35,400, with an additional $50,000 levy to be received this year, for an estimated total $91,400 available.

Representatives from Metro Blooms will be available April 8 to present the proposed project and answer questions. The TAC should then make a recommendation to the Commission regarding the grant request.

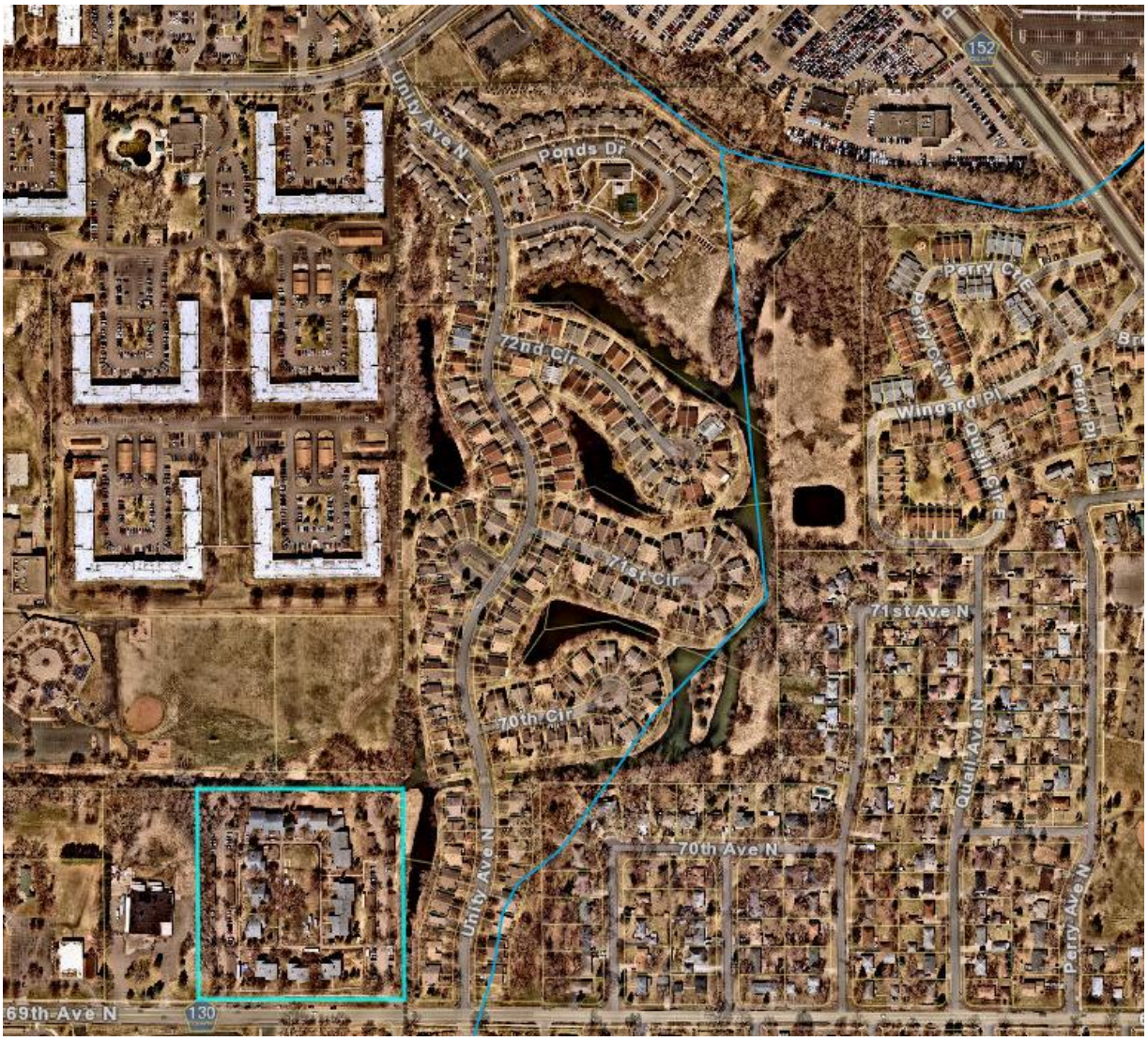


Figure 1: Brooks Garden location.

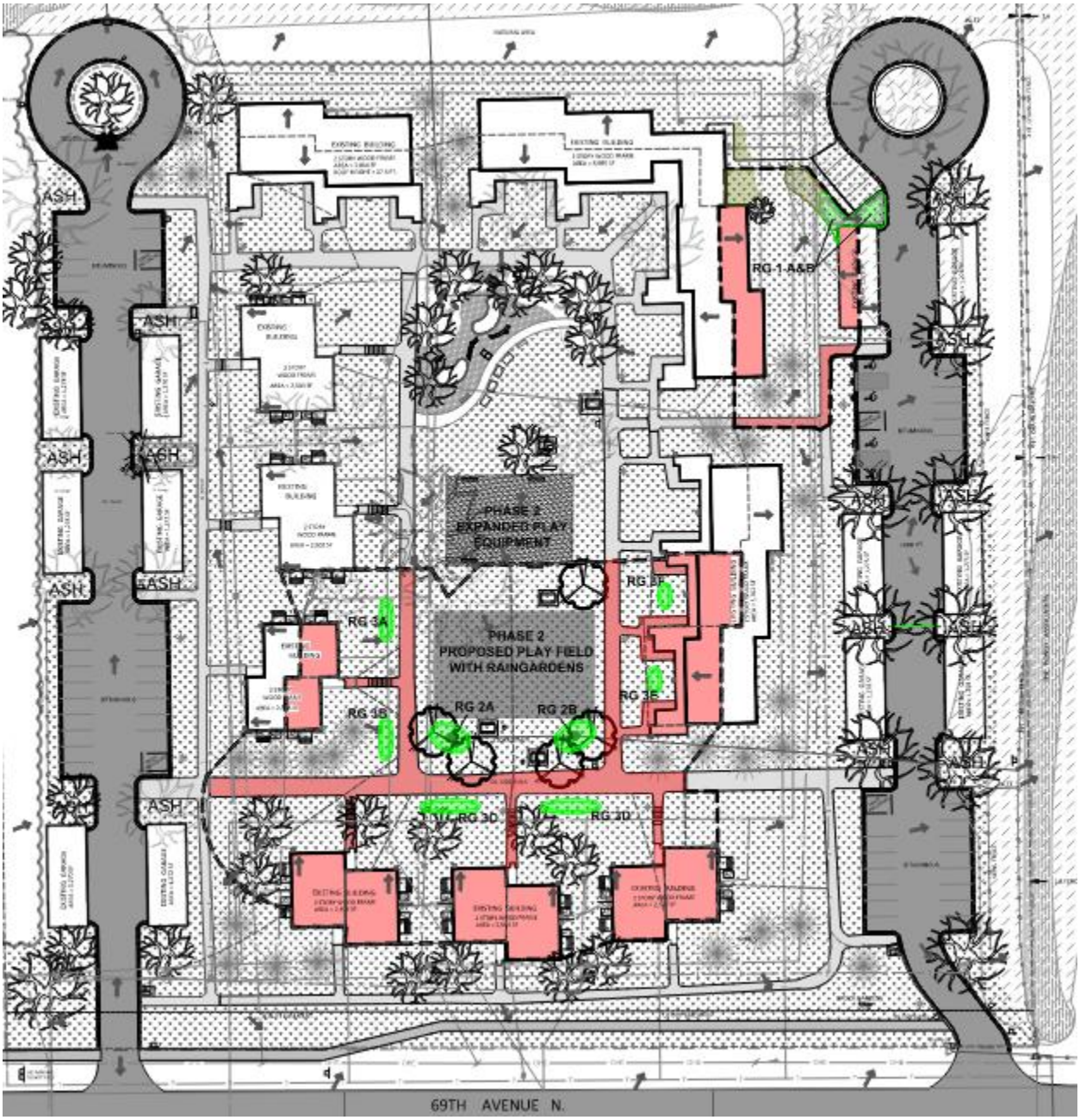


Figure 2. Proposed project. Impervious to be treated shown in pink; light green shows the proposed new rain gardens.

Shingle Creek Watershed Management Commission

3235 Fernbrook Lane N • Plymouth, MN 55447
Phone (763) 553-1144 • Fax (763) 553-9326

HYPERLINK "http://www.shinglecreek.org"
www.shinglecreek.org

Shingle Creek
Watershed Management Commissions
Partnership Cost-Share Program Guidelines

The Shingle Creek Watershed Management Commission will from time to time make funds available to its member cities to help fund the cost of Best Management Practices (BMPs) partnership projects with private landowners. The following are the guidelines for the award of cost-share grants from this program:

1. Projects on private property must be for water quality improvement, and must be for improvement above and beyond what would be required to meet Commission rules. Only the incremental cost of "upsizing" a BMP above and beyond is eligible.
2. Priority is given to projects in a priority area identified in a sub-watershed assessment or TMDL.
3. Commission funds may reimburse up to 100% of the cost of the qualifying BMP.
4. The minimum cost-share per project is $10,000 and the maximum is $50,000.
5. Projects must be reviewed by the Technical Advisory Committee (TAC) and recommended to the Commissions for funding.
6. Cost-share is on a reimbursable basis following completion of project.
7. The TAC has discretion on a case-by-case basis to consider and recommend to the Commissions projects that do not meet the letter of these guidelines.
8. Unallocated funds will carry over from year to year and be maintained in a designated fund account. Any balance in said account in excess of $100,000 will be transferred to the City Cost Share Program Account.
9. The property owner must dedicate a public easement or equivalent sufficient to install and maintain the BMP.
10. The Member City must obtain a recordable maintenance agreement from the property owner that specifies maintenance requirements and schedule; authorizes the City to inspect the BMP and order maintenance and improvement; and authorizes the City to undertake ordered maintenance and improvement not completed by the property owner, and assess the cost that work to the property.
11. The standard Commission/Member Cooperative Agreement will be executed prior to project construction.

Adopted November 2015
Revised February 9, 2017

Shingle Creek Watershed Management Commission

3235 Fernbrook Lane N • Plymouth, MN 55447
Phone (763) 553-1144 • Fax (763) 553-9326

HYPERLINK "http://www.shinglecreek.org"
www.shinglecreek.org

Shingle Creek Watershed Management Commissions
Partnership Cost-Share Program Application

City:	Brooklyn Park
Contact Name:	Maria Riewer (Boisclair) Yordanose Solomone (Metro Blooms)
Contact Phone:	612-306-3513 (Maria Riewer), 612-558-0865 (Yordanose Solomone)
Contact Email:	mriewer@boisclaircorporation.com, yordanose@metroblooms.org
Project Name:	Brooks Gardens Apartments
Total Project Cost:	See attached budget
Amount Requested:	$30,000
Project Location:	5550 69th Avenue North, Brooklyn Park, MN 55429
Owner:	Amorce I GP, LLC
Address:	610 Ottawa Avenue North
City, State, Zip:	Golden Valley, MN 55422
Phone:	952.922.3881
Email:	info@boisclaircorporation.com

1. Describe the BMP(s) proposed in your project. Describe the current condition and how the BMP(s) will reduce pollutant loading and/or runoff volume. Note the estimated annual load and volume reduction by parameter, if known, and how they were calculated. Attach figures showing project location and BMP details including drainage area to the BMP(s).

Boisclair Corporation, on behalf of property owner Amorce I Limited Partnership, is working with residents, Metro Blooms, the City of Brooklyn Park, Hennepin County, and African Career Education and Resource Inc (ACER) to design, install, and care for sustainable landscape practices that improve livability for our residents at Brook Gardens. Brook Gardens was built in 1979 as an affordable housing community. The site is 8.14 acres, 38% impervious, with

Shingle Creek Watershed Management Commission

3235 Fernbrook Lane N • Plymouth, MN 55447
Phone (763) 553-1144 • Fax (763) 553-9326

HYPERLINK "http://www.shinglecreek.org"
www.shinglecreek.org

numerous townhomes and apartment buildings within the complex. Most of the remainder is turf grass (50%). Immediately adjacent to Shingle Creek, a small portion of the site is natural/unmanaged (12%) and lies within the floodplain with many areas experiencing localized flooding due to poor runoff management. Prior to 2020, there were few shade trees, and over a third (25) of those present were ash. While the site faces many challenges, there is a great opportunity to revitalize the landscape through raingardens, sustainable tree canopy, and native plantings. In addition to improving environmental function, creating outdoor play spaces for the many children at Brook Gardens to interact with nature and providing economic opportunities for residents through engagement, installation and long term care are top priorities.

This journey began in 2019, when engagement with residents started to design a landscape that works for and benefits them. With 160 residents, Brook Gardens is a diverse community with many families and young children. Eight-three percent of residents identify as African American or African immigrants and 16% as caucasian. Household income for every unit is below 60% of area median income. Though the community is made up of renters, many are long-term residents that have raised their families at Brook Gardens. This community is invested in their home. We are working with 3 dedicated project stewards to develop leadership and stewardship capacity within the community. They are leading engagement, guided by the following project goals and principles: 1) center the voice and ideas of those most impacted by the project, 2) build resident leadership capacity and community connection 3) improve mental and physical health and quality of life through our landscape, 4) improve environmental sustainability through clean water and habitat projects, 5) create outdoor play spaces where kids can interact with nature and 6) be and encourage others to be responsible stewards of the landscape at our home. Guided by these principles and a series of engagement and feedback events in 2019 and 2020, Metro Blooms developed a phased retrofit plan for the site, prioritized based on water quality impact, parking lot reconstruction, and resident input.

In 2020, project partners and residents celebrated the completion of Phase 1 of this plan. This initial phase leveraged investment from Boisclair Corporation, Hennepin County, the City of Brooklyn Park's new Community Engagement Sustainability grant program, BWSR's Lawns to Legumes program, and the Center for Prevention at Blue Cross Blue Shield. Specific improvements included:

- Two raingardens (2,882 sq ft) in the interior courtyard to capture runoff before it enters existing catch basins in northeast and northwest corners of the courtyard
- 8 new shade trees within the raingardens and courtyard; hydroseeding and grading repairs in courtyard
- Accessible pathway through the courtyard along raingarden edge; benches and picnic tables

Shingle Creek Watershed Management Commission

3235 Fernbrook Lane N • Plymouth, MN 55447
Phone (763) 553-1144 • Fax (763) 553-9326

HYPERLINK "http://www.shinglecreek.org"
www.shinglecreek.org

- Removal of one ash tree, replacement with new shade tree and installation of one raingarden (1400 sq ft) at the end of the west drive lane to capture runoff from that entire drive area
- Nature play including trellises, tree tents, logs, sand boxes, stepping stones, grass mounds, and bridge incorporated into courtyard raingardens

Runoff from these areas was previously piped to the creek from the interior courtyard or flowed directly to the creek through a curb cut in the northwest roundabout. Water quality improvements from Phase 1 included annual capture of:

- 4.634 lbs Total Phosphorus,
- 2,050 lbs of solids, and
- 1,199,419 gallons of runoff annually.

Building on this success, this request for funding of Phase 2 was refined in 2020 to capture untreated runoff from the southern half and northeast corner of the property and remove and replace 10 ash trees on site to improve safety and long term sustainability (see tree plans attached, tree in roundabout of western drive lane replaced in 2020). We are also applying for grants to install a new and larger playground in response to resident input. While our original goal was to capture runoff from the entirety of the eastern drive lane with a raingarden in the roundabout in 2021, this is not feasible due to high groundwater levels. This portion of the property lies within the Shingle Creek floodplain, and while the raingarden would ultimately increase storage capacity in the floodplain, during infiltration testing Metro Blooms discovered the groundwater level was 2.5 feet below surface. This depth would not allow for the standard 3 feet separation between the bottom of the raingarden basin and the water table to ensure a safe and effective stormwater management system. The new proposed location of the raingarden outside of the office entrance in the northeast corner of the property is 1.5 feet higher in elevation, providing enough room for infiltration above the water level through a shallow raingarden (3” deep). In light of infiltration testing, ash tree removal, opportunities for capture, and resident input, Phase 2 projects include the following (see plan attached):

- A raingarden (474 sq ft) and native plantings (754 sq ft) in the northeast corner of the property
- Two raingardens (616 sq ft) in the southern half of the courtyard prior to runoff interception at the catch basins (limited size to leave ample room for free play in this grass field per resident request)
- Six raingardens adjacent to townhomes to capture roof and sidewalk runoff and create a sense of ownership among residents in the townhomes (998 sq ft total)

Shingle Creek Watershed Management Commission

3235 Fernbrook Lane N • Plymouth, MN 55447
Phone (763) 553-1144 • Fax (763) 553-9326

HYPERLINK "http://www.shinglecreek.org"
www.shinglecreek.org

- Removal and replacement of 10 ash trees and planting of 5 additional trees (funding approved by Hennepin County Healthy Tree Grant)
- New/expanded playground in central courtyard (pending additional funding)

Without the installation of proposed projects, runoff in these capture areas drains either directly to Shingle Creek via overland flow through a curb cut in the eastern roundabout (northeast corner of property) or into 2 catch basins on the south end of the courtyard that pipe runoff into Shingle Creek. A Hennepin County Opportunity Grant request for Phase 2 has been leveraged, and in the process of final approval from the board of commissions. We anticipate full approval within the month. This funding request to Shingle Creek leverages the Hennepin County funding and a match from Boisclair Corporation and would allow us to complete the Phase 2 final design and installation.

Project partners are committed to authentic engagement throughout project life, ensuring the project is centered by resident voices. In 2020, we adapted to COVID through phone surveys with residents, flyers, and socially distanced planting and outdoor celebration. We hope for in person events in 2021, but are able to adapt as needed. We have a regular check in with our residents invested in this project to keep them in communication including public funds leveraged, and other project updates. We integrate equitable engagement principles throughout this project, and strive to ensure the clean water investment provided by Shingle Creek Watershed Management Commission not only benefits the community socially and environmentally, but economically as well. *We do this in a number of ways:*

- Prioritizing local contractors and contractors owned/managed by people of color or employing diverse crews through the bid process
- Training resident caretakers to maintain projects long term, ensuring this knowledge lives within the community
- Hiring residents for paid work to work alongside installation crews as possible to assist with installation and planting. This was piloted in 2020 with overwhelming success. We were able to hire 9 residents to plant alongside Metro Blooms' job training crew.

Phase 2 will treat runoff from half an acre of impervious surface, 1.5 acre total surface area, making a significant impact on runoff volume and quality in Shingle Creek and downstream Mississippi River. We address the chloride impairment in Shingle Creek through ongoing smart salting training led by Metro Blooms' staff Yordanose Solomone who is Level 1 certified in Smart Salting by the MPCA. Training audience includes Brook Gardens management, resident caretakers and stewards to provide them with the technical knowledge and power to implement and advocate for proper maintenance practices.

Shingle Creek Watershed Management Commission

3235 Fernbrook Lane N • Plymouth, MN 55447
Phone (763) 553-1144 • Fax (763) 553-9326

HYPERLINK "http://www.shinglecreek.org"
www.shinglecreek.org

Staff and resident caretakers will care for the proposed stormwater management practices long term. Metro Blooms provides training through their sustainable landcare program, with at least one training in the spring, summer and fall of 2021. Caretakers have been exceptionally committed to the projects installed in 2020 this fall. We anticipate long term success of these projects and Phase 2 projects with this dedicated staff. Project stewards contribute to this by encouraging and demonstrating a culture of landscape stewardship at Brook Gardens.

Phase 2 Impact: Brook Gardens is immediately adjacent to Shingle Creek, with a small portion of the property in the floodplain. The property flows directly into the creek via overland flow and through 4 catch basins in the central courtyard. Shingle Creek, from its headwaters in Brooklyn Park at the junction of Bass Creek and Eagle Creek to its confluence with the Mississippi River in Minneapolis, is impaired for aquatic life due to excessive levels of chloride and aquatic recreation, due to bacteria.

Shingle Creek was the first stream in Minnesota to be designated an Impaired Water for excess chloride (1998). The 2007 Shingle Creek Chloride TMDL study required a 71% reduction in chloride. A review completed in 2014 revealed there had been no improvement in stream water quality, even though reductions in road salt use had occurred. In addition to a reduction in road salt by public agencies, as the majority land owner, private property partnerships are integral to reducing chloride. The proposed project addresses this impairment through runoff volume reduction and smart salting education. In addition to chloride reduction, the proposed stormwater best management practices for Phase 2 capture:

- 4.544 lbs Total Phosphorus,
- 1,670 lbs of solids, and
- 796,607 gallons of runoff annually

Projects were modeled in WINSLAMM, based on soil infiltration testing, using the MPD infiltrometer from Upstream Technologies, in the northern half of the courtyard and northeast corner of the property, which averaged 7.64 in/hr. All the raingardens were modeled with an infiltration rate of 2.5in/hr with the exception of RG A by the office which was modeled with an infiltration rate of .1in/hr. Preliminary site investigation in the areas around the office indicated heavily compacted soils with much slower infiltration rates. To address this, the raingarden by the office will only be 3” deep. Additionally, we investigated soils in the roundabout at the end of the eastern drive lane which resulted in infiltration over 8 in/hr. Unfortunately a soil auger test to a depth of 4’ indicated the water table was 2.5’ from the bottom of a proposed 6” deep raingarden in this area. Due to the high groundwater levels, we are unable to capture runoff from the eastern drive lane in a cost effective manner.

Shingle Creek Watershed Management Commission

3235 Fernbrook Lane N • Plymouth, MN 55447
Phone (763) 553-1144 • Fax (763) 553-9326

HYPERLINK "http://www.shinglecreek.org"
www.shinglecreek.org

Additionally, as the Emerald Ash Borer moves through Brooklyn Park, reforesting Brook Gardens with a sustainable tree canopy is an integral part of ecological site design. As part of this project, we'll be working with a Brooklyn Park ISA-certified arborist, Arbortech, to remove 10 ash trees on site. These will be replaced with a diversity of pollinator-friendly shade tree species as part of the work in 2021. We place a special emphasis on tree species that are habitat for the endangered Rusty Patched Bumblebee, Minnesota's native, and declining, state bee. Following Phase 2, Brook Gardens will provide more than 7,124 square feet of native pollinator habitat to support the Rusty Patched and other wildlife.

Project partner Metro Blooms utilizes WINSLAMM modeling software to quantify environmental impact of the project. Chloride reduction is not quantified in WINSLAMM. This is quantified anecdotally with reporting from property management about reduction in salt use due to Smart Salting training. In addition to environmental benefits, this project is focused on equity and engagement. These benefits are evaluated through story gathering by Metro Blooms from the residents, management, and partners as well as an ongoing evaluation of who is benefitting from the project and how the clean water investment dollars are supporting the community. Measures of success:

- WINSLAMM modeling includes runoff, sediment, and total phosphorus reduction
- Number of staff and residents trained in maintenance and proper salt application (goal: 100% of staff, caretaker, and project stewards trained)
- Number of attendees at educational and engagement events (goal: 10 adults and 20-30 youth/event)
- Number of project stewards engaged (goal: 5)
- Storytelling (Goal: residents report increase in environmental literacy, are knowledgeable about actions they can take to improve water quality, and feel empowered to continue leading stewardship of the outdoor spaces at Brook Gardens. Goal: project partners show an increase in knowledge about stormwater management and how it improves quality of life.)

2. If this request is for cost share in "upsizing" a BMP, explain how the upsize cost and benefit were computed.

Not Applicable

3. Show total project cost and the amount of cost share requested.

Shingle Creek Watershed Management Commission

3235 Fernbrook Lane N • Plymouth, MN 55447
Phone (763) 553-1144 • Fax (763) 553-9326

HYPERLINK "http://www.shinglecreek.org"
www.shinglecreek.org

See attached budget

4. What is the project schedule, when will work on the BMP(s) commence and when will work be complete?

Phase 2 Timeline:

- January - March 2021: Design/plan development; resident engagement through flyers and phone surveys or potential in person meeting (COVID dependent)
- March - April 2021: Send project to bid, select contractor; resident update through stewards; ash tree removals
- May - September 2021: Installation, hire residents to plant/install gardens and trees
- February - June 2021: New playground design/installation (pending Kaboom grant)
- Summer/Fall 2021: Maintenance trainings, operation + maintenance plan, as builts; Phase 2 celebration
- Fall 2021: Smart Salting training

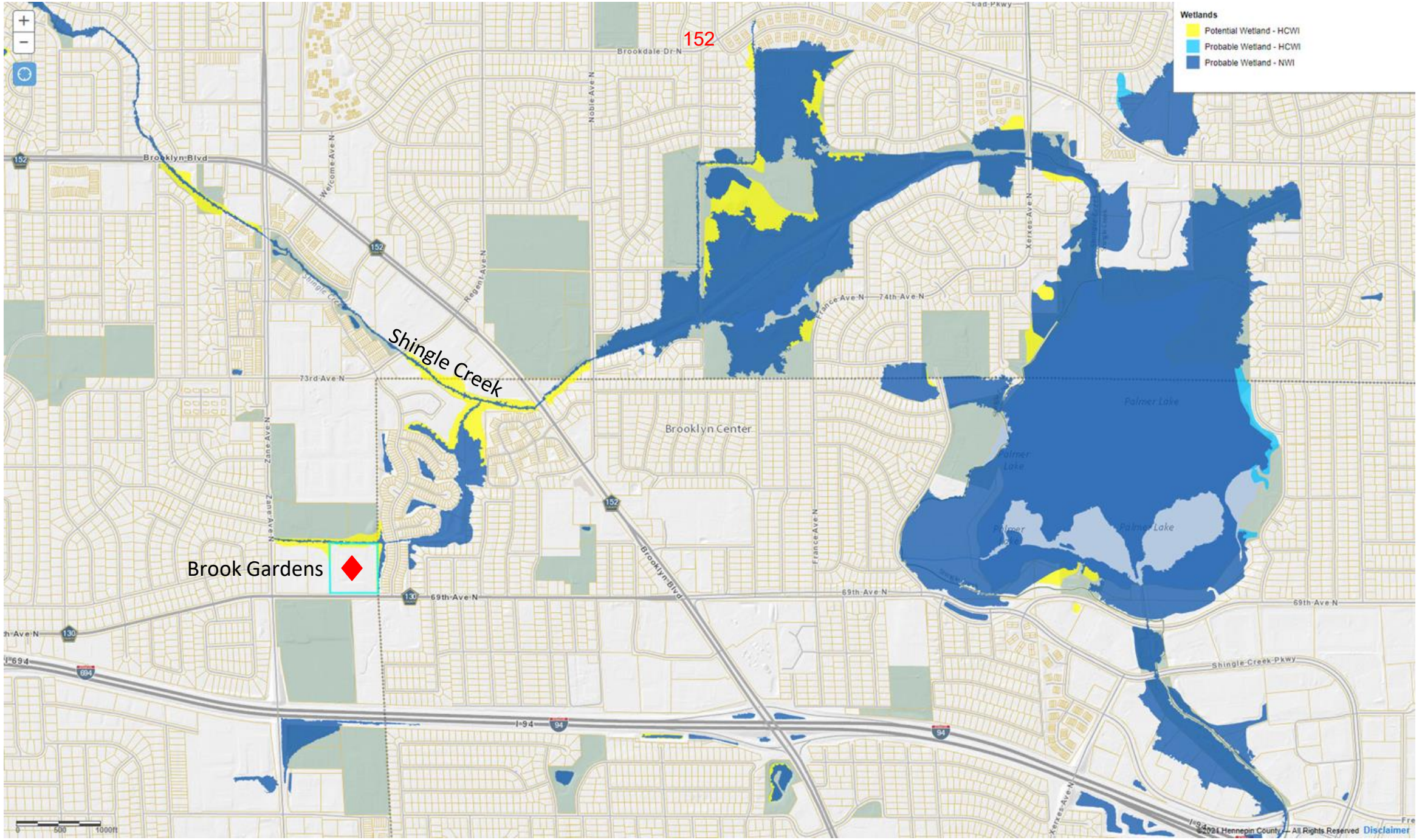
The member City must verify that a public easement (or equivalent) is dedicated and that an Operations and Maintenance Agreement has been executed and recorded prior to release of any funds.

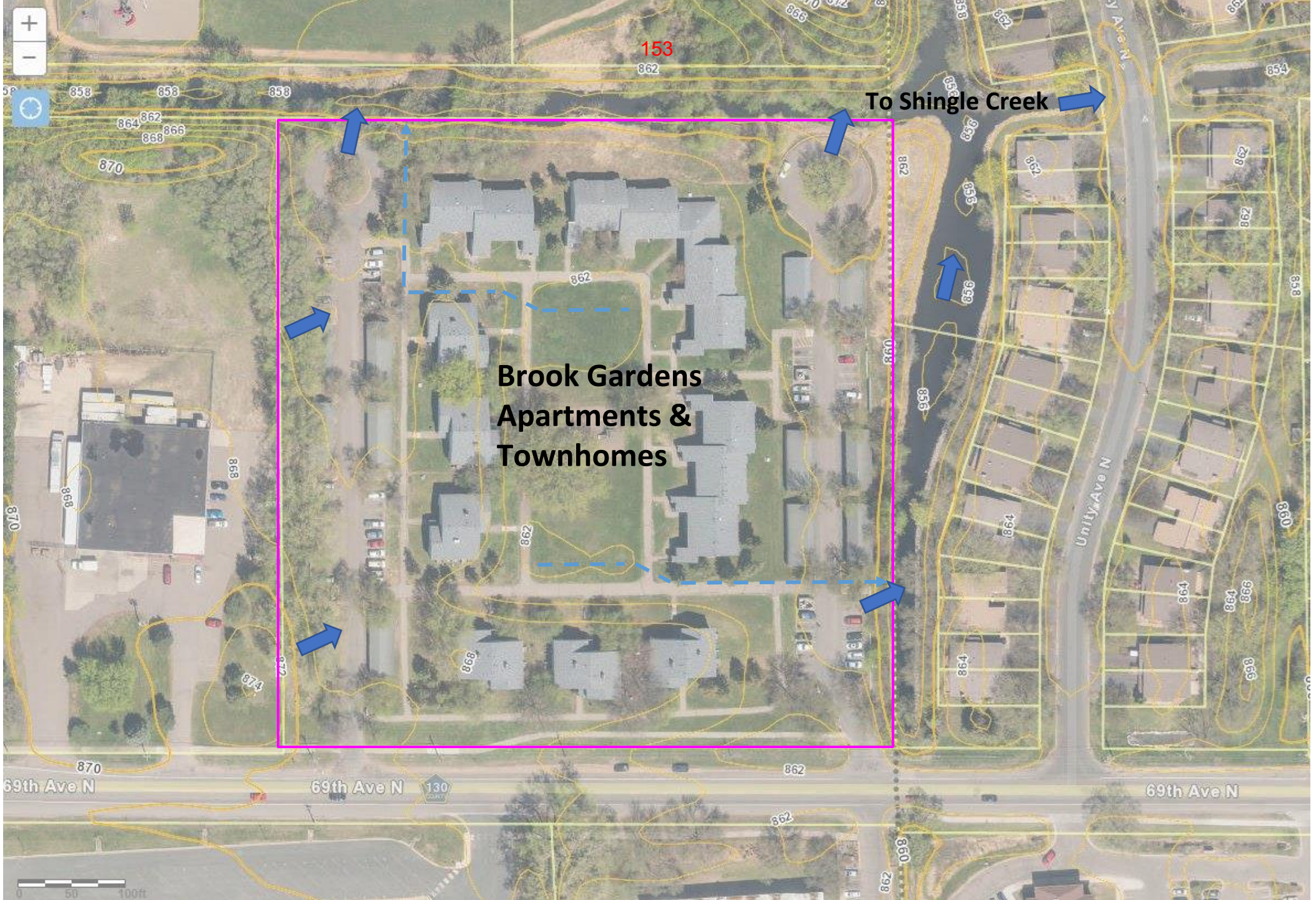
Brooks Gardens: Habitat, Clean Water, + Livability

April 8, 2021
Shingle Creek Watershed Management Commission

Boisclair

CORPORATION


Wetlands
Potential Wetland - HCWI
Probable Wetland - HCWI
Probable Wetland - NWI
152
Brookdale Dr N
Noble Ave N
Brooklyn Blvd
Welcome Ave N
Regent Ave N
Xerxes Ave N
France Ave N
74th Ave N
Shingle Creek
73rd Ave N
Zane Ave N
Brooklyn Center
Palmer Lake
Brook Gardens
69th Ave N
Brooklyn Blvd
France Ave N
Shingle Creek Pkwy
I-94
Xerxes Ave N
0
500
1000ft
2021 Hennepin County — All Rights Reserved
Disclaimer


153
To Shingle Creek
Brook Gardens
Apartments &
Townhomes
69th Ave N
69th Ave N
69th Ave N
Unity Ave N

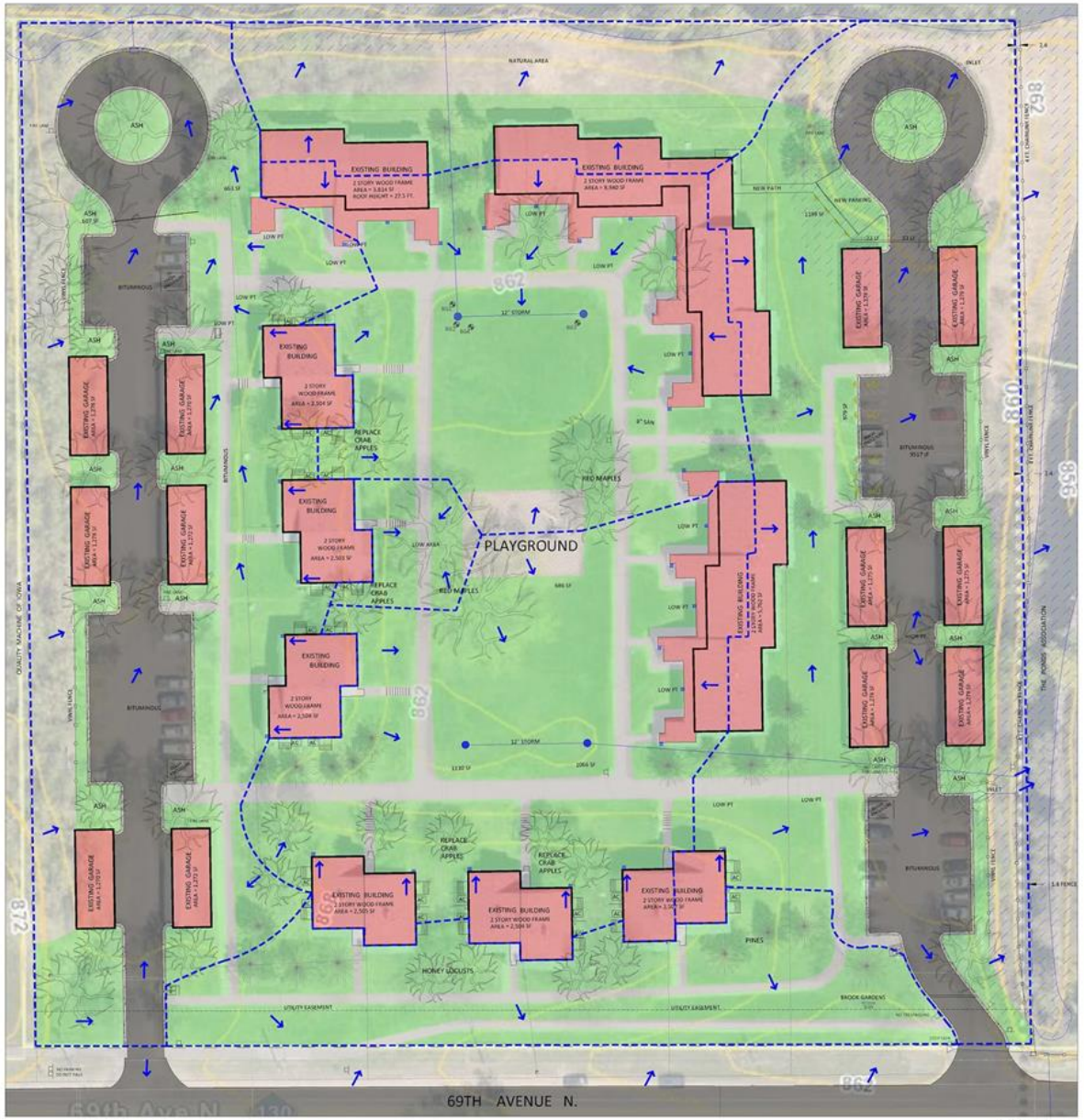
BROOK GARDENS APARTMENTS AND TOWNHOMES

- Affordable housing community
  (Section 8 & 42)

- 8.14 acres,
  3.06 acres impervious
  4.00 acres lawn
  1.00 acre wooded floodplain area

- 60 apartment units & 24 townhomes

- Direct stormwater flow from North and East floodplain to Shingle Creek



EXISTING SITE INFO

TOTAL AREA:	354,671 sq ft (8.14 acres)
PERVIOUS:	221,009 sq ft (5.07 acres)
LAWN	174,474 sq ft (4.00 acres)
NATURAL	44,240 sq ft (1.01 acres)
IMPERVIOUS:	133,662 sq ft (3.06 acres)
TREES:	Approx 80 (25 ash - 31%)
PARKING:	62 spaces + garages

POTENTIAL STORMWATER RUNOFF:
1.1"/24 hour rain event
12,219 cubic feet (91,404 gallons)

30.7" Annual Average Rainfall
377,468 cubic feet (2,823,661 gallons)

4.25 Olympic Swimming pools

LEGEND

- Lawn
- Building
- Parking/Fire Lane
- Walkways/Patios
- Flood zone
- Direction of Runoff
- Downspouts
- Property Line
- Utilities
- Existing Fence
- Sub-catchment areas
- Soil Infiltration Test
- Existing Tree

SOIL INFILTRATION TESTS
BG1: 8.64 IN/HR
BG2: 15.64 IN/HR
BG3: 0.92 IN/HR
BG4: 5.53 IN/HR

PARKING

PATHS

PLAYGROUND

GREEN SPACE

Guiding Principles + Project Stewards

Resident Engagement

Design Co-Creation

Community Improvements

Mapping Walking Patterns, Site Uses & Wants

Desirable Site Amenities

RESIDENT FEEDBACK SUMMARY

- MORE PLANTINGS FOR COLOR
- RESIDENT GARDEN PLOTS
- MORE SEATING / BENCHES UNDER SHADE
- MORE PLAY SPACES FOR KIDS
- GATHERING SPACES
- AREA FOR SPORTS LIKE SOCCER
- ACCESSIBLE SIDEWALKS (NW SIDE)
- MORE WALKING PATHS
- BETTER LIGHTING FOR SAFETY
- MORE SIGNAGE
- VISITOR PARKING
- BUS SHELTER WAITING AREA

Phase 1: 2020

BEFORE

Phase 1: 2020 CONCEPT PLAN

NATURE PLAY

NEW PATHS

BROOK GARDENS APARTMENTS AND TOWNHOMES

LEGEND

- Phase 1
- Drainage Area
- Impervious
- Walkways/Patios
- Flood zone
- Direction of Runoff
- Property Line
- Utilities
- Existing Fence
- Sub-catchment areas
- Existing Tree
- Proposed Trees

RESIDENT INTERESTS SUMMARY

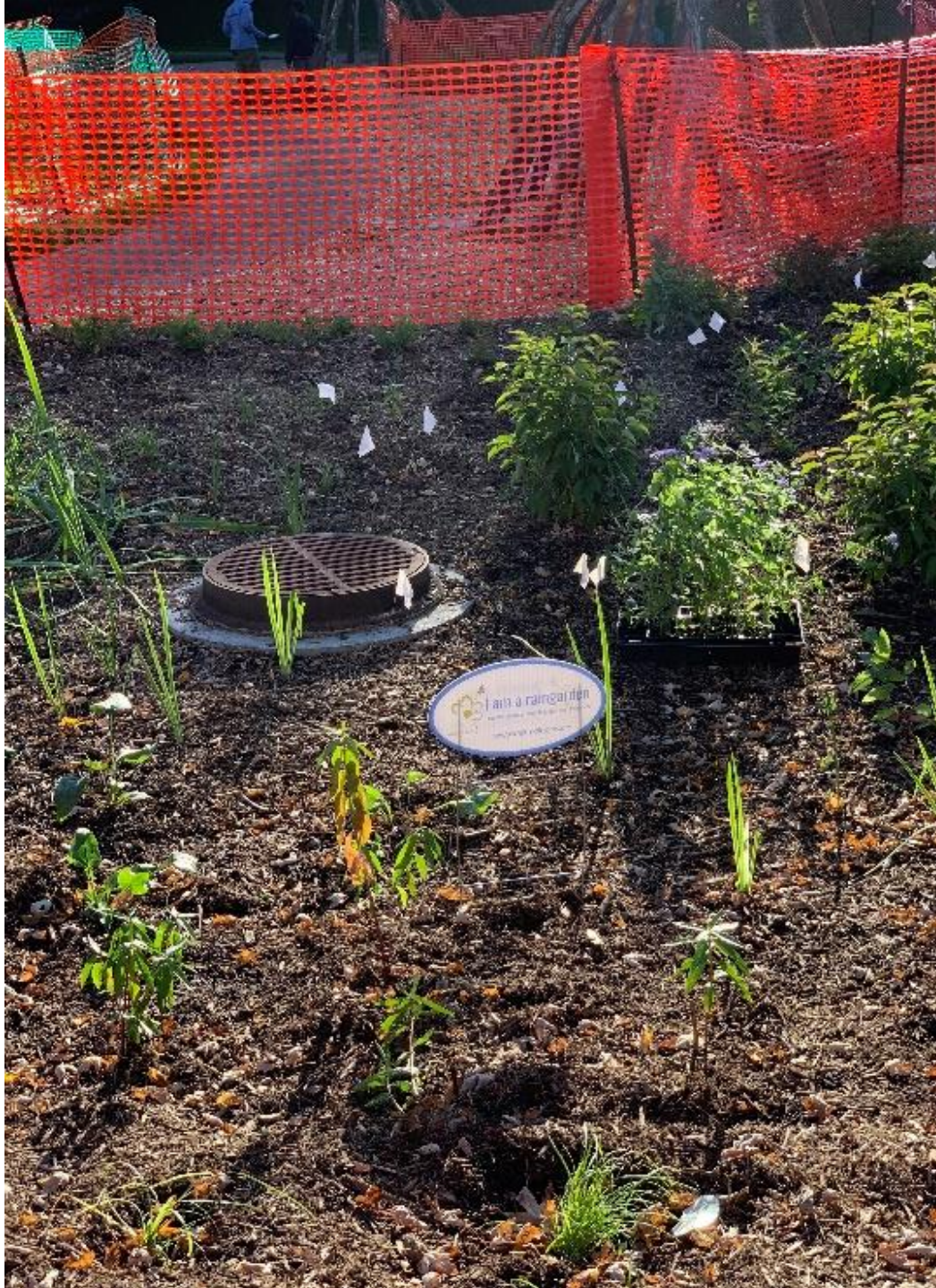
- Plantings for color
- Resident garden/vegetable beds
- More seating/benches under shade
- More play spaces for children
- Soccer, basketball courts
- Gathering spaces
- ADA sidewalk access (NW side)
- Circuit walking path or more paths
- More signage
- Visitor Parking
- Better lighting (safety concerns)
- Bus shelters/waiting areas

PHASE 1 CAPTURE AREA

RG 1A & 1B - 45688 sf
RG 1C - 27324 sf

CONCEPT PLAN PHASE 1

GRAPHIC SCALE
0' 15' 30' 60'
1 inch = 30 feet



4,282 sq ft new habitat

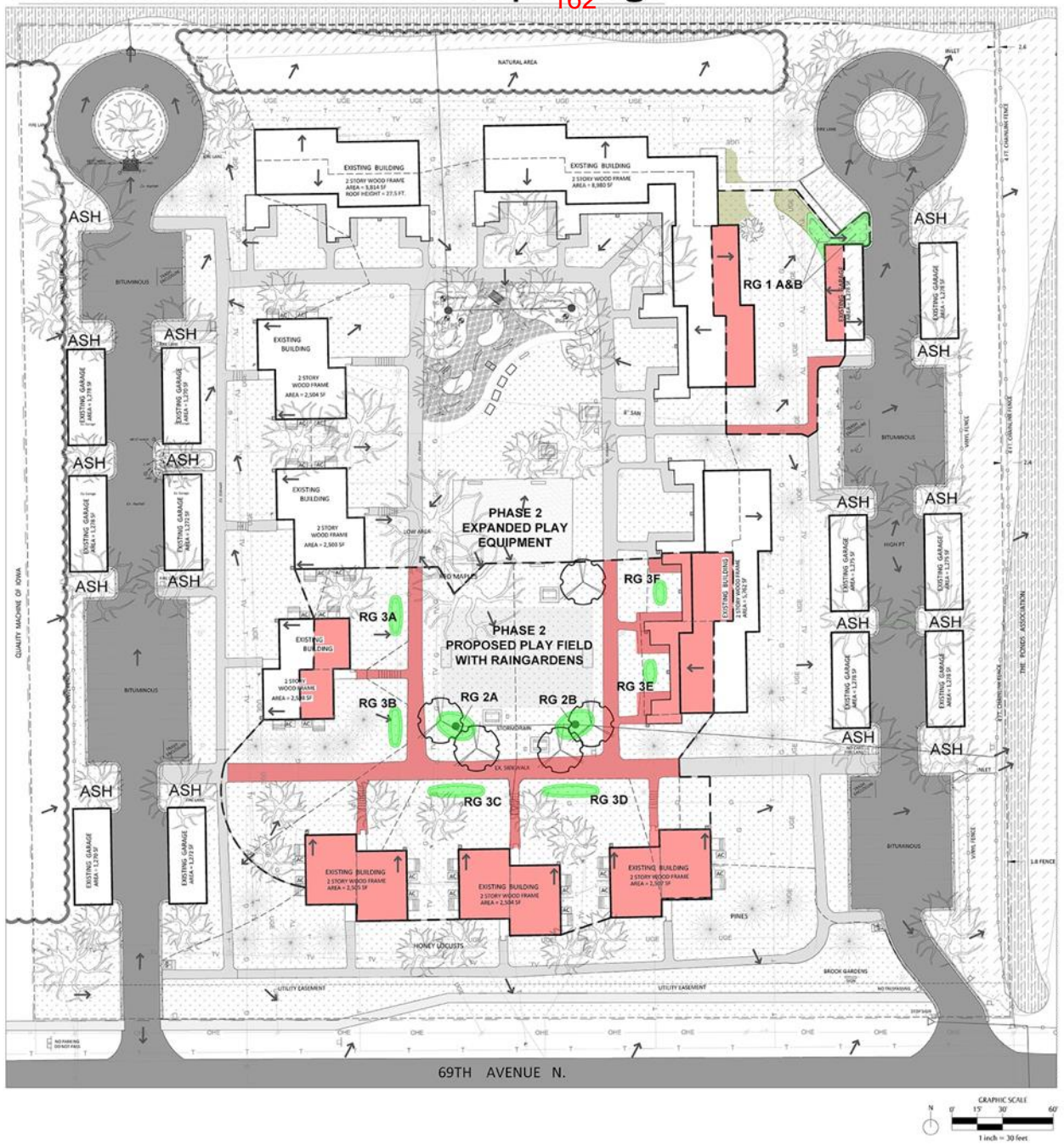
Annual Capture

- 1.17 million gallons runoff
- 2,000 lbs solids
- 4.5 lbs total phosphorus

Somewhere to Play

Phase 2: 2021

Brook Gardens Phase 2 Concept Design



LEGEND

- Proposed Planted Areas
- Proposed Raingardens
- Impervious Area Treated in Raingardens
- Lawn
- Building
- Parking/Fire Lane
- Walkways/Patios
- Flood zone
- Creek
- Direction of Runoff
- Downspouts
- Drainage area to proposed raingarden
- Property Line
- Utilities
- Existing Fence
- Sub-catchment Treament Limits
- Soil Infiltration Test
- Storm Sewer Catch Basin
- Sanitary Sewer Man Hole
- Lights
- Existing Tree
- Proposed Tree
- Proposed Table & Grill

PHASE 2 DESIGN INTENT

Building on progress from phase 1, phase 2 is continues the two primary collective goals of the Brook Gardens community:

The first goal is to build community gathering and play space, this time for older children and adults. Consistent resident feedback requests a place for ball sports, a sturdier playgound and the creation of planted areas with seating in shade.

The second vital goal captures stormwater runoff near the office prior to the direct inlet to the creek, as well as significant lawn runoff from the south central commons field area which currently flows into a stormdrain straight into the creek. These specific focus areas would intercept the remaining half of stormwater flow not addressed in Phase 1.

In support of the creation of tree canopy, ten of the approximate 24 existing ash trees will be removed and replaced through the Hennepin County tree grant in 2021, installing a diverse addition of hardy urban tree species.

EXISTING OFFICE ENTRY

EXISTING SOUTH COMMON AREA

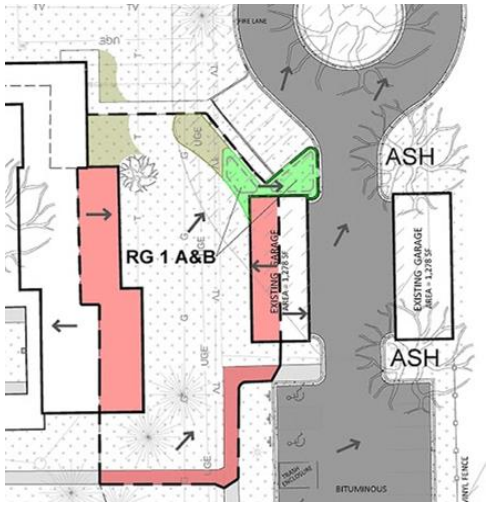
Proximity to Creek:

Right of East Garages

Behind Office & North Apartments

Phase 2 Capture

SITE KEY



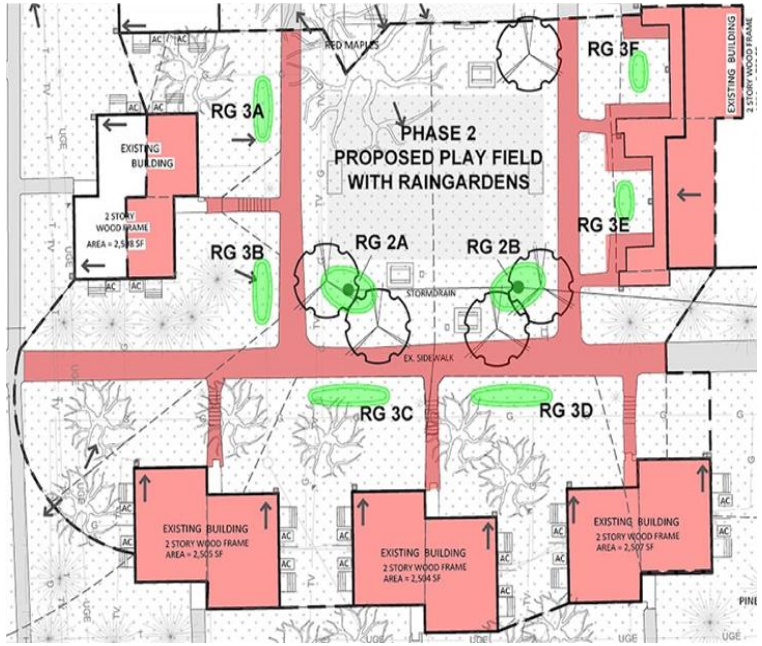
1 OFFICE CAPTURE

Impervious area treated:	2894 sq ft
Lawn area treated:	6153 sq ft
Total Raingarden Area:	474 sq ft @ 3” deep

Runoff Captured Annually:

- 7006 cu ft (52,408.52 gallons) (32.26%)
- 0.304 pounds Total Phosphorus reduction (31.44%)
- 110 pounds Total Suspended Solids reduction (31.56%)

Modeled with WinSLAMM using .1”/24 hr infiltration rate



2 SOUTH COURTYARD CAPTURE

Impervious area treated:	18,618 sq ft
Lawn area treated:	34,274 sq ft
Total Raingarden Area:	1,612 sq ft @ 6” deep

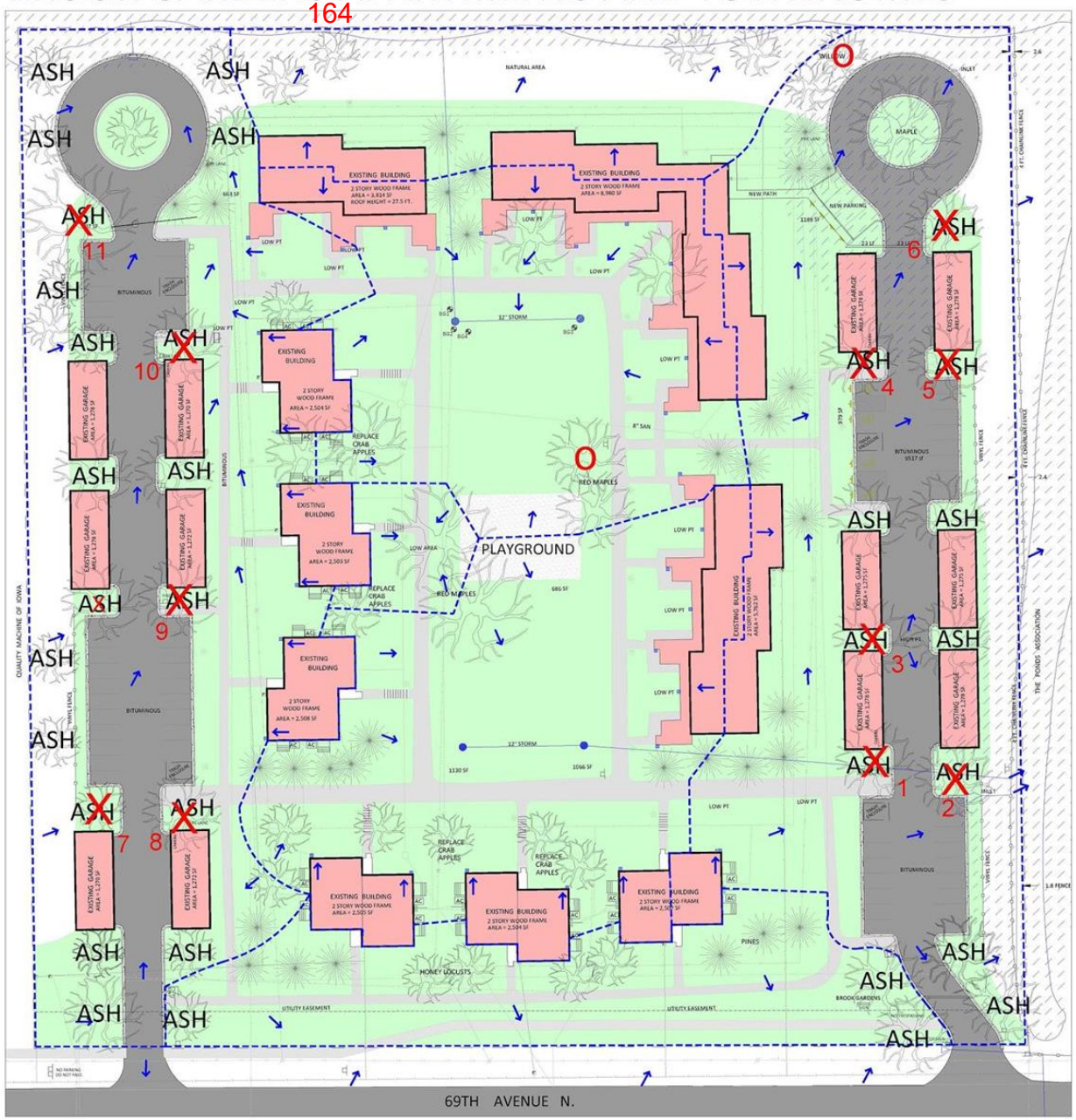
Runoff Captured Annually:

- 99,485 cu ft (744,199 gallons) (82.02% avg)
- 4.240 pounds Total Phosphorus reduction (81.65% avg)
- 1,560.38 pounds Total Suspended Solids reduction (81.72% avg)

Modeled with WinSLAMM using 2.5”/24 hr infiltration rate

Sustainable Tree Canopy

BROOK GARDENS APARTMENTS AND TOWNHOMES



5550 - 69th Avenue North, Brooklyn Park, MN 55429

GRAPHIC SCALE
0' 15' 30' 60'
1 inch = 30 feet

EXISTING SITE INFO

TOTAL AREA:	354,671 sq ft (8.14 acres)
PERVIOUS:	221,009 sq ft (5.07 acres)
LAWN	174,474 sq ft (4.00 acres)
NATURAL	44,240 sq ft (1.01 acres)
IMPERVIOUS:	133,662 sq ft (3.06 acres)
TREES:	Approx 80 on site (25 are ash - 31%)
PARKING:	62 spaces + garages

POTENTIAL STORMWATER RUNOFF:
1.1"/24 hour rain event
12,219 cubic feet (91,404 gallons)

30.7" Annual Average Rainfall
377,468 cubic feet (2,823,661 gallons)

= 4.25 Olympic Swimming pools

LEGEND

- Lawn
- Building
- Parking/Fire Lane
- Walkways/Patios
- Flood zone
- Direction of Runoff
- Downspouts
- Property Line
- Utilities
- Existing Fence
- Sub-catchment areas
- Soil Infiltration Test
- Existing Tree
- ASH Ash Trees to remove

SOIL INFILTRATION TESTS

BG1: 8.64 IN/HR
BG2: 15.64 IN/HR
BG3: 0.92 IN/HR
BG4: 5.53 IN/HR

DRIVE LANE TREES

Funding Request: $30,000

Committed Match:

- Hennepin County Opportunity Grant: $40,257
- Boisclair Corporation: $2,850
- Hennepin County Tree Canopy Grant: $13,000

Total Project Cost Estimate: $86,107

Maria Riewer
Director of Property Management
mriewer@boisclaircorporation.com

Jennifer Moeller
Landscape Designer, MLA
jmoeller@metroblooms.org

Laura Scholl
Project Manager
laura@metroblooms.org

metroblooms.org

Artwork: Maggie Wiebe

To: Shingle Creek WMO Commissioners

From: Ed Matthiesen, P.E.
Diane Spector

Date: April 2, 2021

Subject: Brooklyn Center Cost Share Reimbursement

Recommended Commission Action	Approve City Cost-Share reimbursement of $50,000 for the city of Brooklyn Center Brine Making Equipment project.

Background

The Commission maintains a City Cost Share program to assist cities in implementing Best Management Practices that are too small to be included on the CIP, with a preference given to projects that projects identified in a subwatershed assessment or TMDL

In 2018 the Board of Water and Soil Resources initiated its Watershed-Based Implementation Funding (WBIF) Pilot Program, allocating funds to each of the Metro-area counties for grants for projects and practices. The eligible parties in each county decided how to allocate the funds. Shingle Creek received $68,129 and West Mississippi $35,442. Both Commissions elected to deposit the proceeds into the City Cost-Share Program accounts for small projects.

Shingle Creek allocated its funds to three projects:

- New Hope Civic Center BMPs: $25,000
- Brooklyn Center Brine System: $25,000
- Meadow Lake Management Plan: $18,129

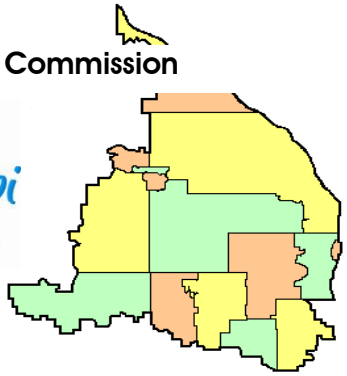
West Mississippi allocated its funds to the Brooklyn Park River Park project.

Action

In 2019 Brooklyn Center applied for up to $50,000 from the Commission's Cost Share Program to help fund purchase and installation of brine making equipment for use in their winter maintenance activities. At the time the City purchased brine from Brooklyn Park and stored it at their municipal garage. Installing brine making equipment on-site would allow the city to make brine on demand and to calibrate it to an individual storm event's need. The TAC reviewed and recommended to the Commission that it be approved and funded $25,000 from the funds received from the WBIF and $25,000 from program funds.

The purchase and installation of the brine making equipment is complete and operational and the city has submitted documentation and a reimbursement request for $50,000. **Staff has reviewed and it is recommended for approval.**

Shingle Creek Watershed Management Commission
West Mississippi Watershed Management Commission
3235 Fernbrook Lane N • Plymouth, MN 55447
Tel: 763.553.1144 • Fax: 763.553.9326
Email: judie@jass.biz • Website: www.shinglecreek.org



Shingle Creek and West Mississippi Watershed Management Commissions
Cost Share Program Final Request for Reimbursement

Project Name: Brine Making Equipment

Lead City: Brooklyn Center

Contact Person: Andrew Hogg

Estimated Project Cost	$125,000
Estimated Commission Cost Share	$50,000
Final Project Cost	$101,072
Maximum Cost Share	$50,000
Amount Requested	$50,000
Difference	$0

Final Project Cost	
Construction	$101,072
Engineering	
Professional Services	
City Staff	
Other*	
TOTAL	$101,072 x50%
	$50,536
Lesser of 50% or $50,000	$50,000

*Explain

Please provide the following:

1. As-builts of features for which cost share is requested, and/or other information documenting that the project achieved the desired outcomes
2. Documentation of all project costs (can be a financial ledger report)

Submit documentation to Ed Matthiesen, emathiesen@wenck.com. Direct questions regarding cost share program costs to Diane Spector, dspector@wenck.com.

To: Shingle Creek WMO Commissioners

From: Ed Matthiesen, P.E.
Diane Spector

Date: April 2, 2021

Subject: Crystal Lake Alum Treatment Cooperative Agreement

Recommended Commission Action	Authorize entering into a Cooperative and Subgrant Agreement with the City of Robbinsdale for the Crystal Lake Alum Treatment project, subject to approval by the Commission's Attorney.

The Commission had previously received an EPA Section 319 grant for the Crystal Lake Management Plan that includes funding a series of alum treatments on Crystal Lake. The City of Robbinsdale is in the process of obtaining quotes for that work and expects to award a contract in early April. The first alum dose should be completed in late April or Early May.

Because the Joint Powers Agreement does not authorize the Commission to enter into construction contracts, typically one city serves as the lead agency and the affected parties (Commission and one or more cities) enter into a Cooperative and Subgrant Agreement whereby the city (or cities) agrees to perform the work and ensure that the obligations in the grant agreement are met. The Commission then agrees to reimburse the City (or cities) for its costs from the grant proceeds and Commission levy funds.

Attached is a draft Agreement for this project. It is still being reviewed by the respective attorneys. Staff recommends that the Commission authorize execution of the agreement once it has received approval from the City and Commission Attorneys.

Z:\Shingle Creek\CIPs\2019-02 Crystal Lake Mgmt Plan\M-approve Robbinsdale coop agreement.docx

COOPERATIVE AND SUBGRANT AGREEMENT
FOR
CRYSTAL LAKE ALUM TREATMENT PROJECT

This Cooperative and Subgrant Agreement ("**Agreement**") is made as of this ___ day of _____ 2021 by and between the Shingle Creek Watershed Management Commission, a joint powers watershed management organization, ("**Commission**") and the City of Robbinsdale, a Minnesota municipal corporation, ("**City**"). The Commission and the City may hereinafter be referred to individually as a "party" and collectively as the "parties."

RECITALS

A. On April 11, 2013, the Commission and the West Mississippi Watershed Management Commission jointly adopted the Shingle Creek and West Mississippi Third Generation Watershed Management Plan ("**Plan**"), a watershed management plan within the meaning of Minn. Stat. § 103B.231.

B. The Plan includes a capital improvement program ("**CIP**") that lists a number of water quality project capital improvements.

C. The water quality projects identified in the CIP include the Crystal Lake Management Plan, which includes as Objective One, Task B, which is a series of alum treatments to address lake internal loading ("**Project**"), which is more fully described in the attached Attachment One.

D. The Plan specifies that projects in the CIP will be partially or fully funded by a County tax levy under Minn. Stat. § 103B.251.

E. The Commission entered into a grant agreement related to the Project with the Minnesota Pollution Control Agency ("MPCA") effective as of January 1, 2020, a copy of which is attached hereto as Attachment Two ("**MPCA Grant Agreement**").

F. The MPCA Grant Agreement provides that MPCA will grant the Commission a sum not to exceed Two Hundred Sixty-six Thousand Sixty-six and No/100 Dollars ($216,066.00), which funds are to be used for the Project to perform the duties and tasks specified in the MPCA Grant Agreement.

G. On September 12, 2019 the Commission adopted a resolution ordering the Project, directing that it be constructed by the City and that the Commission's share of the Project costs be funded from a levy previously certified to Hennepin County ("**County**") in accordance with Minn. Stat. § 103B.251.

H. The Commission and City have agreed for the City to assume, as subgrantee, certain duties and responsibilities of the Commission, as grantee, under the MPCA Grant Agreement in consideration of receiving a portion of the funds provided for in those grant agreement and subject to the terms, conditions, and limitations set forth therein.

I. The City is willing to construct the Project and to perform the duties as a subgrantee in accordance with the terms and conditions of this Agreement.

AGREEMENT

In consideration of the mutual covenants and agreements hereinafter set forth, and intending to be legally bound, the parties hereby agree as follows:

1. Project. The Project will consist of the work required to construct the improvements in the City as more fully described in Attachment One. The Project will be constructed on land owned by the City or within easement areas held by the City.

2. Contract Administration. The City will advertise for bids and award the contract for the Project in accordance with the requirements of law. The City will award the contract and supervise and administer the construction of the Project to ensure that it is completed in accordance with the scope of the Project identified in Attachment One. The City will require the contractor to name the Commission as additional insured on all liability policies required by the City of the contractor and the Commission shall be given the same notification of cancellation or non-renewal as is given to the City. The City will require that the contractor defend, indemnify, protect and hold harmless the Commission and the City, their agents, officers, and employees, from all claims or actions arising from performance of the work of the Project conducted by the contractor. The City will supervise the work of the contractor. However, the Commission may observe and review the work of the Project until it is completed.

3. Contract Payments. The City will pay the contractor and all other expenses related to the construction of the Project and keep and maintain complete records of such costs incurred.

4. Commission Reimbursement. Reimbursement to the City will be made as soon as funds are available provided a request for payment has been received from the City providing such detailed information as may be requested by the Commission to substantiate costs and expenses.

5. Limits on Reimbursement. The total reimbursement paid by the Commission to the City for the Project will not exceed the cost of the stream restoration and professional services contracts, estimated to be Two Hundred Thousand Dollars ($200,000). Reimbursement will not exceed the costs and expenses incurred by the City for the Project, less any amounts the City receives for the Project as grants from other sources. All costs of the Project incurred by the City in excess of such reimbursement, including all costs incurred in excess of estimated project costs due to unforeseen conditions or any other cause, shall be borne by the City or secured by the City from other sources.

6. Grant Agreement. The Commission agrees to forward to the City the funds the Commission receives from the MPCA Grant Agreement for the Project based upon approved reimbursement requests received from the City and conditioned on City's continuing compliance with its obligations under this Agreement.

7. City Obligations as Subgrantee. The City will perform and satisfy certain obligations of the Commission under the Grant Agreement. Specifically, but without limiting the foregoing, the City will perform all of the following with respect to the Project and in satisfaction of the obligations of the Grant Agreement:

   (a) The City will perform, or participate in, all elements of the Project as described or otherwise identified in the Grant Agreement, as it may be amended, and will properly document expenses, including time and materials, in the manner expressed in the Grant Agreement and will provide information to the Commission to aid in accurate grant reporting as required in the Grant Agreement. Any amendments made to the Grant Agreement, including its exhibits, are incorporated in and made part of this Agreement by reference.

   (b) The City will comply with all requirements and conditions of the Grant Agreement applicable to the Project that, by their nature, must be performed by City rather than Commission and that are conditions of award of funds under the Grant Agreement.

   (c) The times of performance and expiration of City's obligations under this Agreement shall be as provided in the Grant Agreement.

   (d) The City will provide invoices for reimbursement in accordance with the requirements of the Grant Agreement.

   (e) The City will take all other actions as are needed to ensure compliance with the Grant Agreement and provide such information and assistance to the Commission as may be needed to ensure the Commission can comply with the requirements of the Grant Agreement that, by their nature, must be performed by the Commission rather than the City.

8. Indemnification. The City will defend, indemnify, protect and hold harmless the Commission and its agents, officers, and employees, from any claims arising out of conducting the Project, including environmental claims. Nothing herein shall be deemed a waiver of the limitations of liability in Minnesota Statutes, chapter 466.

9. Audit. All City books, records, documents, and accounting procedures related to the Project are subject to examination by the Commission and either the State Auditor or the Legislative Auditor for at least six years after completion of the Project.

10. Data Practices. The City shall retain and make available data related to the letting of contracts and construction of the Project in accordance with the Minnesota Government Data Practices Act.

11. Legal Compliance. The City is responsible for complying with all applicable federal, state, and local laws, rules, regulations, and ordinances and for securing all required permits related to the Project.

12. Term. This Agreement shall be in effect as of the date first written above and shall continue until the Project is fully constructed and all obligations under the Grant Agreement have been completed. The indemnification, data practices, audit, and ongoing maintenance obligations set out herein shall survive the termination of this Agreement.

13. Entire Agreement. The above recitals and the attachments attached hereto are incorporated in and made part of this Agreement. This Agreement contains the entire understanding between the parties regarding this matter and no amendments or other modifications of its terms are valid unless reduced to writing and signed by both parties.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized officers on behalf of the parties as of the day and date first above written.

SHINGLE CREEK WATERSHED MANAGEMENT COMMISSION

By:_____
Its Chair

And by:_____
Its Secretary

CITY OF ROBBINSDALE

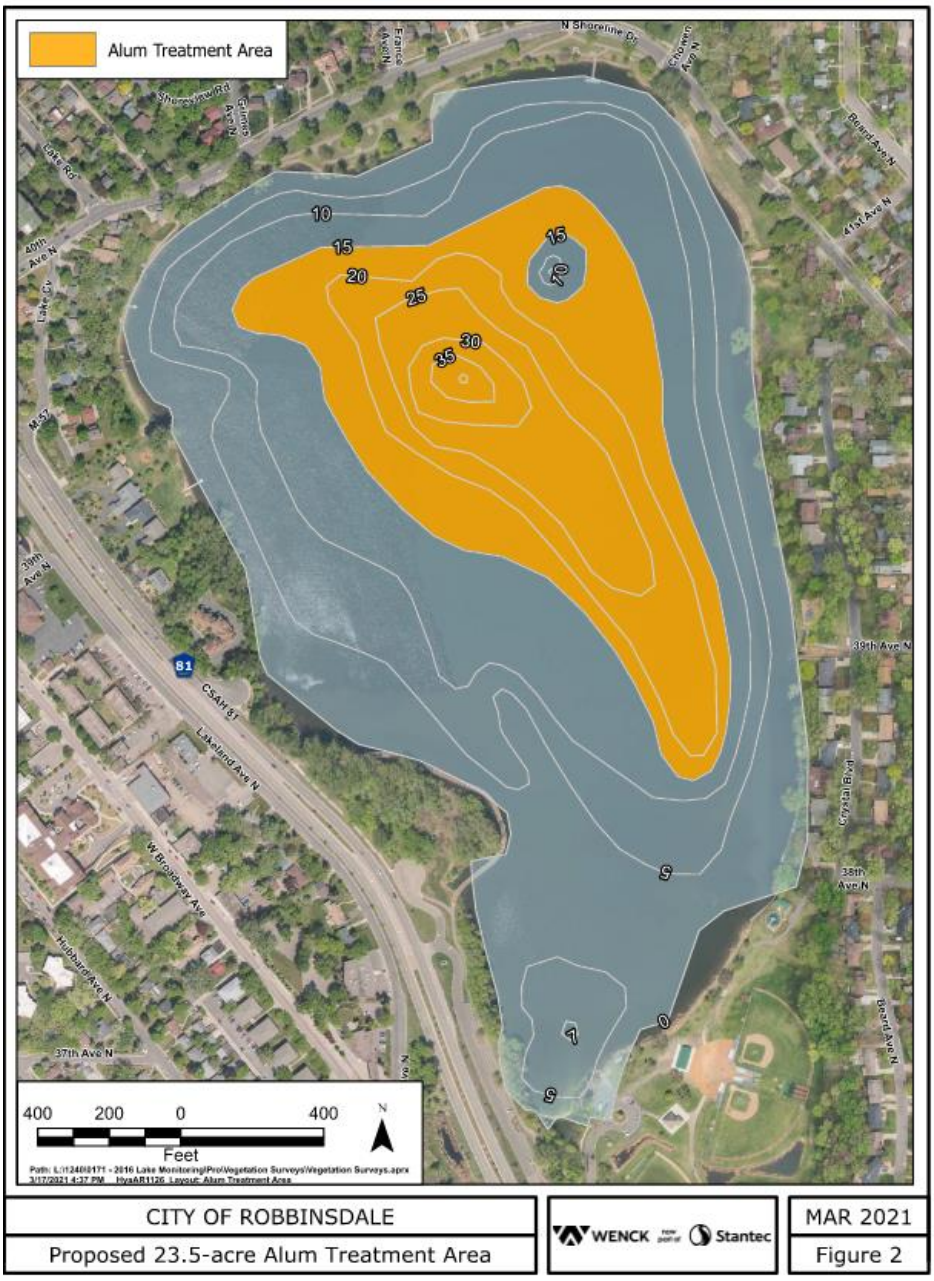
By: _____
Its Mayor

And by: _____
Its City Manager

ATTACHMENT ONE
Crystal Lake Alum Treatment Project

Overall Project Narrative:

The project is Objective One, Task B of the Crystal Lake Management Plan. This task is the application of aluminum sulfate (alum) to the Crystal Lake sediments in two doses at least one year apart in an effort to significantly reduce the release of phosphorus from the sediment in the deeper areas of the lake. The Commisson will take sediment cores from the lake prior to the alum treatment to calculate the maximum initial dosage for alum. Ther COmmision will use dissolved oxygen (DO) profiles previously taken on Crystal Lake to establish the treatment area. Additional cores and DO profiles will be taken following the initial alum dose and results used to make any necessary adjustments to application rates and areas. A final set of cores taken following the second application will be evaluated to verify that the desired reductions have been achieved.



CITY OF ROBBINSDALE	WENCK / Stantec	MAR 2021
Proposed 23.5-acre Alum Treatment Area		Figure 2

ATTACHMENT TWO
BWSR Grant Agreement

(attached hereto)

WENCK now part of Stantec

To: Shingle Creek WMO Commissioners

From: Ed Matthiesen, P.E.
Diane Spector

Date: April 2, 2021

Subject: Authorize Executing BWSR Grant Agreement

Recommended Commission Action	Authorize execution of the grant agreement.

The Board of Water and Soil Resources (BWSR) has prepared a Grant Agreement for the two Clean Water Fund (CWF) grants awarded to the Commission: the Connections II Shingle Creek Restoration Project and the Meadow Lake Management Plan.

Both these grants provide 75% funding for these projects. Last fall the Commission certified levies to fund the required match. These will be for the most part pass-through grants. The member cities (in this case Brooklyn Center and New Hope) will serve as the lead agency. The Commission and the cities will enter into a cooperative and subgrant agreement whereby the Commission agrees to reimburse the respective city for the costs of completing the project and the cities agree to complete the project ion accordance with the grant agreement. The Commission will retain a portion of the grant funds to cover the costs of performance monitoring. Approval of these cooperative agreements will be separate Commission actions.

BOARD OF WATER AND SOIL RESOURCES

FY 2021 STATE OF MINNESOTA
BOARD OF WATER and SOIL RESOURCES
CLEAN WATER FUND COMPETITIVE GRANTS PROGRAM
GRANT AGREEMENT

Vendor:	0000237333
PO#:	3000013060

This Grant Agreement is between the State of Minnesota, acting through its Board of Water and Soil Resources (Board) and **Shingle Creek WMC, 3235 Fernbrook Lane Plymouth Minnesota 55447** (Grantee).

This grant is for the following Grant Programs :		
C21-0949	Meadow Lake Management Plan	$153,510
C21-9903	Shingle Creek Connections II Stream Restoration	$328,000

Total Grant Awarded: **$481,510**

Recitals

1. The Laws of Minnesota 2019, 1st Special Session, Chapter 2, Article 2, Section 7(b)&(j), appropriated Clean Water Funds (CWF) to the Board for the FY 2021 Clean Water Fund Projects & Practices Grants.
2. The Board adopted the FY21 Clean Water Fund Competitive Grant Policy and authorized the FY21 Clean Water Fund Competitive Grants Program through Board Order #20-26.
3. The Board adopted Board Order #20-54 to allocate funds for the FY 2021 Clean Water Fund Competitive Grants Program.
4. The Grantee has submitted a Board approved work plan for this Program, which is incorporated into this Grant Agreement by reference.
5. The Grantee represents that it is duly qualified and agrees to perform all services described in this Grant Agreement to the satisfaction of the Board.
6. As a condition of the grant, Grantee agrees to minimize administration costs.

Authorized Representative

The State's Authorized Representative is Marcey Westrick, Clean Water Coordinator, BWSR, 520 Lafayette Road North, Saint Paul, MN 55155, 651-284-4153, or her successor, and has the responsibility to monitor the Grantee's performance and the authority to accept the services and performance provided under this Grant Agreement.

The Grantee's Authorized Representative is:

Andy Polzin, Chair
3235 Fernbrook Lane N
Plymouth, MN 55447
763-553-1144

If the Grantee's Authorized Representative changes at any time during this Grant Agreement, the Grantees must immediately notify the Board.

Grant Agreement

1. **Terms of the Grant Agreement.**
   1.1. ***Effective date:*** The date the Board obtains all required signatures under Minn. Stat. § 16B.98, Subd. 5. **The Board will notify the Grantee when this Grant Agreement has been executed. The Grantee must not begin work under this Grant Agreement until it is executed.**
   1.2. ***Expiration date: December 31, 2023***, or until all obligations have been satisfactorily fulfilled, whichever comes first.
   1.3. ***Survival of Terms:*** The following clauses survive the expiration date or cancellation of this Grant Agreement: 7. Liability; 8. State Audits; 9. Government Data Practices; 11. Publicity and Endorsement; 12. Governing Law, Jurisdiction, and Venue; 14. Data Disclosure; and 19. Intellectual Property Rights.

2. **Grantee's Duties.**
The Grantee will comply with required grants management policies and procedures set forth through Minn. Stat § 16B.97, Subd.4(a)(1). The Grantee is responsible for the specific duties for the Program as follows:
2.1. ***Implementation:*** The Grantee will implement their work plan, which is incorporated into this Grant Agreement by reference.
2.2. ***Reporting:*** All data and information provided in a Grantee's report shall be considered public.
2.2.1. The Grantee will submit an annual progress report to the Board by February 1 of each year on the status of Program implementation by the Grantee. Information provided must conform to the requirements and formats set by the Board. All individual grants over $500,000 will also require a reporting expenditure by June 30 of each year.
2.2.2. The Grantee will prominently display on its website the Clean Water Legacy Logo and a link to the Legislative Coordinating Commission website.
2.2.3. Final Progress Report: The Grantee will submit a final progress report to the Board by February 1, 2024 or within 30 days of completion of the project, whichever occurs sooner. Information provided must conform to the requirements and formats set by the Board.
2.3. ***Match:*** The Grantee will ensure any local match requirement will be provided as stated in Grantee's approved work plan.

3. **Time.**
The Grantee must comply with all the time requirements described in this Grant Agreement. In the performance of this Grant Agreement, time is of the essence.

4. **Terms of Payment.**
4.1. Grant funds will be distributed in three installments: 1) The first payment of 50% will be distributed after the execution of the Grant Agreement. 2) The second payment of 40% will be distributed after the first payment of 50% has been expended and reporting requirements have been met. An eLINK Interim Financial Report that summarizes expenditures of the first 50% must be signed by the Grantee and approved by the Board. Selected grantees may be required at this point to submit documentation of the expenditures reported on the Interim Financial Report for verification. 3) The third payment of 10% will be distributed after the grant has been fully expended and reporting requirements are met. The final, 10% payment must be requested within 30 days of the expiration date of the Grant Agreement. An eLINK Final Financial Report that summarizes final expenditures for the grant must be signed by the Grantee and approved by the Board.
4.2. All costs must be incurred within the grant period.
4.3. All incurred costs must be paid before the amount of unspent funds is determined. Unspent grant funds must be returned within 30 days of the expiration date of the Grant Agreement.
4.4. The obligation of the State under this Grant Agreement will not exceed the amount listed above.
4.5. This grant includes an advance payment of 50% of the grant's total amount. Advance payments allow the Grantee to have adequate operating capital for start-up costs, ensure their financial commitment to landowners and contractors, and to better schedule work into the future.

5. **Conditions of Payment.**
5.1. All services provided by the Grantee under this Grant Agreement must be performed to the Board's satisfaction, as set forth in this Grant Agreement and in the Board approved work plan for this Program. Compliance will be determined at the sole discretion of the State's Authorized Representative and in accordance with all applicable federal, State, and local laws, policies, ordinances, rules, FY21 Clean Water Fund Competitive Grant Policy, and regulations. The Grantee will not receive payment for work found by the Board to be unsatisfactory or performed in violation of federal, State or local law.
5.2. Minnesota Statutes §103C.401 (2018) establishes the Board's obligation to assure program compliance. If the noncompliance is severe, or if work under the Grant Agreement is found by the Board to be unsatisfactory or performed in violation of federal, State, or local law, the Board has the authority to require the repayment of grant funds or withhold payment on grants from other programs.

6. **Assignment, Amendments, and Waiver**
6.1. ***Assignment.*** The Grantee may neither assign nor transfer any rights or obligations under this Grant Agreement without the prior consent of the Board and a fully executed Assignment Agreement, executed and approved by the same parties who executed and approved this Grant Agreement, or their successors in office.
6.2. ***Amendments.*** Any amendments to this Grant Agreement must be in writing and will not be effective until it has been approved and executed by the same parties who approved and executed the original Grant Agreement, or their successors in office. Amendments must be executed prior to the expiration of the original Grant Agreement or any amendments thereto.

6.3. ***Waiver.*** If the Board fails to enforce any provision of this Grant Agreement, that failure does not waive the provision or its right to enforce it.

7. **Liability.**
The Grantee must indemnify, save, and hold the State, its agents, and employees harmless from any claims or causes of action, including attorney's fees incurred by the State, arising from the performance of this Grant Agreement by the Grantee or the Grantee's agents or employees. This clause will not be construed to bar any legal remedies the Grantee may have for the State's failure to fulfill its obligations under this Grant Agreement.

8. **State Audits.**
Under Minn. Stat. § 16B.98, Subd. 8, the Grantee's books, records, documents, and accounting procedures and practices of the Grantee or other party relevant to this Grant Agreement or transaction are subject to examination by the Board and/or the State Auditor or Legislative Auditor, as appropriate, for a minimum of six years from the end of this Grant Agreement, receipt and approval of all final reports, or the required period of time to satisfy all State and program retention requirements, whichever is later.

8.1. The books, records, documents, accounting procedures and practices of the Grantee and its designated local units of government and contractors relevant to this grant, may be examined at any time by the Board or Board's designee and are subject to verification. The Grantee or delegated local unit of government will maintain records relating to the receipt and expenditure of grant funds.

9. **Government Data Practices.**
The Grantee and State must comply with the Minnesota Government Data Practices Act, Minn. Stat. Ch. 13, as it applies to all data provided by the State under this Grant Agreement, and as it applies to all data created, collected, received, stored, used, maintained, or disseminated by the Grantee under this Grant Agreement. The civil remedies of Minn. Stat. § 13.08 apply to the release of the data referred to in this clause by either the Grantee or the State.

10. **Workers' Compensation.**
The Grantee certifies that it is in compliance with Minn. Stat. § 176.181, Subd. 2, pertaining to workers' compensation insurance coverage. The Grantee's employees and agents will not be considered State employees. Any claims that may arise under the Minnesota Workers' Compensation Act on behalf of these employees and any claims made by any third party as a consequence of any act or omission on the part of these employees are in no way the State's obligation or responsibility.

11. **Publicity and Endorsement.**

11.1. ***Publicity.*** Any publicity regarding the subject matter of this Grant Agreement must identify the Board as the sponsoring agency. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Grantee individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from this Grant Agreement.

11.2. ***Endorsement.*** The Grantee must not claim that the State endorses its products or services

12. **Governing Law, Jurisdiction, and Venue.**
Minnesota law, without regard to its choice-of-law provisions, governs this Grant Agreement. Venue for all legal proceedings out of this Grant Agreement, or its breach, must be in the appropriate State or federal court with competent jurisdiction in Ramsey County, Minnesota.

13. **Termination.**

13.1. The Board may cancel this Grant Agreement at any time, with or without cause, upon 30 days' written notice to the Grantee. Upon termination, the Grantee will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed.

13.2. In the event of a lawsuit, an appropriation from a Clean Water Fund is canceled to the extent that a court determines that the appropriation unconstitutionally substitutes for a traditional source of funding.

13.3. The Board may immediately terminate this Grant Agreement if the Board finds that there has been a failure to comply with the provisions of this Grant Agreement, that reasonable progress has not been made or that the purposes for which the funds were granted have not been or will not be fulfilled. The Board may take action to protect the interests of the State of Minnesota, including the refusal to disburse additional funds and requiring the return of all or part of the funds already disbursed.

14. **Data Disclosure.**
Under Minn. Stat. § 270C.65, Subd. 3, and other applicable law, the Grantee consents to disclosure of its social security number, federal employer tax identification number, and/or Minnesota tax identification number, already provided to the State, to federal and State tax agencies and State personnel involved in the payment of State obligations. These identification numbers may be used in the enforcement of federal and State tax laws which could result in action requiring the Grantee to file State tax returns and pay delinquent State tax liabilities, if any.

15. **Prevailing Wage.**
It is the responsibility of the Grantee or contractor to pay prevailing wage for projects that include construction work of $25,000 or more, prevailing wage rules apply per Minn. Stat. §§ 177.41 through 177.44. All laborers and mechanics employed by grant recipients and subcontractors funded in whole or in part with these State funds shall be paid wages at a rate not less than those prevailing on projects of a character similar in the locality. Bid requests must state the project is subject to prevailing wage.

16. **Municipal Contracting Law.**
Per Minn. Stat. § 471.345, grantees that are municipalities as defined in Subd. 1 of this statute must follow the Uniform Municipal Contracting Law. Supporting documentation of the bidding process utilized to contract services must be included in the Grantee's financial records, including support documentation justifying a single/sole source bid, if applicable.

17. **Constitutional Compliance.**
It is the responsibility of the Grantee to comply with requirements of the Minnesota Constitution regarding the use of Clean Water Funds to supplement traditional sources of funding.

18. **Signage.**
It is the responsibility of the Grantee to comply with requirements for project signage as provided in Minnesota Laws 2010, Chapter 361, Article 3, Section 5(b) for Clean Water Fund projects.

19. **Intellectual Property Rights.**
The State owns all rights, title, and interest in all of the intellectual property rights, including copyrights, patents, trade secrets, trademarks, and service marks in the Works and Documents *created and paid for under this grant.* Works means all inventions, improvements, discoveries, (whether or not patentable), databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, and disks conceived, reduced to practice, created or originated by the Grantee, its employees, agents, and subcontractors, either individually or jointly with others in the performance of this grant. Work includes "Documents." Documents are the originals of any databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, disks, or other materials, whether in tangible or electronic forms, prepared by the Grantee, its employees, agents or subcontractors, in the performance of this grant. The Documents will be the exclusive property of the State and all such Documents must be immediately returned to the State by the Grantee upon completion or cancellation of this grant at the State's request. To the extent possible, those Works eligible for copyright protection under the United State Copyright Act will be deemed to be "works made for hire." The Grantee assigns all right, title, and interest it may have in the Works and the Documents to the State. The Grantee must, at the request of the State, execute all papers and perform all other acts necessary to transfer or record the State's ownership interest in the Works and Documents.

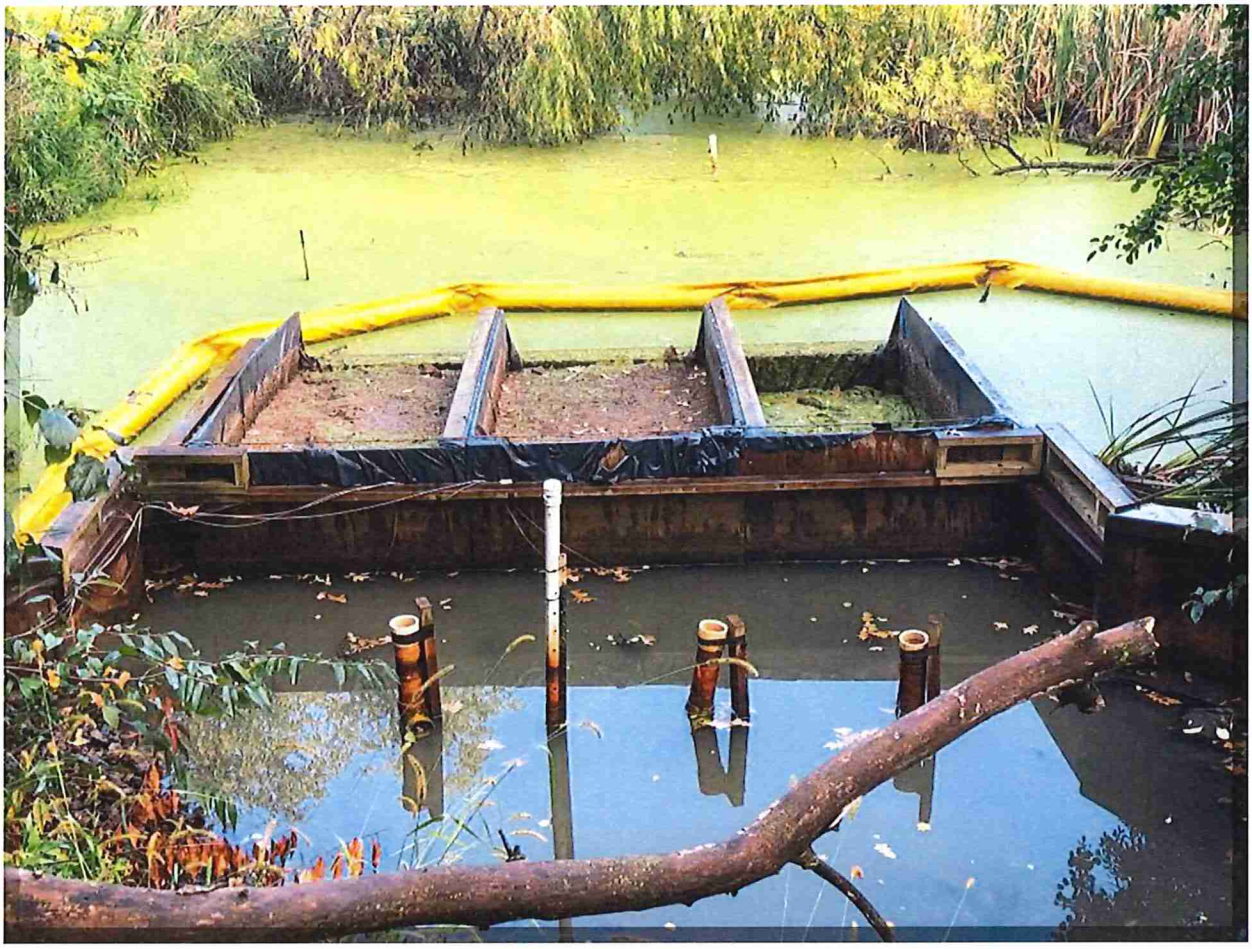
***IN WITNESS WHEREOF**, the parties have caused this Grant Agreement to be duly executed intending to be bound thereby.*

Approved:

Shingle Creek WMC	**Board of Water and Soil Resources**
By: ____Andy Polzin_____ *(print)*	**By:** _____
_____ *(signature)*	
Title:_____Chair_____	**Title:** _____
Date: ____April 8, 2021_____	**Date:** _____

03-26-2021 Draft 5 151-71-6

DRAFT



Shingle Creek Watershed Management Commission

2020 Annual Activity Report

Table of Contents

This report was prepared for the
Shingle Creek Watershed Management Commission
by JASS

Questions regarding this report should be directed to
JASS, 763.553.1144 or judie@jass.biz.

We gratefully acknowledge the assistance of
Diane Spector and Katie Kemmitt, Wenck/Stantec

Cover photograph:

SRP Reduction Project. 2020 marked the second year of SRP monitoring at wetland 639W, just upstream of Upper Twin Lake in Crystal. Monitoring results are less pronounced than in 2019, but the incoming SRP (soluble reactive phosphorus) concentrations are also lower than last year. The outlet box design was modified slightly to provide a method of keeping large debris from being swept into the box.

2020 Annual Activity Report

This annual report has been prepared by the Shingle Creek Watershed Management Commission in accordance with the annual reporting requirements of Minnesota Rules Chapter 8410.0150, Subps. 2 and 3. It summarizes the activities undertaken by the Commission during calendar year 2020.

The Commission

The Shingle Creek Watershed Management Commission is governed by a nine-member board comprised of representatives from each member city who are appointed for terms of three years. The nine member cities are Brooklyn Center, Brooklyn Park, Crystal, Maple Grove, Minneapolis, New Hope, Osseo, Plymouth and Robbinsdale. Commissioners who served in 2020 are shown in *Appendix 1.* Also shown there are members of the Technical Advisory Committee (TAC) who represent the member cities.

Consultants

The Commission has no employees. The names of the consultants currently retained by the Commission are also listed in *Appendix 1.*

Meetings

The Commission meets monthly at 12:45 p.m. on the second Thursday at the Clubhouse at Edinburgh, USA, 8700 Edinbrook Crossing, Brooklyn Park. The meetings are open to the public. Meeting notices, agendas and approved minutes are posted on the Commission's website, www.shinglecreek.org. In 2020, due to the COVID-19 pandemic, Commission meetings were held virtually on www.zoom.us. Meeting dates and times remained the same.

Watershed Management Plan

In 2013 the Shingle Creek and West Mississippi Watershed Management Commissions adopted their joint 2013-2022 Third Generation Watershed Management Plan. The Plan, approved by the Board of Water and Soil Resources on March 27, 2013, is the culmination of a two-year planning effort by the two Commissions, the cities that are members of these Joint Powers Organizations, state agencies, and the public. The Plan sets forth goals and strategies that will guide water resources management activities in the two watersheds over the coming decade. Over the years the Commission, either individually or together with the West Mississippi Commission, has adopted a number of amendments to the Plan. They are described briefly in *Appendix 2.*

Local Plans

Revisions to Minnesota Rules 8410 adopted in 2015 include significant changes in the timing of local water plan revisions. Found under Rule 8410.0105 sub-paragraph 9 and 8410.0160 subparagraph 6 local plan requirements are summarized in *Appendix 3.*

Status of 2020 Work Plan

The Third Generation Watershed Management Plan states that the Shingle Creek and West Mississippi Watershed Management Commissions will annually review progress toward their Third Generation goals and that this evaluation will become part of the Annual Activity Report. The purpose of the annual review is two-fold: to determine progress towards the goals and to be sure the Commission stays on track to reach them. The annual review also provides opportunity to discuss whether the goals and actions in the Plan still make sense or if they should be considered for modification or enhancement, perhaps to add new priorities.

The Shingle Creek Watershed Management Commission established its 2020 Work Plan at its January 9,2020 meeting. Highlights include:

- **Development Projects**

  Complete reviews of development and redevelopment projects as necessary. *Thirteen projects were reviewed by the Commission in 2020. They are described in more detail in* Appendix 4. No variances were requested for these projects. *The Commission does not have a permit program.*

- **Stream Monitoring**

  Complete routine flow and water quality monitoring and special project monitoring on streams in the Shingle Creek watershed. *Completed routine flow and water quality monitoring on Shingle and Bass Creeks at three locations and partnered with the USGS to maintain the Shingle Creek real-time site at Queen Avenue.*

  Compiled data and completed two DO longitudinal surveys on Bass and Shingle Creeks for the Biotic and DO TMDL 5-year review.

  Partnered with the cities of Brooklyn Park and Brooklyn Center to undertake streambank improvements for Shingle Creek from Regent Avenue to Brooklyn Boulevard. Developed concepts and 30% design. Prepared and submitted a Clean Water Find grant application for the Shingle Creek Connections II stream restoration project. This project was not funded; however, the Commission did receive a total of $110,000 Watershed-Based Implementation Funding for this and the Meadow Lake Management Plan project.

  Partnered with the City of Brooklyn Park to prepare a Feasibility Study for streambank

improvements for Bass Creek from Cherokee Drive to I-694 and submit a grant application for partial funding.

Monitored effectiveness of the SRP Reduction site treatment system and presented results at the MN Water Resources Conference and the North American Lake Management Society annual meetings. Prepared a Feasibility Study to extend the SRP Reduction filter along the length of the Wetland 639W overflow channel and submitted a grant application for partial funding.

Volunteer stream monitoring through RiverWatch and wetland monitoring through WHEP (Hennepin County) did not occur in 2020 due to COVID-19.

- **LAKE MONITORING**

  Undertake routine and special project water quality monitoring on watershed lakes.
  Routine monitoring occurred on Eagle, Pike, Crystal, Bass and Pomerleau lakes. While Lower Twin, Ryan, and Schmidt Lakes have been delisted from the draft Impaired Waters list, the Commission has a stretch goal of achieving delisting for Bass, Eagle, Crystal, and Middle Twin lakes.

  Completed the first routine collection of *zooplankton and phytoplankton samples on Meadow, Crystal, Bass, Pomerleau, Eagle, and Pike lakes, and curly-leaf pondweed delineations on Bass and Pomerleau lakes.*

  Performed aquatic vegetation surveys on Eagle, Pike and Crystal lakes.

  Completed a turtle survey on Meadow Lake.

  Worked with the City of New Hope and Meadow Lake Watershed Association to undertake a Meadow Lake Management Plan feasibility analysis and submitted a Clean Water Fund grant application. Collected baseline, pre-drawdown SAV, sediment, zooplankton, and fish community data. This project did not receive CWF funding, however, the Commission did receive a total of $110,000 Watershed-Based Implementation Funding for this and the Connections II project.

  Worked with the City of Plymouth to undertake a second round of alum treatments on Bass and Pomerleau Lakes and provided aquatic invasive species treatment on Bass Lake.

  Began work on the Crystal Lake Management Plan (319 Grant Project). Collected sediment cores, completed a carp biomass survey and population study on Crystal Lake, monitored SAV, and began planning for the Spring 2021 alum treatment 2021 carp removal. Alum treatments have significantly improved water quality in Bass and Pomerleau Lakes, and it is hoped there will be a similar result in Crystal Lake. Removed carp from Ryan Creek in 2020.

  Sponsored volunteer lake monitoring through CAMP (Met Council) on Upper, Middle, and Lower Twin, Ryan, Meadow, and Success Lakes.

- **STUDIES**

  Continue to work with the DNR to update the Special Flood Hazard Areas in the watershed ("the HUC8 Study"). *In November of 2019, the Commission approved amending the scope of the ongoing HUC 8 hydrologic and hydraulic modeling to include the Twin and Ryan Lake/Creek system. This included additional detailed analysis of Twin Lakes and Ryan Lake to establish the regulatory High-Water Level (HWL) as well as additional analysis to determine how the proposed HWL will impact nearby structures and how to mitigate risk with additional drainage options. The estimated additional cost would be $13,000, funded from the Closed Projects Account. The agreement between the parties extends through March 31, 2021.*

  Partnered with the City of Minneapolis to finalize work on a subwatershed BMP assessment for that part of Minneapolis that is within the Shingle Creek watershed. The Commission has had a goal to complete subwatershed assessments for at least 25% of that part of the watershed that developed prior to Commission rules in 1984. *Only 14% of pre-1984 development Shingle Creek watershed will have been completed when the Minneapolis Subwatershed Assessment is completed. A more achievable goal would be 15%.*

- **COST SHARE PROJECTS**

  Solicited cost-share projects from member cities, to be funded from the Cost Share Fund and its annual $100,000 levy and the Partnership Cost Share Fund with its annual $50,000 levy.

  - *In January, the Commission approved $20,000 in cost share funds for Brooks Landing Senior Apartments in the City of Brooklyn Park. Various site improvements, including raingardens, stormwater treatment, and adding some amenities will be constructed on the site. Upon receipt of a revised plan, the Commission approved an additional $10,000 of funding at their February meeting.*
  - *The City of Crystal submitted a City Cost Share Program application for its West Broadway Stormwater Infiltration Project at 5747 West Broadway. The request was for $50,000; the total estimated project cost is $400,000. The project will infiltrate runoff that is currently discharged untreated into the Bass Lake Road trunk system that flows to Upper Twin Lake. The Commission approved the full cost-share amount of $50,000 at their May meeting.*
  - *At their July meeting, the Commission approved a Cost Share application on behalf of Crescent Cove, a children's respite care and hospice facility on the north end of Upper Twin Lake in Brooklyn Center. The grant will create a play area that is mostly within the 100-year floodplain and convert the adjacent existing non-native landscape to a diverse native planned community that creates an ecologically appropriate wetland buffer. The Commission awarded $50,000 for this project.*

- **CAPITAL PROJECTS**

  Review feasibility studies for 2020 proposed capital projects, undertake Plan Amendments, hold public hearings, order projects, and certify levies. *The joint Commissions conducted a public hearing on September 10, 2020 to consider six Shingle Creek and three West Mississippi projects for County levy in 2020 for collection in 2021. The cost of the six Shingle Creek projects is estimated to be $1,750,000; the total levy amount is $1,405,165. The six projects with their estimated costs and total levy amounts are:*

  - *City Cost Share Projects, unidentified watershed-wide, $200,000, $106,000*
  - *Connections II Stream Restoration, Brooklyn Center and Brooklyn Park, $400,000, $424,200*
  - *Plymouth Street Sweeper, Plymouth, $350,000, $79,540*
  - *Meadow Lake Management Plan, New Hope, $300,000, $318,150*
  - *Bass Creek Restoration, Brooklyn Park, $400,000, $424,200*
  - *Partnership (private) Cost Share Projects, unidentified watershed-wide, $50,000, $53,025*

- **EDUCATION AND PUBLIC OUTREACH**

  Participate in the West Metro Water Alliance joint education and outreach group. The West Metro Water Alliance continued its successful Watershed PREP classes. *About 572 fourth grade students in 21 classrooms participated in classroom lesson one (What is a watershed?) in 2020, and 172 of those students in seven classrooms learned lesson two (The incredible journey). The onset of the pandemic curtailed in-class participation beyond March 2020. Lesson one was converted into a virtual on-line learning experience and 290 students in ten classrooms in three schools participated virtually. (Those 290 students are included in the 572-student total above.)*

  Invite three guest speakers to make lunchtime water resources presentations.

  - *In February, ReNae Bowman, Master Water Steward Appointee, presented her Capstone Project designed to evaluate and revitalize the City of Crystal's 125 rain-gardens and offer alternative runoff abatement methods to those without raingardens.*
  - *Dr. Richard Kiesling, USGS, spoke about* Advanced BMPs for Emerging Contaminants *at the Commission's March meeting.*
  - *In June, Stephen Mastey, Landscape Architects, presented the Twin Lake North Condominium parking lot BMP project.*

  Tour project sites in the watershed. *Due to COVID-19 and the need for social distancing, no tours were conducted in 2020.*

  Prepare an annual water quality report.

- **ADMINISTRATION AND OPERATIONS**

  Prepare a 2021 annual operating budget and begin scoping the Fourth Generation Management Plan, which will be completed in 2022. *On June 11, 2020, the Commission adopted a $442,590 operating budget for 2021. Assessment to the members totaled $363,590, a zero increase over 2020. See* Appendix 5 *to view the 2021 budget.*

  Update the project list previously provided to Hennepin County Commissioner Mike Opat, (the "State of the Watershed"). *This task was not completed in 2020.*

  A solicitation of interest proposals for technical, legal, and administrative services was last published in the January 14, 2019 edition of the *State Register*. The current providers are listed in *Appendix 1. This biennial process will be repeated in 2021.*

- **ONGOING AND OUTSTANDING GOALS**

  Begin work on the "sustainable water budget" project. *While Commission staff have had discussions with USGS staff about this, a funding source for this project has yet to be identified.*

  The Commission has a goal of maintaining the functions and values of priority wetlands. *A process has not established by which that would be evaluated.*

  Expand the Directly Connected Untreated Areas geodatabase to include boundaries of the untreated areas directly connected to the lakes in the watershed. *Streams were completed in 2017.*

  Partner with the USGS, DNR, and other interested parties to stay abreast of groundwater issues.

  Continue to pursue grant funding for TMDL implementation projects.

  Continue to identify, pursue grant funding for, and implement projects and programs addressing the bacterial impairment in Shingle Creek and the Mississippi River.

  Stay abreast of other regional and state TMDLs.

2020 WATER MONITORING

Minnesota Administrative Rule 8410.0100 Subp.5 requires watershed management organizations to conduct monitoring programs "capable of producing accurate data to the extent necessary to determine whether the water quality and quantity goals of the organization are being achieved."

The Shingle Creek and West Mississippi Watershed Management Commissions (WMCs) annually monitor water quality in the lakes, streams, and outfalls of the watersheds. The Commissions' technical staff obtain the stream and some lake water quality, fisheries, and vegetation data while volunteers also collect lake water quality and stream and wetland macroinvertebrate data.

Together the Shingle Creek and West Mississippi Watershed Management Commissions have established monitoring objectives to guide their monitoring programs. The following objectives have been established for stream, outfall, and lake monitoring in both watersheds:

- To quantify the current status of streams/outfalls and lakes (Shingle Creek only) throughout the watershed in comparison to state water quality standards established for nutrients, turbidity, chloride, bacteria, and other parameters currently regulated by the State.
- To quantify changes over time, or trends, in stream and lake water quality in the watersheds.
- To quantify the effectiveness of implemented BMPs throughout the watersheds for the protection of water quality.

Surface water quality in the watersheds is typical of urban lakes and streams in the Twin Cities metropolitan area. Agriculture followed by urban development have changed drainage patterns, increased pollutants to the waters, and reduced habitat for aquatic and terrestrial life. Both Shingle and Bass Creeks do not meet state water quality standards for chloride, bacteria, and dissolved oxygen, and have severely impacted fish and macroinvertebrate communities. Thirteen of the 16 lakes were originally listed as Impaired Waters of the State due to their high concentrations of phosphorus.

TMDLs and Implementation Plans have been approved for all the Impaired Waters and the Commission and member cities have been actively implementing improvements. Three lakes have subsequently been delisted, or removed, from the Impaired Waters list due to improved water quality. Long-term stream monitoring shows a clear improvement in suspended sediment and nutrient concentrations in both Shingle and Bass Creeks, a result of ongoing efforts to stabilize streambanks, increase the frequency of street sweeping, enhance erosion control on construction sites, and installing Best Management Practices (BMPs) to treat stormwater before it is discharged into the streams. However, chloride concentrations in the streams, mostly from road salt applied in the winter for snow and ice control, continue to be high.

2020 monitoring activities in the two watersheds included stream and outfall monitoring, lake monitoring, and volunteer lake monitoring. Each monitoring effort is described later in this section.

Stream Monitoring

In 2020 three sites along Bass/Shingle Creek were monitored biweekly April-October: the outlet in Minneapolis (SC-0); mid-watershed in Brooklyn Park (SC-3); and in Bass Creek (BCP) in the upper watershed. Winter chloride was sampled monthly from November-March at the three locations and at the USGS gage site located near the outlet of Shingle Creek. Real-time data from that site is available through the USGS website: http://waterdata.usgs.gov/mn/nwis/uv?05288705.

Due to the COVID 19 pandemic volunteer stream macroinvertebrate monitoring, conducted through the Hennepin County RiverWatch program, did not occur in 2020.

Lake Monitoring

Routine water quality monitoring in Eagle and Pike lakes was conducted biweekly in 2020. Aquatic vegetation surveys were also conducted, once in late spring and once in late summer.

Thirteen of the sixteen lakes in Shingle Creek are periodically monitored for water quality by volunteers through the Citizen Assisted Monitoring program (CAMP). Volunteers in the program monitor their lake every other week from mid-April to mid-October. They measure surface water temperature, Secchi depth, and collect surface water samples that are analyzed by the Met Council for Total Phosphorus (TP), Total Kjeldahl Nitrogen (TKN) , and chlorophyll-a. In 2020, Twin, Ryan, Success and Meadow lakes were monitored through CAMP.

As part of two grant projects, Bass and Pomerleau Lakes were monitored biweekly for water quality. Bass and Pomerleau, which have both been listed as impaired for nutrients, are undergoing active management. Water quality in Crystal Lake was monitored biweekly during the 2020 field season. Water quality monitoring in the lakes has helped our understanding of changes in lake health following management activities.

Wetland Monitoring

As was the case with the RiverWatch program, wetland monitoring for macroinvertebrate communities and vegetation did not occur in 2020 due to COVID-19. The Wetland Health Evaluation Program (WHEP) is administered by Hennepin County.

The Commission's 2020 *Water Quality Monitoring Report* provides more detail on the Commission's stream and lake monitoring activities. The report will be forwarded to the Board of Water and Soil Resources as a companion to this report. It will also be available on the Commissions' website, www.shinglecreek.org.

Finances

The Commission's Joint Powers Agreement provides that each member city contributes toward the annual operating budget based 50% on the area located within the watershed boundary and 50% on the tax capacity of all property within the watershed. The 2020 cost allocations to the members are shown as part of the 2020 Operating Budget found in *Appendix 5.*

Of the $443,590 operating budget approved by the Commission for 2020 revenue consisting of $24,000 in application fees and reimbursements, $41,000 in program reimbursements, and $15,000 in interest income resulted in assessments to members totaling $363,590.

An amendment of Minnesota Rules, Chapter 8410 became effective on July 13, 2015. One of the revisions to the Rules extends the annual audit due date to 180 days after the end of the fiscal year, in the case of the Shingle Creek Commission, to June 30, 2021. The 2019 Audit Report, which was prepared by Johnson & Company, Ltd., Certified Public Accountants, may be viewed on the Commission's website, www.shinglecreek.org. The 2020 Audit Report will be posted there after June 30, 2021.

The Commission follows Rule 54 of the Government Accounting Standard Board (GASB) to report Fund Balances. The fund balance classifications include:

- *Nonspendable* – amounts that are not in a spendable form. The Commission does not have any items that fit this category.
- *Restricted* – amounts constrained to specific purposes by their providers. One example would be ad valorem levy funds received from the County for capital improvement projects. The unused portion of these funds must be set aside in a restricted account for similar projects. Another example would be BWSR Legacy Grant proceeds where the funds are received prior to the onset of a project and where any unused portion must be returned to the grantor.
- *Committed* – amounts constrained to specific purposes by the Commission itself. An example would be residual funds carried over from one year to the next for Studies, Project Identification and Subwatershed Assessments.
- *Assigned* – amounts the Commission intends to use for specific purposes. Most line items in the Commission's Operating Budget fall under this category.
- *Unassigned* – amounts that are available for any purpose. These amounts are reported only in the general fund.

Amounts paid by the Commission per the Commission's 2019 Annual Audit are:

General engineering	159,143
General administration	107,928
Education	57,228
Programs	110,240
Projects	916,906
Capital Projects	700,282
Total	$2,051,727

General engineering work includes review of local plans, review of development/ redevelopment projects, tracking grant opportunities, attendance at meetings and other technical services. General administration includes support to technical staff, attendance at meetings, insurance premiums, bookkeeping and annual audit, legal counsel, and other non-engineering services.

PROJECTED 2021 WORK PLAN

The Shingle Creek Watershed Management Commission established its 2021 Work Plan at its January 9, 2021 meeting. Most of the activities of the Commission are ongoing, although some rotate around the watershed.

- **Continue to Implement TMDLs.**
  - Complete the 5-year performance review for the Bass and Shingle Creek Biotic and DO TMDL.
  - Complete aquatic vegetation surveys on Bass and Upper Twin Lake and provide aquatic invasive species treatment as necessary.
  - Partner with the City of Robbinsdale to continue implementing the Crystal Lake Management Plan, including carp removal, aquatic vegetation management, and alum treatment.
  - Partner with the City of New Hope to implement the Meadow Lake Management Plan, including a lake drawdown in fall and winter 2021.
  - Partner with the Cities of Brooklyn Park and Brooklyn Center to undertake Connections II streambank improvements for Shingle Creek from Regent Avenue to Brooklyn Boulevard.
  - Partner with the City of Brooklyn Park to undertake Bass Creek Park streambank improvements from Cherokee Drive to I-694.
  - If the Hennepin County grant application is funded, extend the SRP Reduction filter along the Wetland 639W overflow channel. If not funded, then submit a CWF grant application for partial funding.
  - Continue to pursue grant funding for TMDL implementation projects.
  - Expand the Directly Connected Untreated Areas geodatabase to include boundaries of the untreated areas directly connected to the lakes in the watershed. (Streams was completed in 2017.)
  - Continue to identify, pursue grant funding for, and implement projects and programs addressing the bacterial impairment in Shingle Creek and the Mississippi River.
  - Stay abreast of other regional and state TMDLs.
- **Partner with other organizations to increase reach and cost effectiveness.**
  - Participate in the West Metro Water Alliance joint education and outreach group.
  - Continue to partner with the USGS to operate the Queen Avenue monitoring site.

- Partner with the USGS, DNR, and other interested parties to stay abreast of groundwater issues.
- Complete the HUC study in partnership with the DNR.

➢ **Continue ongoing administration and programming.**

- Conduct routine Commission lake water quality monitoring and aquatic vegetation and fish surveys on Success and Cedar Island Lakes and grant funded monitoring on Bass, Pomerleau, and Crystal Lakes.
- Conduct Commission routine flow and water quality monitoring at SC-0 and SC-3 on Shingle Creek and Bass Creek Park (BCP) on Bass Creek as well as two DO longitudinal studies as part of the Shingle and Bass Creeks Dissolved Oxygen (DO) and Biotic Integrity TMDL 5 Year Review.
- Sponsor volunteer stream monitoring through RiverWatch and wetland monitoring through WHEP (Hennepin County).
- Sponsor volunteer lake monitoring through CAMP (Met Council) on Eagle, Pike, Schmidt, and Magda Lakes.
- Complete reviews of development and redevelopment projects as necessary.
- Prepare an annual water quality report.
- Solicit cost-share projects from member cities funded from the Cost Share Fund and the annual $100,000 levy and the Partnership Cost Share Fund and the annual $50,000 levy.
- Review feasibility studies for 2021 proposed capital projects, undertake Plan Amendments, hold public hearings, order projects, and certify levies.
- Prepare a 2022 annual budget and begin the Fourth Generation Management Plan, which will be completed in 2022-2023.
- Invite three guest speakers to make lunchtime water resources presentations.
- Tour project sites in the watershed.

Have a question about this report? Need more information? Want to know how to get involved? Contact us: drop us an email, give us a call, we're happy to help:

http://www.shinglecreek.org/contact-us.html

APPENDIX

2020 Commissioners

Representing	Name	Address	Telephone	Email	Term Expires Jan 31
Brooklyn Center	David Vlasin		651.792.7972	David.vlasin@rwmwd.org	2021
Brooklyn Park	Adam Quinn	6711 Oak Grove Pkwy, Apt 2108 Brooklyn Park, MN 55445	612 791.5945	adamgquinn@gmail.com	2021
Crystal	Burton Orred, Jr.	6700 60th Avenue North Crystal, MN 55428	763.533.7808	burtssquirts@gmail.com	2021
Maple Grove	Karen Jaeger Secretary	8459 Rice Lake Road Maple Grove, MN 55369	763.420.3838	kjaeger@ci.maple-grove.mn.us	2022
Minneapolis	Ray Schoch	5146 Russell Avenue North Minneapolis, MN 55430		rayeschoch@gmail.com	2022
New Hope	Bill Wills	6149 Gettysburg Avenue N New Hope, MN 55428	763.531.0788	wjw9416@msn.com	2022
Osseo	John Roach	12-Sixth Street NE #113 Osseo, MN 55369	763.315.4258	johnbp60@gmail.com	2023
Plymouth	Andy Polzin Chair	18605 29th Avenue North Plymouth, MN 55447	952.832.2938	rapolzin@msn.com	2023
Robbinsdale	Wayne Sicora Vice Chair	3706 Abbott Avenue North Robbinsdale, MN 55422	763.522.8165	wayne.sicora@erm.com	2023

2020 Technical Advisory Committee

Representing	Name	Address	Telephone	Email
Brooklyn Center	Andrew Hogg	6301 Shingle Creek Parkway Brooklyn Center, MN 55430	763.569.3327	ahogg@ci.brooklyn-center.mn.us
Brooklyn Park	Mitchell Robinson	5200 85th Avenue North Brooklyn Park, MN 55443	763.493.8291	mitchell.robinson@brooklynpark.org
Crystal	Mark Ray	4141 Douglas Drive Crystal, MN 55422	763.531.1160	mark.ray@ci.crystalmn.gov
Maple Grove	Derek Asche	12800 Arbor Lakes Parkway Maple Grove, MN 55313	763.494.6354	dasche@ci.maple-grove.mn.us
Minneapolis	Elizabeth Stout	City of Lakes Building #300, 309 Second Avenue South Minneapolis, MN 55401	612.673.5284	Elizabeth.Stout@minneapolismn.gov
New Hope	Megan Hedstrom	5500 International Parkway New Hope, MN 55428	763.592.6765	mhedstrom@newhopemn.gov
Osseo	Nick Waldbillig	415 Central Avenue Osseo MN 55369	763-425-5741	nwaldbillig@ci.osseo.mn.us
Plymouth	Ben Scharenbroich	3400 Plymouth Boulevard Plymouth, MN 55447	763.509.5527	bscharenbroich@plymouthmn.gov
Robbinsdale	Richard McCoy	4100 Lakeview Avenue North Robbinsdale, MN 55422	763.531.1260	rmccoy@ci.robbinsdale.mn.us

2020 Shingle Creek Commission Staff

Name	Address	Telephone	Email
Technical			
Ed Matthiesen	Wenck Associates, Inc.	763.252.6851	ematthiesen@wenck.com
Diane Spector	7500 Highway 55 Ste 300	763.252.6880	dspector@wenck.com
Jeff Strom	Golden Valley, MN 55427	763 252.6833	jstrom@wenck.com
Katie L. Kemmitt		763.252.6879	kkemmitt@wenck.com
Legal			
Troy Gilchrist	Kennedy & Graven, 470 Pillsbury Center Minneapolis, MN 55402	612.337.9214	tgilchrist@kennedy-graven.com
Administrative			
Judie Anderson	JASS	763.553.1144	judie@jass.biz
Amy Juntunen	3235 Fernbrook Lane		amy@jass.biz
Beverly Love	Plymouth, MN 55447		beverly@jass.biz

AMENDMENTS TO THE JOINT WATERSHED MANAGEMENT PLAN

In 2013 the Shingle Creek and West Mississippi Watershed Management Commissions adopted their joint *2013-2022 Third Generation Watershed Management Plan.* The Plan sets forth goals and strategies that will guide water resources management activities in the two watersheds over the coming decade. Over the years the Commission, either individually or together with the Shingle Creek Commission, has adopted a number of amendments to the Plan. They are described below:

In 2013 the Commissions adopted a minor amendment to the Plan which revised the Commissions' Rules and Standards to adopt the new National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation frequency standards, replacing the outdated Weather Bureau Technical Paper 40 (TP-40) standards.

In 2014 the Commissions adopted a second minor amendment to the Plan. It revises the estimated cost and provides more description and detail about one proposed Shingle Creek project in the Commissions' Capital Improvement Program (CIP).

In December 2014 the Commissions adopted a major amendment to the Plan which added five projects to the Commissions' CIP - three pond retrofits in the Shingle Creek watershed and Priority BMP Retrofits in both watersheds.

On May 14, 2015, the Commissions adopted a minor Plan amendment to 1) increase the annual levy for city cost-share projects from $50,000 to $100,000, 2) increase the (Shingle Creek) Commission cost share for lake internal load projects from 25% to 100%; and 3) specify that the potential 2015 lake internal load project (in the Shingle Creek watershed) would be the proposed Twin Lake Carp Tracking and Removal project.

On November 12, 2015, the Commissions amended their joint *Third Generation Watershed Management Plan* to adopt a revision to the plan amendment process to conform to 2015 revisions to MN Rules 8410. In part, the revisions will allow the Commission to modify the CIP with only minimal need for plan amendments.

On June 9, 2016, the Commissions adopted a minor amendment to the Plan which amended the Shingle Creek 2016 CIP to include: 1) an annual levy for city cost-share projects of $200,000 with Commission cost-share of $100,000; 2) Iron and Biochar-Enhanced Sand Filter Retrofits of $210,000 with Commission cost-share at 100%; and 3) Partnership cost share (private projects) of $100,00, with Commission cost-share of $50,000; and further amended the West Mississippi 2016 CIP to include: 1) an annual levy for city cost-share projects of $50,000 with Commission cost-share at 100%; and 2) Iron and Biochar-Enhanced Sand Filter Retrofits of $80,000 with Commission cost-share at 100%.

On May 11, 2017, the Commissions adopted a seventh minor amendment to their joint Plan. In Shingle Creek a second phase to the Reaeration Project was added to the CIP at a project cost/Commission contribution of $145,000; and specificity of description was added to the Shingle/Bass Creek project, now known as the Palmer Creek Estates Bass Creek Stream Restoration. Three other projects were moved to future years. In West Mississippi the 2017 CIP was revised to move three projects to future years.

AMENDMENTS TO THE JOINT WATERSHED MANAGEMENT PLAN, *cont'd.*

On May 10, 2018, the Commissions adopted a minor amendment to the Plan which amended the Shingle Creek CIP to substitute the Bass and Pomerleau Lakes Alum Treatment Project for the generic Lake Internal Load Project in 2018 and added the SRP Reduction Project to the CIP, also in 2018. Two other projects were moved to future years. No revisions were made to the West Mississippi CIP.

On May 9, 2019, the Commission adopted the first of four new amendments to the Plan. The first amendment revised the CIP to add specificity to a project and to revise certain cost-share policies.

The second, adopted August 8, 2019, revised the CIP to reschedule and add specificity to a project and to adopt a cost-share policy for capital improvements.

The third amendment, adopted September 12, 2019, ordered four improvements, designating the members responsible for construction and certifying them for ad valorem levy. One improvement, City Cost Share Best Management Practices (BMP) Projects ($53,025.00), was located in the West Mississippi watershed.

On October 10, 2019, the Plan was amended to add one West Mississippi project– River Park Storm Approvements - to its 2020 CIP.

The joint Plan was not amended in 2020.

Local Plan Requirements

Local water plans must be prepared by metropolitan cities and towns (municipalities) and a local water plan must become part of the local comprehensive plan for a municipality.

- Under the amended rule, local water plans must be revised essentially once every ten years in alignment with the local comprehensive plan schedule.
- A municipality has two years before its local comprehensive plan is due to adopt its local water plan.
- Prior to adoption, a municipality must prepare its local water plan, distribute it for comment, and have it approved by the organization with jurisdiction in the municipality.
- The next local comprehensive plans are due December 31, 2018. All cities and towns in the seven-county metropolitan area must complete and adopt their local water plans between January 1, 2017 and December 31, 2018.
- Local water plans may be updated more frequently by a municipality at its discretion.

At a minimum, cities in their Local Plans are required to do the following:

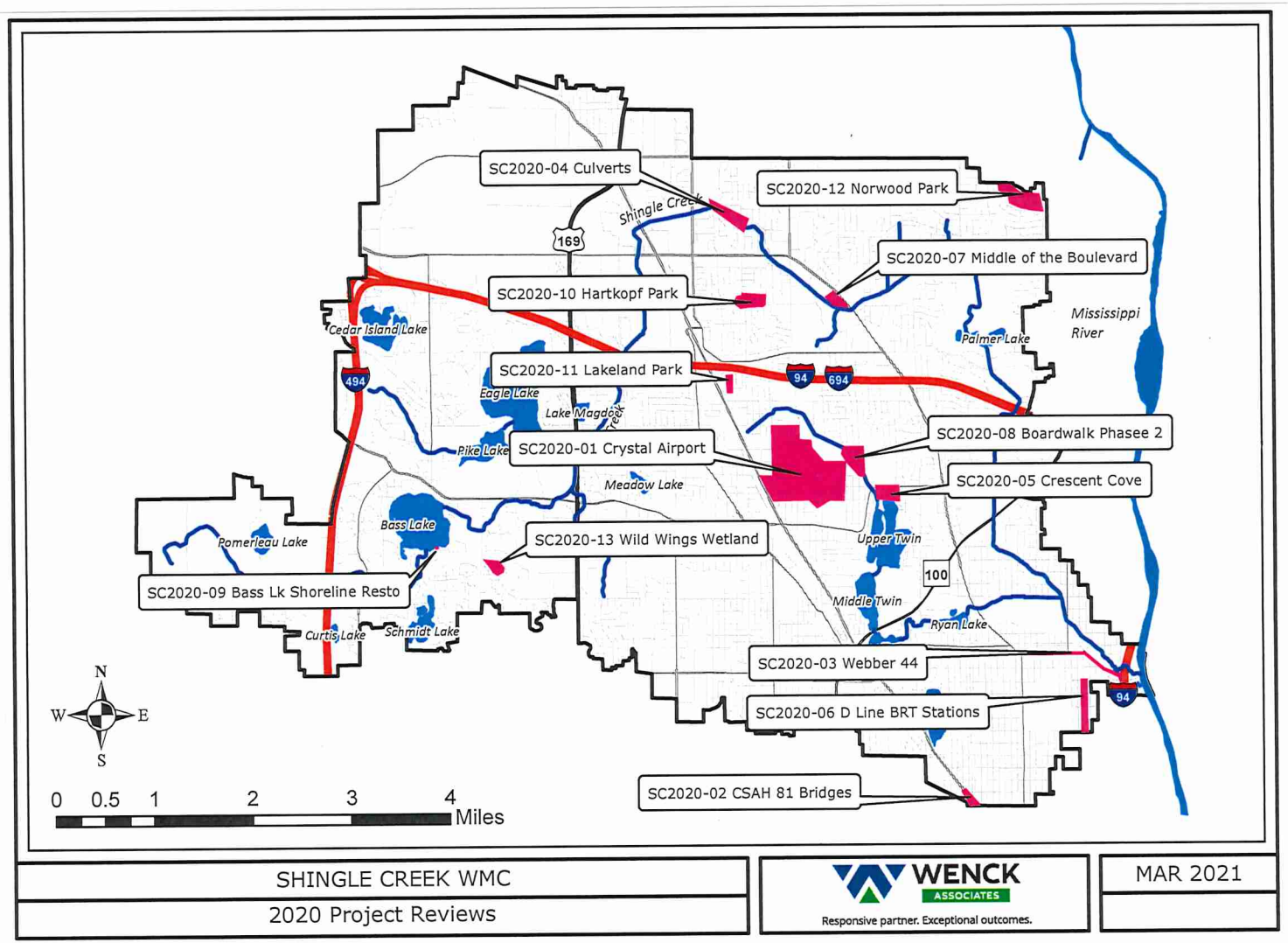
1. Update the existing and proposed physical environment and land use. Information from previous plans that has not changed may be referenced and summarized but does not have to be repeated. Local Plans may adopt relevant sections of the Commission's Watershed Management Plan (WMP) Section 2.0 Inventory and Condition Assessment by reference unless the member city has more recent information.
2. Update the existing and proposed hydrology and provide subwatershed, storm raingage system, and installed BMP figures and Shapefiles.
3. Explain how the goals and policies and rules and standards established in the WMP will be implemented at the local level.
4. Show how the member city will take action to achieve the load reductions and other actions identified in and agreed to in TMDL Implementation Plans, including identifying known upcoming projects, including street reconstruction projects, that will provide opportunities to include load and volume reduction BMPs.
5. Explain how the City will implement the City Review project review requirements of the revised Rules and Standards.
6. Update existing or potential water resource related problems and identify nonstructural, programmatic, and structural solutions, including those program elements detailed in Minnesota Rules 8410.0100, Subp. 1-6.
7. Summarize the estimated cost of implementation.
8. Set forth an implementation program including a description of adoption or amendment of official controls and local policies necessary to implement the Rules and Standards; programs; policies; and a capital improvement plan.

2020 Project Reviews

Number	Project	City	WCA LGU	Project Description	Impervious Area	Approved
SC2020-001	Crystal Airport	Crystal	City	Redevelopment of airport taxiways and runways on 326 acres	29% impervious with 94.1 acres of imperious surface, DECREASE of 0.5 acres	12-Mar-20
SC2020-002	CSAH 81 Bridges Reconstruction	Robbinsdale	City	Reconstruction of bridge, roadway and utility improvements on 13.7 acres.	47% impervious with 6.5 acres of imperious surface, DECREASE of 0.2 acres	11-Jun-20
SC2020-003	CSAH 152 Webber Parkway Resconstruction (Webber 44)	Brooklyn Park, Minneapolis	Comm, City	Reconstruction of roadway and storm sewer at 44th Avenue, Webber Parkway and Lyndale Avenue up to 41st Avenue, 15.38 acres.	75% impervious, 11.6 acres impervious surface, DECREASE of 1.1 acres.	11-Jun-20
SC2020-004	Candlewood/Hampshire Culverts	Brooklyn Park	Comm	Reconstruction of culvert with bridge on Shingle Creek at Hampshire Avenue. 14.7 acres.	73% impervious with 10.7 acres of impervious surface, an increase of 0.0 acres	11-Jun-20
SC2020-005	Crescent Cove	Brooklyn Center	Comm	Construction of play space along wetland edge that incorporates wetland buffer, floodplain storage and stormwater treatment on 2.23 acre site.	2% impervious with 0.04 acres of impervious surface, increase of 0.02 acres	11-Jun-20
SC2020-006	D Line BRT	Brooklyn Center	Comm	Construction of new bus rapid transit line along Route 5 from Mall of America to Brooklyn Center Transit Center. Sites within Shingle Creek watershed are 0.56 acres.	No increase in impervious surface following development.	9-Jul-20
SC2020-007	Middle of the Boulevard	Brooklyn Park	Comm	Destruction of two existing structures, construction of parking lot and associated landscaping on 11.5 acre site	85% impervious with 9.8 acres of impervious surface, an increase of 0.25 acres	grading 13-Aug-20; complete plan 10-Sep-20
SC2020-008	Crystal MAC Boardwalk Phase 2	Crystal	City	Construction of boardwalk elevated education platform, and access ramps connecting old and new boardwalk on 40-acre site	Disturbed area is 0.11 acres, with no increase in impervious surface	10-Sep-20
SC2020-009	Bass Lake Shoreline Restoration	Plymouth	City	Shoreline restoration of a private property on Bass Lake. Existing shoreline boulders will be moved and lined underneath with MnDO& 3733 fabric liner. A buffer with landscaped wetland vegetation is proposed on west side of property.	No increase in impervious surface.	8-Oct-2020
SC2020-010	Hartkopf Park	Brooklyn Park	Comm	Park improvements including parking lot replacement, addition of prefabricated restrooms, large multi-purpose grass field area, new trails on 25.3 acres. 8.7 acres will be disturbed.	No increase in impervious surface.	10-Dec-2020

2020 Project Reviews, *cont'd.*

Number	Project	City	WCA LGU	Project Description	Impervious Area	Approved
SC2010-011	Lakeland Park	Brooklyn Park	Comm	Park improvements including parking lot mill and overlay, replacement of concrete picnic pad, two new basketball courts, new paved trail loop, regrading to create new grass field area on 10.03 acre site.	7 acres will be disturbed, an increase of 0.48 acres of impervious area	10-Dec-20
SC2020-012	Norwood Park	Brooklyn Park	Comm	Park improvements including new park building, reconstructed parking lot, new basketball court, small concrete pad and new trails on 32.0 acre site.	8.3 acres will be disturbed with no net increase in impervious area	10-Dec-20
SC2020-013	Wild Wings Western Wetland Improvement Project	Plymouth	City	Alteration of a natural wetland by reconstructing a channel and installing an emergency overflow structure. Excavate a depth of four feet of sediment along channel Site is 0.9 acres.	No change to impervious area.	14-Jan-21


SC2020-04 Culverts
SC2020-12 Norwood Park
SC2020-07 Middle of the Boulevard
SC2020-10 Hartkopf Park
SC2020-11 Lakeland Park
SC2020-08 Boardwalk Phasee 2
SC2020-01 Crystal Airport
SC2020-05 Crescent Cove
SC2020-13 Wild Wings Wetland
SC2020-09 Bass Lk Shoreline Resto
SC2020-03 Webber 44
SC2020-06 D Line BRT Stations
SC2020-02 CSAH 81 Bridges
Shingle Creek
Cedar Island Lake
Eagle Lake
Lake Magda
Pike Lake
Meadow Lake
Bass Lake
Pomerleau Lake
Curtis Lake
Schmidt Lake
Palmer Lake
Mississippi River
Upper Twin
Middle Twin
Ryan Lake
169
494
94
694
100
N
W
E
S
0 0.5 1 2 3 4
Miles
SHINGLE CREEK WMC
2020 Project Reviews
WENCK ASSOCIATES
Responsive partner. Exceptional outcomes.
MAR 2021

Shingle Creek 2020 - 2021 Operating Budgets

		2020 Budget	2021 Budget
REVENUE			
	Application Fees	$23,000	$20,000
	Member Assessments	363,590	363,590
	Blue Line Extension	1,000	0
	Interest	15,000	20,000
	WMWA Education Reimbursement	33,000	33,000
	WMWA Rain Garden Workshops	8,000	6,000
	Miscellaneous Income	0	0
	Subtotal	***$443,590***	***$442,590***
EXPENSES			
	ADMINISTRATION		
	Administrative Services	$71,000	$71,000
	Engineering Support	17,000	17,000
	Project Reviews/WCA	1,500	1,500
	Blue Line Extension	500	0
	Subtotal	**$90,000**	**$89,500**
	ENGINEERING		
	Engineering Services	62,000	75,000
	Grant Application Writing	11,500	11,000
	Project Reviews/WCA	45,000	44,000
	Local Plan Reviews	0	0
	Blue Line Extension	500	0
	TMDL 5 Year Reviews	12,000	10,000
	Subtotal	**$131,000**	**$140,000**
	LEGAL		
	Legal Services	6,000	5,500
	Subtotal	**$6,000**	**$5,500**
	MISCELLANEOUS		
	Bookkeeping	7,000	7,000
	Audit	6,500	6,500
	Insurance & Bonding	3,100	3,100
	Meeting Expense	5,000	5,000
	Subtotal	**$21,600**	**$21,600**

Shingle Creek 2020 - 2021 Operating Budgets, *cont'd.*

	PROGRAMS	2020 Budget	2021 Budget
	Monitoring		
	Stream Monitoring	35,000	36,000
	Stream Monitoring-USGS	4,500	4,200
	Monitoring Equipment	0	0
	Stream Biomonitoring	0	0
	Commission Lake Monitoring	24,000	24,000
	Citizen Assisted Lake Monitoring	3,800	3,800
	Vol Wetland Monitoring	2,000	2,000
	Vol Stream Monitoring	1,000	1,000
	Annual Monitoring Report	16,000	16,000
	Subtotal	**$86,300**	**$87,000**
	Water Quality Education		
	Education Program	15,000	15,000
	Education Grants	500	500
	WMWA Admin/Tech: SC Share	5,000	5,000
	WMWA Admin/Tech: Partners Share	15,000	15,000
	WMWA Impl Activities: SC Share	2,000	2,000
	WMWA Impl Activities: Partners Share	4,500	4,500
	Rain Garden Workshops: SC Share	2,000	2,000
	Rain Garden Workshops: Partners Share	6,000	6,000
	WMWA Educators: SC Share	4,500	4,500
	WMWA Educators: Partners Share	13,500	13,500
	Subtotal	**$68,000**	**$68,000**
	MANAGEMENT PLANS		
	3rd Gen Plan/Plan Amendments	1,000	0
	Subwatershed BMP Assessment	20,000	10,000
	Subtotal	**$21,000**	**$10,000**
	PROJECTS		
	Flood Modeling and Mapping	0	0
	Contribution to 4th Generation Plan	0	0
	To (from) Restricted Fund Balances		
	To/From Reserves	19,690	20,990
	Subtotal	**$19,690**	**$20,990**
	TOTAL OPERATING EXPENSE	***$443,590***	***$442,590***

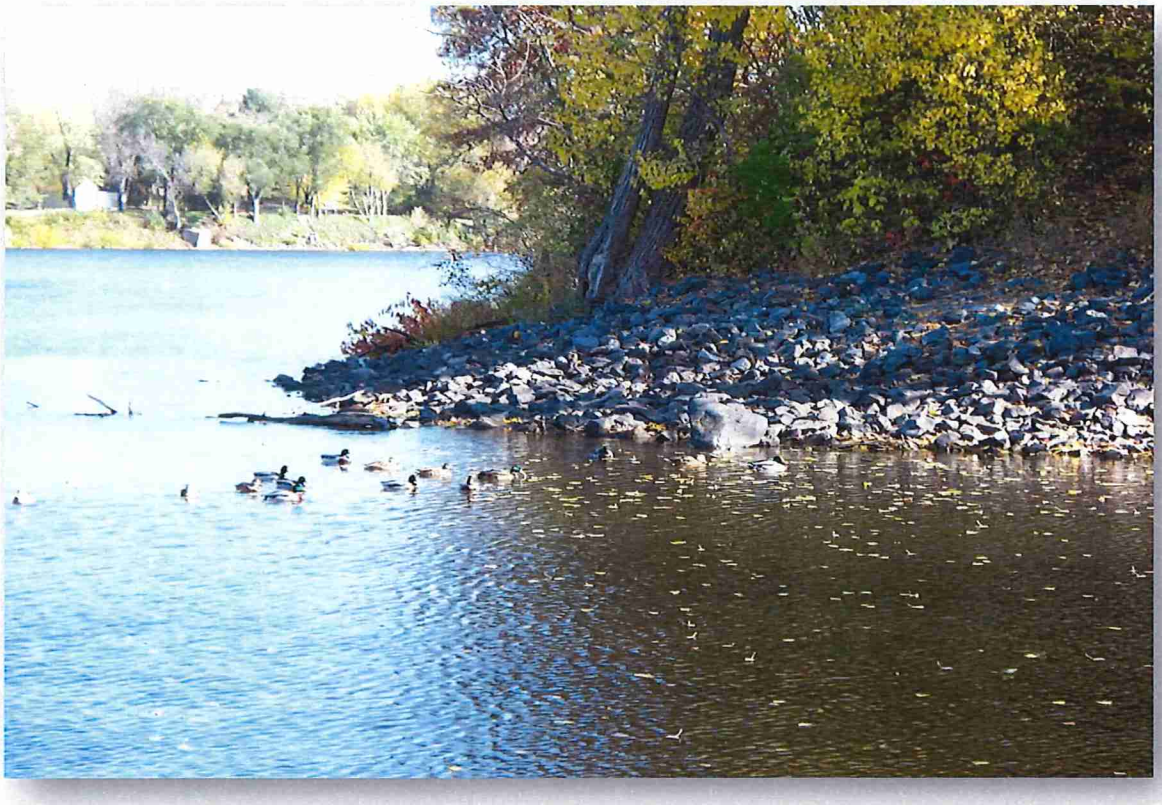
Shingle Creek 2020-2021 Member Assessments

2020 Community	Acreage	2019 Tax Capacity	Cost Allocation Based on Area		Cost Based on Tax Capacity		Total Cost	
			%age	Dollars	%age	Dollars	%age	Dollars
Brooklyn Center	3,720	17,466,627	13.07%	*23,762.382*	10.42%	18,943.731	11.75%	42,706.11
Brooklyn Park	7,080	40,905,072	24.88%	*45,225.179*	24.40%	44,364.299	24.64%	89,589.49
Crystal	2,480	11,980,781	8.71%	*15,841.588*	7.15%	12,993.962	7.93%	28,835.55
Maple Grove	5,020	32,567,463	17.64%	*32,066.441*	19.43%	35,321.602	18.53%	67,388.04
Minneapolis	1,950	11,207,087	6.85%	*12,456.087*	6.69%	12,154.839	6.77%	24,610.93
New Hope	2,070	14,486,344	7.27%	*13,222.616*	8.64%	15,711.413	7.96%	28,934.03
Osseo	300	2,082,122	1.05%	*1,916.321*	1.24%	2,258.201	1.15%	4,174.52
Plymouth	4,380	27,889,515	15.39%	*27,978.289*	16.64%	30,248.053	16.01%	58,226.34
Robbinsdale	1,460	9,034,849	5.13%	*9,326.096*	5.39%	9,798.901	5.26%	19,125.00
Total	***28,460***	***167,619,860***	***100%***	***181,795***	***100%***	***181,795***	***100%***	***363,590***

2021 Community	Acreage	2020 Tax Capacity	Cost Allocation Based on Area		Cost Based on Tax Capacity		Total Cost	
			%age	Dollars	%age	Dollars	%age	Dollars
Brooklyn Center	3,720	19,082,171	13.07%	23,762.382	10.55%	19,174.501	11.81%	42,936.88
Brooklyn Park	7,080	41,288,026	24.88%	45,225.179	22.82%	41,487.799	23.85%	86,712.99
Crystal	2,480	13,455,117	8.71%	15,841.588	7.44%	13,520.220	8.08%	29,361.81
Maple Grove	5,020	35,903,298	17.64%	32,066.441	19.84%	36,077.017	18.74%	68,143.46
Minneapolis	1,950	12,300,200	6.85%	12,456.087	6.80%	12,359.715	6.83%	24,815.80
New Hope	2,070	16,231,998	7.27%	13,222.616	8.97%	16,310.537	8.12%	29,533.15
Osseo	300	2,201,981	1.05%	1,916.321	1.22%	2,212.635	1.14%	4,128.96
Plymouth	4,380	30,147,065	15.39%	27,978.289	16.66%	30,292.932	16.03%	58,271.22
Robbinsdale	1,460	10,309,759	5.13%	9,326.096	5.70%	10,359.643	5.41%	19,685.74
Total	***28,460***	***180,919,615***	***100%***	***181,795***	***100%***	***181,795***	***100%***	***363,590***

March 25 2021 Draft 7 118-146-60

DRAFT



WEST MISSISSIPPI WATERSHED MANAGEMENT COMMISSION

2020 ANNUAL ACTIVITY REPORT

Table of Contents

This report was prepared for the
West Mississippi Watershed Management Commission
by JASS

Questions regarding this report should be directed to
JASS, 763.553.1144 or judie@jass.biz

We gratefully acknowledge the assistance of
Diane Spector and Katie Kemmitt
Wenck/Stantec

Cover photograph: Champlin at the confluence of Elm Creek and the Mississippi River. The streambank is in the Elm Creek watershed, the area beyond the trees is in the West Mississippi watershed. Courtesy of Diane Spector

ANNUAL ACTIVITY REPORT

This annual report has been prepared by the West Mississippi Watershed Management Commission in accordance with the annual reporting requirements of Minnesota Rules Chapter 8410.0150, Subps. 2 and 3. It summarizes the activities undertaken during calendar year 2020.

THE COMMISSION

The West Mississippi Watershed Management Commission is governed by a five-member board comprised of representatives from each member city who are appointed for terms of three years. The five member cities are Brooklyn Center, Brooklyn Park, Champlin, Maple Grove, and Osseo. Commissioners who served in 2020 are shown in *Appendix 1.* Also shown there are the members of the Technical Advisory Committee (TAC) from each city.

CONSULTANTS

The Commission has no employees. The names of the consultants currently retained by the Commission are also listed in *Appendix 1.*

MEETINGS

The Commission meets monthly at 12:45 p.m. on the second Thursday at the Clubhouse at Edinburgh, USA, 8700 Edinbrook Crossing, Brooklyn Park. The meetings are open to the public. Meeting notices, agendas and approved minutes are posted on the Commission's website, www.shinglecreek.org. The meetings are open to the public and visitors are welcome. However, due to the COVID-19 pandemic, beginning in April 2020 the Commission met virtually via zoom.us. All other meeting criteria remained the same.

WATERSHED MANAGEMENT PLAN

In 2013 the Shingle Creek and West Mississippi Watershed Management Commissions adopted their joint 2013-2022 Third Generation Watershed Management Plan. The Plan, approved by the Board of Water and Soil Resources (BWSR) on March 27, 2013, is the culmination of a nearly two-year planning effort by the two Commissions, the cities that are members of these joint powers organizations, state agencies, and the public. The Plan sets forth goals and strategies that will guide water resources management activities in the two watersheds over the coming

decade. Over the years the Commission, either individually or together with the Shingle Creek Watershed Management Commission, has adopted a number of amendments to the Plan. They are described in *Appendix 2.*

LOCAL PLANS

Revisions to Minnesota Rules 8410 adopted in 2015 included significant changes in the timing of local water plan revisions. Per 8410.0105 subp. 9 and 8410.0160 subp. 6:

- Local water plans must be prepared by metropolitan cities and towns (municipalities) and a local water plan must become part of the local comprehensive plan for a municipality.
- Under the amended rule, local water plans must be revised essentially once every ten years in alignment with the local comprehensive plan schedule.
- A municipality has two years before its local comprehensive plan is due to adopt its local water plan.
- Prior to adoption, a municipality must prepare its local water plan, distribute it for comment, and have it approved by the organization with jurisdiction in the municipality.
- The most recent local comprehensive plans were due December 31, 2018. As of that date, the local plans of all member cities had been reviewed and approved by the Commission.
- Local water plans may be updated more frequently by a municipality at its discretion.

At a minimum, Local Plans are required to:

- Update the existing and proposed physical environment and land use. Information from previous plans that has not changed may be referenced and summarized but does not have to be repeated. Local Plans may adopt relevant sections of the Commission's Watershed Management Plan (WMP) Section 2.0 Inventory and Condition Assessment by reference unless the member city has more recent information.
- Update the existing and proposed hydrology and provide subwatershed, storm drainage system, and installed BMP figures and Shapefiles.
- Explain how the goals and policies and rules and standards established in the WMP will be implemented at the local level.
- Show how the member city will achieve the load reductions and other actions identified in and agreed to in TMDL Implementation Plans, including identifying known upcoming projects, including street reconstruction projects, that will provide opportunities to include load and volume reduction BMPs.
- Explain how the City will implement the project review requirements of the revised Rules and Standards.

- Update existing or potential water resource related problems and identify nonstructural, programmatic, and structural solutions, including those program elements detailed in MN Rules 8410.0100, Subp. 1-6.
- Summarize the estimated cost of implementation.
- Set forth an implementation program including a description of adoption or amendment of official controls and local policies necessary to implement the Rules and Standards, programs, policies, and a capital improvement plan.

STATUS OF 2020 WORK PLAN

The joint Third Generation Watershed Management Plan states that the Shingle Creek and West Mississippi Commissions will annually review progress toward their Third Generation goals and that this evaluation will become part of the Annual Activity Report.

The purpose of the annual review is twofold -- to determine progress towards the goals and to be sure the Commissions stay on track to reach them. The annual review is also an opportunity to discuss whether the goals and actions in the Plan still make sense or if they should be considered for modification or enhancement, perhaps to add new priorities. Ideally, this annual review is also an opportunity to start thinking about the following year's work plan.

At their January 9, 2020 meeting the West Mississippi Watershed Management Commission identified the following activities for inclusion in their 2020 Work Plan. Most are ongoing, although some activities rotate around the watershed. Some highlights of the past year include:

- Sponsor routine flow and water quality at two outfalls into the Mississippi River. *In 2020 stream monitoring occurred monthly, April through October, in the Environmental Preserve and at the 65th Avenue Outfall in Brooklyn Park. Partnered with the Mississippi Watershed Management Organization to undertake monitoring at the 65th Avenue outfall.*
- Sponsor volunteer stream monitoring through RiverWatch and wetland monitoring through WHEP (Hennepin County). *Due to COVID-19, no volunteer monitoring occurred in 2020.*
- Completed reviews of development and redevelopment projects as necessary. *The West Mississippi Commission completed seven reviews of development/ redevelopment projects and acted as the WCA LGU for one wetland delineation/wetland-type review and two no- or incidental-loss determinations. They are described in more detail in* Appendix 3. *No variances were requested for these projects.*

- The Commissions continue to work cooperatively with the Metropolitan Council and Hennepin County on the Blue Line LRT Extension project, and with the Metropolitan Council on the C Line Bus Rapid Transit project. *No work was performed on the Blue Line in 2020; however, it appears the Blue Line may be coming back on a different route.*
- Prepare an annual water quality report. *The* 2019 Annual Activity Report *was accepted by the Commission at its April 9, 2020 meeting and forwarded to the Board of Water and Soil Resources on April 30, 2020.*
- Solicit cost-share projects from member cities funded from the Cost Share Fund and the annual $50,000 levy. *The City of Brooklyn Park submitted a Cost Share Program application to assist in the cost of designing the River Park Stormwater Improvements. This project will provide treatment for 250 acres of land that currently discharge untreated into the Mississippi River. At their April meeting, the Commission authorized the allocation of $35,422 of Watershed Based Implementation Funding to Brooklyn Park's River Park Stormwater Improvements Project. (WBIF resources were allocated by the Commission to the Cost Share Program as a convenience for disbursal.)*
- Review feasibility studies for 2020 proposed capital projects, hold public hearings, order projects, and certify levies. *On September 10, 2020, the West Mississippi Watershed Management Commission adopted Resolution No. 2020-01, certifying for payment by Hennepin County of the Commission's share of the costs of three projects:*
  Project 2020-07 City Cost Share Best Management Practices (BMP) Projects ($53,025)
  Project 2020-08 Mississippi Crossings Phase B Infiltration Vault ($106,050)
  Project 2020-09 River Park Stormwater Improvements ***($128,585)***
- Prepare a 2021 annual budget and begin scoping the Fourth Generation Watershed Management Plan, which will be completed in 2022. *The 2021 budget, adopted on June 11, 2020, is shown in* Appendix 4.
- Invite three guest speakers to make lunchtime water resources-related presentations.

  In February, ReNae Bowman, Master Water Steward Appointee, presented her Capstone Project designed to evaluate and revitalize the City of Crystal's 125 raingardens and offer alternative runoff abatement methods to those without raingardens.

  Dr. Richard Kiesling, USGS, spoke about Advanced BMPs for Emerging Contaminants *at the Commission's March meeting.*

  In June, Stephen Mastey, Landscape Architects, presented the Twin Lake North Condominium parking lot BMP project in Crystal.
- Tour project sites in the watershed. *Due to COVID-19 and the need for social distancing, no tours were conducted in 2020.*
- Participate in the West Metro Water Alliance (WMWA) joint education and outreach

- group. The SCWM Commissions' Education and Public Outreach Committee (EPOC) is charged with developing and implementing an annual education and public outreach plan. Most of the EPOC business is done in conjunction with WMWA. *The Commission continues to participate in WMWA, with a primary activity being the 4th Grade education program called Watershed PREP. However, in 2020 in-classroom education was paused due to the pandemic and the Educators explored ways to offer the program virtually.*

  Continually updated the WMWA website, registering 9,000 unique pageviews in the first 11 months of 2020. Posted to social media and achieved 156 Facebook followers.

  WMWA's 2020 Annual Report is found at http://www.westmetrowateralliance.org/. Activities of the Alliance are also provided to the cities for their NPDES annual reports.

For the most part the Commissions are on track to meet their goals, with the following exceptions:

- Work has not yet begun on the "sustainable water budget" project. There have been some discussions with USGS staff about this, but a funding source for this project has not yet been identified. *This project will be completed in the 2020-2022 timeframe.*
- The Commissions have a goal to complete subwatershed assessments for at least 25% of that part of the watersheds that developed prior to Commission rules in 1984. *West Mississippi is on track to complete this goal.*
- The Commissions also have a goal of maintaining the functions and values of priority wetlands but have not established a process by which that would be evaluated.
- Continue to identify, pursue grant funding for, and implement projects and programs addressing the bacterial impairment in the Mississippi River. *This goal was not undertaken in 2020.*
- Stay abreast of other regional and state TMDLs. *This goal was not undertaken in 2020.*
- Identify boundaries of the untreated areas directly connected to the Mississippi River or other conveyances. *This did not occur in 2020.*

Water Monitoring

The West Mississippi watershed is comprised of 25 square miles of 25% high impervious urban development and 38% low-moderate impervious urban development, with 18.3 miles of stream. There are still approximately 1,000 acres of agricultural land still in production within the city of Brooklyn Park in the western portion of the watershed. Most of the developed land in the watershed is single-family residential. Due to soil conditions within the watershed, there are no lakes and very few wetlands.

One of the defining characteristics of the West Mississippi watershed is its sandy, well-

draining soils. Much of the watershed is located within the Anoka Sand Plain and, therefore, approximately 88% of the management unit contains type A, A/D, or B soils.

Surface water quality in the watershed is typical of urban lakes and streams in the Twin Cities metropolitan area. Agriculture followed by urban development have changed drainage patterns, increased pollutants to the waters, and reduced habitat for aquatic and terrestrial life. Diagnostic and feasibility studies completed between 2007 and 2011 have identified actions that can be taken in the watershed to help improve water quality.

Minnesota Administrative Rule 8410.0100 Subp.5 requires watershed management organizations to conduct monitoring programs *capable of producing accurate data to the extent necessary to determine whether the water quality and quantity goals of the organization are being achieved.*

The Shingle Creek and West Mississippi Watershed Management Commissions (WMCs) annually monitor water quality in the lakes, streams, and outfalls of the watersheds. A joint *Water Quality Report* summarizing current and historic conditions in the watersheds has been published annually since 1998. The 2020 report is found on the Shingle Creek/West Mississippi website at www.shinglecreek.org.

Together, the Commissions have established monitoring objectives to guide their monitoring programs:

- To quantify the current status of streams/outfalls and lakes throughout the watersheds in comparison to state water quality standards established for nutrients, turbidity, chloride, bacteria, and other parameters currently regulated by the State.
- To quantify changes over time, or trends, in stream and lake water quality in the Shingle Creek and West Mississippi watersheds.
- To quantify the effectiveness of implemented BMPs throughout the watersheds for the protection of water quality.

There are four major outfalls in the West Mississippi watershed:

- Located in Champlin, the **Oxbow storm sewer outfall** consists of a series of storm sewer pipes that drain approximately 1,167 acres of land in Champlin and Maple Grove.
- The **Environmental Preserve** is a small stream located in Brooklyn Park. This stream drains approximately 2,160 acres upstream of Brooklyn Park's Environmental Preserve and outlets to a small wetland in the Coon Rapids Dam Regional Park.
- **Mattson Brook** is another small surface channel/stream that drains most of central Brooklyn Park (approximately 3,500 acres) and includes a tributary, Edinbrook/Century Channel.
- **The 65th Avenue outfall** is the outlet of the storm sewer trunk line that runs beneath 65th Avenue North in Brooklyn Center.

Data has been collected from West Mississippi river outfalls since 2010, monitoring water quality and flow at two of the four outfall monitoring sites per year. Stream monitoring efforts consist of continuous flow measurements and water quality samples. Four main water quality parameters are sampled at each of the outfall monitoring stations – TSS, TP, bacteria (E. coli), and chloride. *In 2020, stream monitoring occurred monthly from April through October in the Environmental Preserve (ENVP) and at the 65th Avenue outfall in Brooklyn Park.*

In past years, high school volunteers coordinated by Hennepin County Environmental and Energy (HCEE) have performed macroinvertebrate monitoring at a site on Mattson Brook through the River Watch program. *The program was not conducted in 2020 due to COVID 19.*

HCEE also coordinated wetland monitoring by adult volunteers through WHEP (Wetland Health Evaluation Program). *As with River Watch, WHEP was not conducted in 2020.*

Consultant Services Selection

Every two years, a solicitation of interest proposals for technical, legal and administrative services is published in the *State Register*. *This biennial process will be repeated in January 2021.*

Financials

The Commission's Joint Powers Agreement provides that each member city contributes toward the annual operating budget based 50% on the area located within the watershed boundary and 50% on the tax capacity of all property within the watershed. *The 2020 cost allocations to the members are shown as part of the Operating Budget found in* Appendix 4.

Of the $177,600 operating budget approved by the Commission for 2020, income of $19,000 was projected as proceeds from application fees and reimbursements and $5,000 as interest income, resulting in assessments to the members totaling $153,600.

The West Mississippi Watershed Management Commission maintains a checking account at US Bank for current expenses and rolls uncommitted monies to its account in the 4M Fund, the Minnesota Municipal Money Market Fund. Amounts paid by the Commission per the 2019 Audit are categorized as General Engineering, General Administration, Education, Programs, Projects, or Capital Projects, and are shown below.

General engineering	$ 64,642
General administration	$ 50,509
Education	$ 27,523
Programs	$ 24,183
Projects and Management Plans	$ 128
Total	$166,985

General engineering work includes review of local plans, review of development/ redevelopment projects, tracking grant opportunities, attendance at meetings and other technical services. General administration includes support to technical staff, attendance at meetings, insurance premiums, annual audit, legal counsel, and other non-engineering services.

A 2015 amendment of Minnesota Rules, Chapter 8410 extended the annual audit due date to 180 days after the end of the fiscal year; in the case of the West Mississippi Commission, to June 30, 2020. *Prepared by Johnson & Company, Ltd., Certified Public Accountants, the 2019 Audit Report, is available on the Commission's website, www.shinglecreek.org*

The Commission follows Rule 54 of the Government Accounting Standard Board (GASB) to report Fund Balances. The fund balance classifications include:

> *Nonspendable* – amounts that are not in a spendable form. The Commission does not have any items that fit this category.

> *Restricted* – amounts constrained to specific purposes by their providers. One example would be ad valorem levy funds received from the County for capital improvement projects. The unused portion of these funds must be set aside in a restricted account for similar projects. Another example would be BWSR Legacy Grant proceeds where the funds are received prior to the onset of a project and where any unused portion must be returned to the grantor.

> *Committed* – amounts constrained to specific purposes by the Commission itself. An example would be residual funds carried over from one year to the next for Studies, Project Identification and Subwatershed Assessments.

> *Assigned* – amounts the Commission intends to use for specific purposes. Most line items in the Commission's Operating Budget fall under this category.

> *Unassigned* – amounts that are available for any purpose. These amounts are reported only in the general fund.

PROJECTED 2021 WORK PLAN

At their January 14. 2021 meeting the West Mississippi Watershed Management Commission identified the following activities for inclusion in their 2021 Work Plan. Most are ongoing activities, although some rotate around the watershed.

➢ **Continue to stay abreast of regional TMDLs.**

- Continue to identify, pursue grant funding for, and implement projects and programs addressing the bacterial impairment in the Mississippi River.
- Stay abreast of other regional and state TMDLs.
- Identify boundaries of the untreated areas directly connected to the Mississippi River or other conveyances.

➢ **Partner with other organizations to increase reach and cost effectiveness.**

- Participate in the West Metro Water Alliance joint education and outreach group.
- Partner with the USGS, DNR, and other interested parties to stay abreast of groundwater issues.

- Partner with the MWMO to undertake monitoring at the 65th Avenue outfall.
- Partner with a member city to complete a subwatershed BMP analysis.

➢ **Continue ongoing administration and programming.**

- Undertake routine flow and water quality at two outfalls into the Mississippi River.
- Sponsor volunteer stream monitoring through RiverWatch and wetland monitoring through WHEP (Hennepin County).
- Complete reviews of development and redevelopment projects as necessary.
- Prepare an annual water quality report.
- Solicit cost-share projects from member cities funded from the Cost Share Fund and the annual $50,000 levy.
- Review feasibility studies for 2020 proposed capital projects, undertake Plan Amendments, hold public hearings, order projects and certify levies.
- Prepare a 2022 annual budget and begin scoping the Fourth Generation Plan, which will be completed in 2022.
- Invite three guest speakers to make lunchtime water resources presentations.
- Tour project sites in the watershed.

Have a question about this report? Need more information? Want to know how to get involved? Contact us: drop us an email, give us a call, we're happy to help:

http://www.shinglecreek.org/contact-us.html

APPENDICES

2020 West Mississippi Commissioners and Technical Advisory Committee

	Representing	Name	Address	Telephone	Email	Term Expires
Commissioners	Brooklyn Center	David Vlasin Vice Chair		651.792.7972	david.vlasin@rwmwd.org	2021
	Brooklyn Park	Steve Chesney	8172 Zenith Court North Brooklyn Park, MN 55443	763.561-2512	Steven.Chesney@outlook.com	2021
	Champlin	Gerry Butcher Chair	11467 Preserve Lane N Champlin, MN 55316	763.557.1451	JG_Butcher@yahoo.com	2022
	Maple Grove	Karen Jaeger Sec/Treas	8459 Rice Lake Road Maple Grove, MN 55369	763.420.3838	kjaeger@ci.maple-grove.mn.us	2022
	Osseo	Harold E. Johnson	12-Sixth Street NE Osseo, MN 55369	763.424.3707	HJohnson@ci.osseo.mn.us	2023
Technical Advisory Commitee	Brooklyn Center	Andrew Hogg	City of Brooklyn Center 6301 Shingle Creek Pkwy Brooklyn Center, MN 55430	763.569.3327	ahogg@ci.brooklyn-center.mn.us	
	Brooklyn Park	Mitchell Robinson	City of Brooklyn Park 5200 85th Avenue North Brooklyn Park, MN 55443	763.493.8291	Mitchell.Robinson@brooklynpark.org	
	Champlin	Todd Tuominen	City of Champlin 11955 Champlin Drive Champlin, MN 55316	763.923.7120	ttuominen@ci.champlin.mn.us	
	Maple Grove	Derek Asche	City of Maple Grove 12800 Arbor Lakes Pkwy Maple Grove, MN 55313	763.494.6354	dasche@maplegrovemn.gov	
	Osseo	Nick Waldbillig	City of Osseo 415 Central Avenue Osseo MN 55369	763.425.5741	nwaldbillig@ci.osseo.mn.us	

2020 West Mississippi Commission Staff

Name	Address	Telephone	Email
Technical			
Ed Matthiesen	Wenck Associates, Inc.	763.252.6851	ematthiesen@wenck.com
Diane Spector	7500 Highway 55 Ste 300	763.252.6880	dspector@wenck.com
Jeff Strom	Golden Valley, MN 55427	763 252.6833	jstrom@wenck.com
Katie L. Kemmitt		763.252.6879	kkemmitt@wenck.com
Legal			
Troy Gilchrist	Kennedy & Graven, 470 Pillsbury Center Minneapolis, MN 55402	612.337.9214	tgilchrist@kennedy-graven.com
Administrative			
Judie Anderson	JASS	763.553.1144	judie@jass.biz
Amy Juntunen	3235 Fernbrook Lane		amy@jass.biz
Beverly Love	Plymouth, MN 55447		beverly@jass.biz

AMENDMENTS TO THE JOINT WATERSHED MANAGEMENT PLAN

In 2013 the Shingle Creek and West Mississippi Watershed Management Commissions adopted their joint *2013-2022 Third Generation Watershed Management Plan.* The Plan sets forth goals and strategies that will guide water resources management activities in the two watersheds over the coming decade. Over the years the Commission, either individually or together with the Shingle Creek Commission, has adopted a number of amendments to the Plan. They are described below:

In 2013 the Commissions adopted a minor amendment to the Plan which revised the Commissions' Rules and Standards to adopt the new National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation frequency standards, replacing the outdated Weather Bureau Technical Paper 40 (TP-40) standards.

In 2014 the Commissions adopted a second minor amendment to the Plan. It revises the estimated cost and provides more description and detail about one proposed Shingle Creek project in the Commissions' Capital Improvement Program (CIP).

In December 2014 the Commissions adopted a major amendment to the Plan which added five projects to the Commissions' CIP - three pond retrofits in the Shingle Creek watershed and Priority BMP Retrofits in both watersheds.

On May 14, 2015, the Commissions adopted a minor Plan amendment to 1) increase the annual levy for city cost-share projects from $50,000 to $100,000, 2) increase the (Shingle Creek) Commission cost share for lake internal load projects from 25% to 100%; and 3) specify that the potential 2015 lake internal load project (in the Shingle Creek watershed) would be the proposed Twin Lake Carp Tracking and Removal project.

On November 12, 2015, the Commissions amended their joint *Third Generation Watershed Management Plan* to adopt a revision to the plan amendment process to conform to 2015 revisions to MN Rules 8410. In part, the revisions will allow the Commission to modify the CIP with only minimal need for plan amendments.

On June 9, 2016, the Commissions adopted a minor amendment to the Plan which amended the Shingle Creek 2016 CIP to include: 1) an annual levy for city cost-share projects of $200,000 with Commission cost-share of $100,000; 2) Iron and Biochar-Enhanced Sand Filter Retrofits of $210,000 with Commission cost-share at 100%; and 3) Partnership cost share (private projects) of $100,00, with Commission cost-share of $50,000; and further amended the West Mississippi 2016 CIP to include: 1) an annual levy for city cost-share projects of $50,000 with Commission cost-share at 100%; and 2) Iron and Biochar-Enhanced Sand Filter Retrofits of $80,000 with Commission cost-share at 100%.

On May 11, 2017, the Commissions adopted a seventh minor amendment to their joint Plan. In Shingle Creek a second phase to the Reaeration Project was added to the CIP at a project cost/Commission contribution of $145,000; and specificity of description was added to the Shingle/Bass Creek project, now known as the Palmer Creek Estates Bass Creek Stream Restoration. Three other projects were moved to future years. In West Mississippi the 2017 CIP was revised to move three projects to future years.

AMENDMENTS TO THE JOINT WATERSHED MANAGEMENT PLAN, *cont'd.*

On May 10, 2018, the Commissions adopted a minor amendment to the Plan which amended the Shingle Creek CIP to substitute the Bass and Pomerleau Lakes Alum Treatment Project for the generic Lake Internal Load Project in 2018 and added the SRP Reduction Project to the CIP, also in 2018. Two other projects were moved to future years. No revisions were made to the West Mississippi CIP.

On May 9, 2019, the Commission adopted the first of four new amendments to the Plan. The first amendment revised the CIP to add specificity to a project and to revise certain cost-share policies.

The second, adopted August 8, 2019, revised the CIP to reschedule and add specificity to a project and to adopt a cost-share policy for capital improvements.

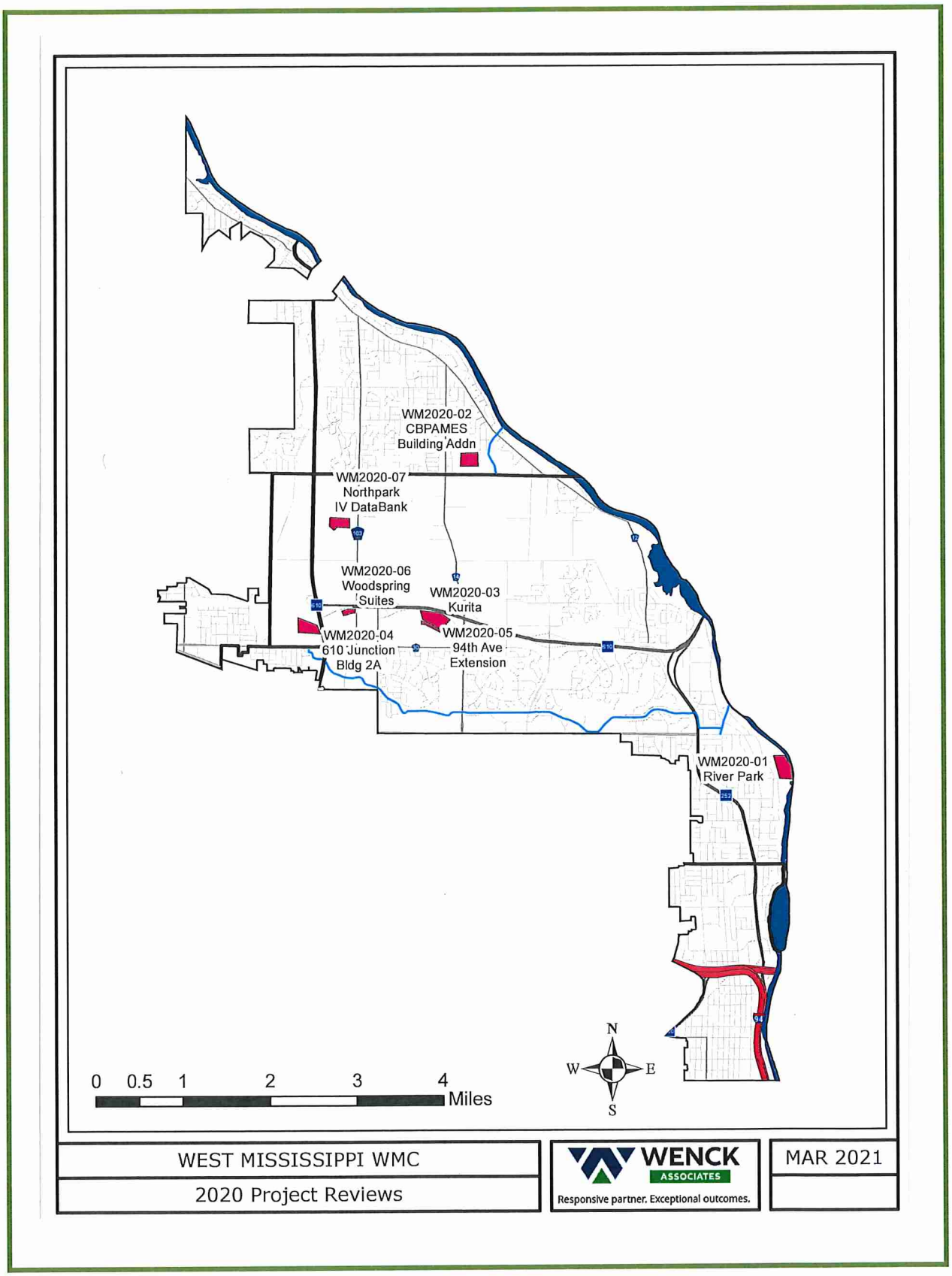
The third amendment, adopted September 12, 2019, ordered four improvements, designating the members responsible for construction and certifying them for ad valorem levy. One improvement, City Cost Share Best Management Practices (BMP) Projects ($53,025.00), was located in the West Mississippi watershed.

On October 10, 2019, the Plan was amended to add one West Mississippi project – River Park Storm Approvements - to its 2020 CIP.

The joint Plan was not amended in 2020.

2020 Project Reviews

Number	Project	Community	WCA LGU	Project Description	Impervious Area	Approved
2020-001	River Park Improvement Project	Brooklyn Park	Comm	Renovation of park facilities on 10.07 acres, creation of stormwater treatment pond.	56% impervious with 5.68 acres of impervious surface, increase of 0.83 acres	13-Feb-20
2020-002	CBPAMES Building additions and renovations	Champlin	Comm	Construction of building addition, playground and additonal parking area on 19.5 acres	25% impervious with 4.8 acres of impervious surface, increase of 0.5 acres	12-Mar-20
2020-003	Kurita	Brooklyn Park	Comm	Construction of building, parking lot and load dock on 54 acres of vacant farmland	15% impervious with 8 acres of impervious surface, increase of 8 acres	12-Mar-20
2020-004	610 Junction Building 2A	Brooklyn Park	Comm	Construction of new building, drive aisles, parking lot and sidewalks on 8.46 acres vacant agricultural and wooded land	80% impervious with 6.8 acres of impervious surface, increase of 6.8 acres.	9-Apr-20
2020-005	94th Avenue Extension	Brooklyn Park	Comm	Extension of 94th Avenue to connect Zane and Hampshire Avenues. Site is 98.3 acres.	15.9% impervious with 15.6 acres of impervious surface, an increase of 15.6 acres.	14-May-20
2020-006	Woodstring Suites Hotel	Brooklyn Park	Comm	Construction of a 13,000 SF 4-story hotel building and associated parking lot on 4.9 acres	33.7% impervious with 1.65 acres of impervious surface, increase of 1.65 acres.	10-Sep-20
2020-007	North Park Business Center - Databank	Brooklyn Park	Comm	Construction of two buildings in businnes park. The site is 14.4 acres.	74% impervious with 10.7 acres of impervious surface, increase of 10.5 acres	10-Sep-20


WM2020-02
CBPAMES
Building Addn
WM2020-07
Northpark
IV DataBank
WM2020-06
Woodspring
Suites
WM2020-03
Kurita
WM2020-04
610 Junction
Bldg 2A
WM2020-05
94th Ave
Extension
WM2020-01
River Park
N
W
E
S
0 0.5 1 2 3 4
Miles
WEST MISSISSIPPI WMC
2020 Project Reviews
WENCK
ASSOCIATES
Responsive partner. Exceptional outcomes.
MAR 2021

West Mississippi 2020 - 2021 Operating Budgets

		2020 Budget	2021 Budget
REVENUE			
	Application Fees	$18,000	$18,000
	Member Assessments	153,600	153,600
	Blue Line Extension	1,000	0
	Interest	5,000	7,000
	Miscellaneous Income	0	0
	Reserve	0	0
	Subtotal	***$177,600***	***$178,600***
EXPENSES			
	ADMINISTRATION		
	Administrative Services	$31,000	$30,000
	Engineering Support	4,500	5,000
	Project Reviews/WCA	1,500	1,500
	Blue Line Extension	500	0
	Subtotal	***$37,500***	***$36,500***
	ENGINEERING		
	Engineering Services	31,000	31,500
	Grant Application Writing	1,000	1,000
	Project Reviews/WCA	27,600	30,000
	Blue Line Extension	500	0
	Subtotal	***$60,100***	***$62,500***
	LEGAL		
	Legal Services	5,000	4,000
	Subtotal	***$5,000***	***$4,000***
	MISCELLANEOUS		
	Bookkeeping	3,000	3,000
	Audit	5,500	5,500
	Insurance & Bonding	2,800	2,800
	Meeting Expense	2,700	2,700
	Subtotal	***$14,000***	***$14,000***

West Mississippi 2020 - 2021 Operating Budgets, *contd.*

	2020 Budget	2021 Budget
EXPENSES. *contd.*		
MONITORING		
Volunteer Stream Monitoring	$ 1,000	$ 0
Volunteer Wetland Monitoring	2,000	2,000
Outfall and Stream Monitoring	20,000	22,600
Annual Monitoring Report	8,000	8,000
Subtotal	***$31,000***	***$32,600***
EDUCATION		
Education Program	15,000	15,000
Raingarden Workshops	2,000	2,000
WMWA Implementation	11,500	11,500
Education Grants	500	500
Subtotal	***$29,000***	***$29,000***
MANAGEMENT PLANS		
Third Gen Plan/Amendments	1,000	0
Subwatershed BMP Assessments	0	0
Subtotal	***$1,000***	***$0***
Contribution constr/grant match		
Contribution to 4th Gen Plan		
Flood Modeling and Mapping		
To (from) Reserves		
TOTAL OPERATING EXPENSE	**$177,600**	**$178,600**

2020-2021 Member Assessments

2020 Community	Acreage	2019 Tax Capacity	Cost Allocation Based on Area		Cost Based on Tax Capacity		Total Cost	
			%age	Dollars	%age	Dollars	%age	Dollars
Brooklyn Center	1,660	8,058,439	10.46%	8,033	10.92%	8,386	10.69%	16,419
Brooklyn Park	9,880	42,590,111	62.26%	47,813	57.71%	44,321	59.98%	92,134
Champlin	3,620	19,143,084	22.81%	17,518	25.94%	19,921	24.37%	37,440
Maple Grove	530	2,686,113	3.34%	2,565	3.64%	2,795	3.49%	5,360
Osseo	180	1,322,328	1.13%	870	1.79%	1,376	1.46%	2,247
Totals	15,870	73,800,075	100.00%	76,800	100.00%	76,800	100.00%	153,600

2021 Community	Acreage	2020 Tax Capacity	Cost Allocation Based on Area		Cost Based on Tax Capacity		Total Cost	
			%age	Dollars	%age	Dollars	%age	Dollars
Brooklyn Center	1,660	9,158,330	10.46%	8,033	10.92%	8,387	10.69%	16,420
Brooklyn Park	9,880	49,614,398	62.26%	47,813	59.16%	45,436	60.71%	93,248
Champlin	3,620	20,767,803	22.81%	17,518	24.76%	19,019	23.79%	36,537
Maple Grove	530	2,911,603	3.34%	2,565	3.47%	2,666	3.41%	5,231
Osseo	180	1,410,734	1.13%	870	1.68%	1,292	1.41%	2,163
Totals	15,870	83,862,868	100.00%	76,800	100.00%	76,800	100.00%	153,600

Appendix 4

WENCK now part of Stantec

SHINGLE CREEK / WEST MISSISSIPPI WATERSHED MANAGEMENT COMMISSION
MONTHLY COMMUNICATION LOG
March 2021

Date	From	To	SC	WM	Description
3-3-2021	Nathan Fair @ Sathre-Bergquist	Ed Matthiesen	X		Avery Park project review status
3-4-21	Resident on Upper Twin Lake	Website comment entry	X		Concern about potential installation of slalom waterski course on Upper Twin. Referred to cities
3-5-2021	Ben Ford @ Rehder Assoc.	Ed M.	X		Project review requirements for a site in New Hope
3-5-2021	Ben Johnson @ Kimley-Horn	Ed M.		X	Project review WM2021-002 North Park Business Center in Brooklyn Park pond question
3-7-2021	Hennepin-Watch	Ed M.	X		Freight train derailment in Plymouth near Schmidt Lake
3-9-21	Kevin Hejna, Hennepin County	Diane Spector	X		New HC staff person, is the county still required to report annual road salt usage to the watershed. (No)
3-15-2021	MnDNR	Ed M.	X		Upper Twin Lake curly-leaf pondweed management permit renewal reminder
3-15-2021	Liz Stout @ City of Mpls	Ed M.	X		Green Infrastructure Training discussion
3-15-2021	Hudson Echelard @ Merjent	Ed M.	X		Pipeline review thresholds
3-15-21	MPARS, MnDNR	SC WMC	X		Notification that curly-leaf pondweed treatment permit has expired and must be reauthorized. (Nick's on it.)
3-18-2021	Richard Kiesling, PhD @ USGS	Ed M.	X	X	Support for pollutants of emerging concern with biochar filters for LCCMR grant
3-19-2021	Dr. Jiwei Zhang @ U of Minnesota	Ed M.	X	X	PFAS fungal wood chip media support letter and equipment grant application
3-24-2021	Derek Asche @ Maple Grove	Ed M.	X	X	6820 Wedgewood Rd. N pavement rehab review requirements
3-26-2021	Jeff Weiss @ MnDNR	Ed M.	X		Prep for HUC8 TAC meeting
3-29-2021	Mitch Robinson @ City of Brooklyn Park	Ed M.	X		Build out of SC1985-01 Northland Office Park

Shingle Creek Watershed Management Commission
3235 Fernbrook Lane N • Plymouth, MN 55447
Phone (763) 553-1144 • Fax (763) 553-9326
www.shinglecreek.org

March 29, 2021

Attention: Dr. Richard L. Kiesling
United States Geological Survey
2280 Woodale Drive
Mounds View, MN 55112-4900

Dear Dr. Kiesling,

Reference: Support for the Application to the Environmental and Natural Resources Trust Fund 2022 Request for Proposals Regarding the Project, "Removing CECs from Stormwater with Biofiltration".

The Shingle Creek Watershed Management Commission is very supportive of your proposed research in the use of biofiltration media to mitigate contaminants of emerging concern such as pharmaceuticals, pesticides and PAHs, among others. As a watershed organization tasked with improving the water resources in the Shingle Creek Watershed in Hennepin County, it is important for us to have treatment options that are cost effective, reliable, and easy to deploy. We believe outcomes of this research will further the progress toward finding these treatment options.

The Shingle Creek Watershed Management Commission believes this work in biofiltration treatment media will have direct benefits to our watershed, statewide and the environment. Please let me know how we at the Commission can be of assistance to you and your work.

Regards,

R. A. Polzin
Chair
Z:\Shingle Creek\Communications\2021\L_Kiesling.docx