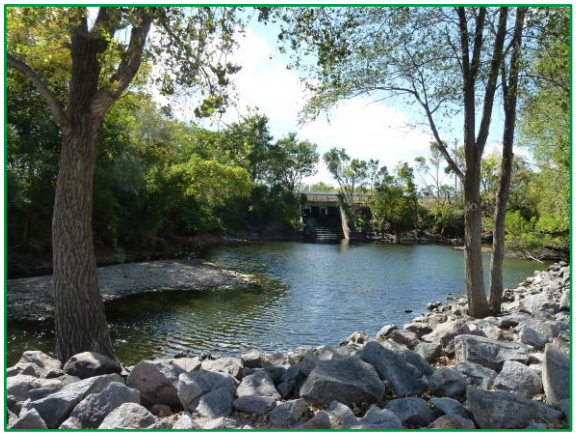
Third Generation Watershed Management Plan October 2015






Elm Creek Watershed Management Commission

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elm creek
Watershed Management Commission

Elm Creek
Watershed Management Commission
Third Generation Watershed Management Plan

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Commission Adopted October 14, 2015

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BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
cfs	cubic feet per second
cfu	colony-forming unit
Chl-a	Chlorophyll-a
Commission	Elm Creek Watershed Management Commission
DNR	Department of Natural Resources
DO	Dissolved Oxygen
EC WMC	Elm Creek Watershed Management Commission
EPA	Environmental Protection Agency
F-IBI	Index of Biotic Integrity for Fish
ft^3	Cubic feet
HCEED	Hennepin County Environment and Energy Department
IBI	Index of Biotic Integrity
LGU	Local Government Unit
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
M-IBI	Index of Biotic Integrity for Macroinvertebrates
MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer Systems
NAWQA	National Water Quality Assessment Program
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetland Inventory
NWS	National Weather Service
ppb	parts per billion
SWPPP	Storm Water Pollution Prevention Program
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
µg/L	microgram per liter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WCA	Wetland Conservation Act
WLA	Wasteload Allocation
WMC	Watershed Management Commission
WMO	Watershed Management Organization
WMWA	West Metro Water Alliance
WRAPS	Watershed Restoration and Protection Strategies

This watershed management plan describes how the Elm Creek Watershed Management Commission (EC WMC) will manage activities in the watershed in the ten year period 2015-2024.

The Elm Creek Watershed Management Commission is a Watershed Management Organization (WMO) formed in 1973 using a Joint Powers Agreement (JPA) developed under authority conferred to the member communities by Minnesota Statutes Sections 471.59 and 103B.201 through 103B.251. The watershed is located in the northwest portion of the Minneapolis-St. Paul seven county Metropolitan Area and is comprised of all or part of the following cities in Hennepin County:

Cities	Area (sq mi)
Champlin	3.08
Corcoran	36.06
Dayton	25.17
Maple Grove	26.32
Medina	9.34
Plymouth	4.44
Rogers	26.20
Total	**130.61**

The WMO is governed by a Board of Commissioners that is comprised of one member appointed from each community by their respective City Councils. The Commission's purpose is set forth in the JPA and Minnesota Statutes 103B.210, Metropolitan Surface Water Planning, which codified the Metropolitan Surface Water Management Act of 1982:

(1) protecting, preserving, and using natural surface and groundwater storage and retention systems;
(2) minimizing public capital expenditures needed to correct flooding and water quality problems;
(3) identifying and planning for means to effectively protect and improve surface and groundwater quality;
(4) establishing more uniform local policies and official controls for surface and groundwater management;
(5) preventing erosion of soil into surface water systems;
(6) promoting groundwater recharge;
(7) protecting and enhancing fish and wildlife habitat and water recreational facilities; and
(8) securing the other benefits associated with the proper management of surface and ground water.

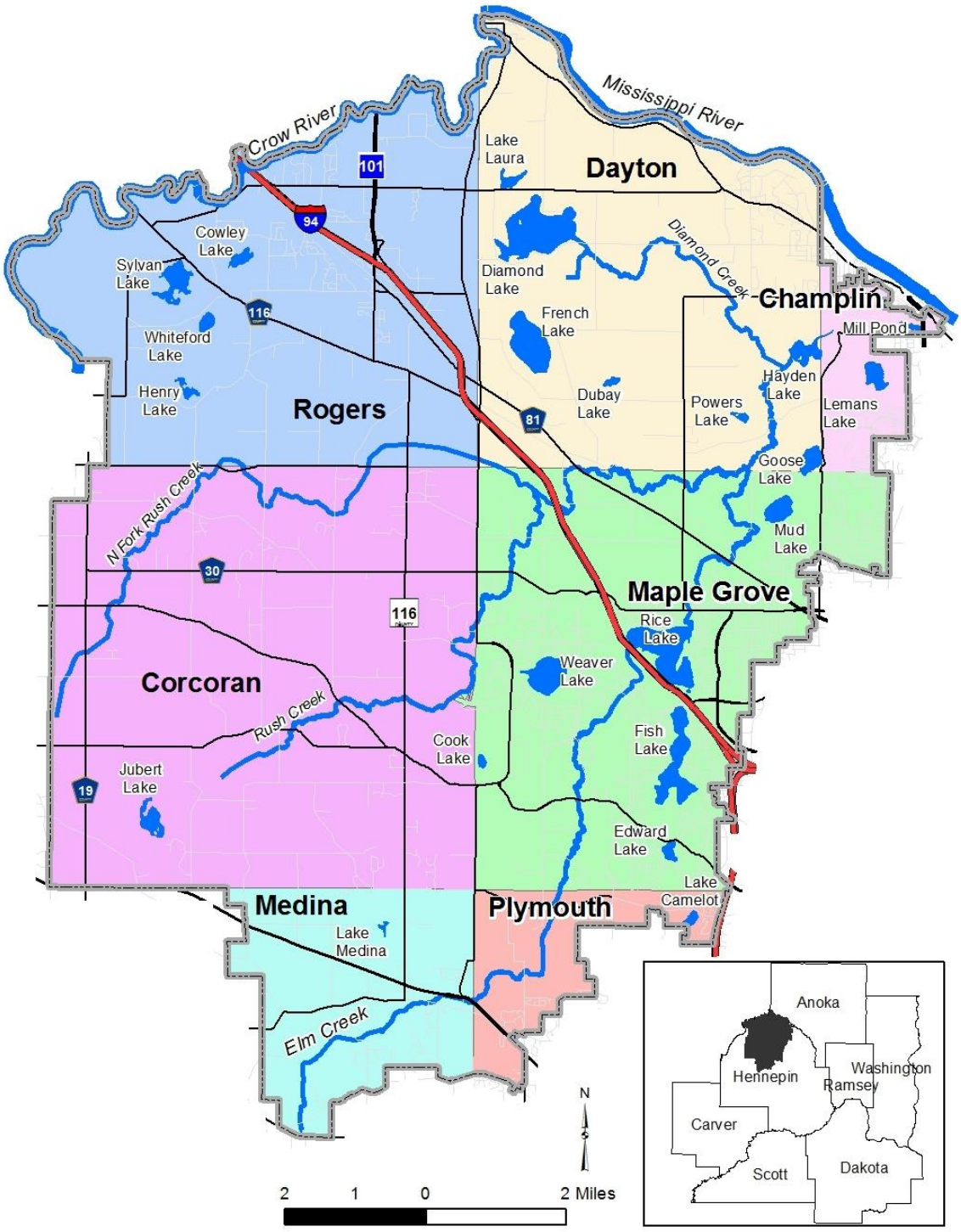

Figure E.1.1.Cities in the Elm Creek watershed.
Source: Minnesota DNR. Watershed Boundary: Hennepin County Environmental Services.

Third Generation Watershed Management Plan

The Elm Creek Watershed Management Commission initiated work on the Third Generation Plan in January 2013. The Plan includes information required in Minnesota Administrative Rules Chapter 8410, Local Water Management: an updated land and water resources inventory, goals and policies; an assessment of problems and identification of corrective actions; an implementation program; and a process for amending the Plan. This Plan also incorporates information and actions identified in the Elm Creek Watershed Total Maximum Daily Load study (TMDL) and Watershed Restoration and Protection Strategy study (WRAPS) completed between 2009 and 2015.

The Commission and Citizen and Technical Advisory Committees identified the following issues and issue areas during the planning process:

- Water Quality: numerous lake and stream impairments with multiple parameters, impact of land use change on water quality, continued stream stability issues.
- Agricultural Impacts on Water Quality: need to increase agricultural BMPs in the watershed, develop effective mechanisms to encourage voluntary adoption, more effective outreach
- Funding Needs: maintaining a sustainable funding level, funding capital projects.
- Other Issues: lack of information and knowledge of water quality issues and actions by multiple stakeholders, need to be realistic and prioritize actions, increase member city involvement, and foster collaboration with other agencies.

Management Plan Priorities and Goals

Through the identification of issues in the watershed, the ECWMC developed the following priorities and goals to guide water resources planning and management functions:

Priorities:

1. Begin implementing priority projects and actions in 2015, providing cost-share to member cities to undertake projects to help achieve WRAPS lake and stream goals.
2. Use the results of the WRAPS study to establish priority areas, and complete subwatershed assessments to identify specific Best Management Practices that feasibly and cost-effectively reduce nutrient and sediment loading to impaired water resources. Convene a TAC of agencies specializing in ag outreach to help guide assessments in agricultural subwatersheds.
3. Develop a model manure management ordinance to regulate the placement of new small non-food animal operations using the City of Medina ordinance as a guide, and require member cities to adopt that ordinance or other ordinances and practices to accomplish its objectives.
4. Partner with other organizations to complete a pilot project for targeted fertilizer application and to increase and focus outreach to agricultural operators.
5. Continue participating in joint education and outreach activities with WMWA and other partners.

Goals:

Goal Area A. Water Quantity

- Goal A. 1. Maintain the post-development 2-year, 10-year, and 100-year peak rate of runoff at pre-development level for the critical duration precipitation event.
- Goal A. 2. Maintain the post-development annual runoff volume at pre-development volume.
- Goal A. 3. Prevent the loss of floodplain storage below the established 100-year elevation.
- Goal A. 4. Reduce peak flow rates in Elm, Diamond, and Rush Creeks and tributary streams to the Crow and Mississippi and preserve conveyance capacity.

Goal Area B. Water Quality

- Goal B. 1. Improve Total Phosphorus concentration in the impaired lakes by 10% over the 2004-2013 average by 2024.
- Goal B. 2. Maintain or improve water quality in the lakes and streams with no identified impairments.
- Goal B. 3. Conduct a TMDL/WRAPS progress review every five years following approval of the TMDLs and WRAPS study.
- Goal B. 4. Use information in the WRAPS to identify high priority areas where the Commission will partner with cities and other agencies to provide technical and financial assistance.

Goal Area C. Groundwater

- Goal C. 1. Promote groundwater recharge by requiring abstraction/infiltration of runoff from new development and redevelopment.
- Goal C. 2. Protect groundwater quality by incorporating wellhead protection study results into development and redevelopment Rules and Standards.

Goal Area D. Wetlands

- Goal D. 1. Preserve the existing functions and values of wetlands within the watershed.
- Goal D. 2. Promote the enhancement or restoration of wetlands in the watershed.

Goal Area E. Drainage Systems

- Goal E. 1. Continue current Hennepin County jurisdiction over the county ditches in the watershed.

Goal Area F. Commission Operations and Programming

- Goal F. 1. Identify and operate within a sustainable funding level that is reasonable to member cities.
- Goal F. 2. Foster implementation of priority TMDL and other implementation projects by sharing in their cost and proactively seeking grant funds.
- Goal F. 3. Operate a public education and outreach program to supplement the NPDES Phase II education requirements for the member cities.

Goal F. 4. Operate a monitoring program sufficient to characterize water quantity, water quality, and biotic integrity in the watersheds and to evaluate progress toward meeting goals.

Goal F. 5. Maintain rules and standards for development and redevelopment that are consistent with local and regional TMDLs, federal guidelines, source water and wellhead protection requirements, nondegradation, and ecosystem management goals.

Goal F. 6. Serve as a technical resource for member cities.

Implementation

This Third Generation Watershed Management Plan continues a number of activities that have been successful in the past and introduces some new activities, including modified development rules and standards and an enhanced monitoring program.

Rules and Standards

In developing this Plan the Commission updated policies from the Second Generation Plan and developed new standards based on the 2013 Minnesota NPDES General Permit for Municipal Separate Storm Sewer Systems (MS4s), the 2013 Minnesota NPDES Construction Stormwater General Permit, and the MPCA's Minimal Impact Design Standards and State Stormwater Manual. These were compiled and codified into a Rules and Standards document. The Commission chose to adopt those new standards in advance of the Third Generation Plan, effective January 1, 2015. In general, the new Rules and Standards apply to all development and redevelopment one acre or more in size; require at a minimum no increase in pollutant loading or stormwater volume; require no increase in the peak rate of runoff from the property; require the abstraction/ infiltration of 1.1 inches of runoff from impervious surfaces; and clarify the wetland buffer requirements. This Plan also provides a method by which member cities can take on review responsibilities for smaller projects, reducing the regulatory burden for small developers.

Monitoring Program

The monitoring program continues the partnership with the USGS for routine flow and water quality monitoring on Elm Creek, with periodic monitoring on additional Elm Creek sites, and on Rush, North Fork Rush, and Diamond Creeks on a rotating or as-needed basis. Four lakes – Weaver, Fish, Rice, and Diamond Lakes – have been classified as "Sentinel Lakes," and will be monitored every year. Other lakes will be monitored on a rotating basis.

Education and Outreach

The Citizens Advisory Committee (CAC) for the Plan developed a recommended Education and Outreach program that identifies stakeholder groups and key education messages. This Plan expands

education and outreach activities to key stakeholders and continues collaborative partnerships such as the West Metro Water Alliance (WMWA), Blue Thumb, and Watershed Partners.

Other Activities — The Implementation Plan includes funding for BMP assessments and special studies such as feasibility studies and special monitoring that will identify the most cost-effective practices and projects.

WRAPS Implementation — This Plan includes key findings and actions identified in the Elm Creek Watershed Restoration and Protection Strategies (WRAPS) study, , which includes TMDLs for the impaired waters and improvement and protection strategies and activities for all waters.

Local and Watershed Plan Amendments

On final approval of the Plan, cities will have 2 years to update their Local Stormwater Management Plan (LWMP). These updates will be expected to include:

- Updated land use, hydrologic, and hydraulic data, and existing or potential water resource related problems that may have changed since the last LWMP.
- An explanation of how the member city will help to implement the actions set forth in the Commission's Plan, including a focus on ensuring that both public and private water quality and other Best Management Practices are properly installed and maintained as well as a plan for adopting and enforcing a City of Medina-like manure management ordinance.
- A detailed explanation of how the member city will take action to achieve the load reductions and other actions identified in and agreed to in TMDL Implementation Plans.
- An updated Implementation Plan identifying specific structural, nonstructural, and programmatic solutions to the problems and issues identified in the LWMP; their costs; and funding.
- 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; a capital improvement plan; and estimates of cost and funding mechanisms.

This Plan provides direction for EC WMC activities through the year 2024. The Commissioners intend the Plan to be a flexible framework and, as such, may initiate amendments to this plan at any time. The Commission will annually review the Capital Improvement Program and may adopt major or minor plan amendments adding or revising proposed capital improvement projects.

1.0 Introduction and Purpose

The Elm Creek Watershed Management Commission (EC WMC) was formed on February 1, 1973, under a Joint Powers Agreement (JPA) developed under authority conferred to the member communities by Minnesota Statutes 471.59. The parties to that JPA were Champlin, Corcoran, Dayton, Maple Grove, Medina, Plymouth, and the Hennepin Conservation District. In 1980 Hassen Township joined, followed by Rogers in 1983. Greenfield was also a party to the JPA, but left in 2001. Hassen was fully annexed by Rogers in 2012. The Joint Powers Agreement governing the WMO is included in Appendix A.

The watershed is located in the northwest part of the Minneapolis-St. Paul seven county metropolitan area (Figure 1.1) in the Crow River and Twin Cities Mississippi River basins of the Upper Mississippi River watershed. The Commission's purpose is set forth in Minnesota Statutes 103B.210, Metropolitan Surface Water Planning, which codified the Metropolitan Surface Water Management Act of 1982:

(1) protect, preserve, and use natural surface and groundwater storage and retention systems;
(2) minimize public capital expenditures needed to correct flooding and water quality problems;
(3) identify and plan for means to effectively protect and improve surface and groundwater quality;
(4) establish more uniform local policies and official controls for surface and groundwater management;
(5) prevent erosion of soil into surface water systems;
(6) promote groundwater recharge;
(7) protect and enhance fish and wildlife habitat and water recreational facilities; and
(8) secure the other benefits associated with the proper management of surface and ground water.

1.1 First and Second Generation Plans

The Commission adopted its initial Management Plan in 1983 and a Second Generation Plan in 2004. The Second Generation Management Plan was amended three times between 2004 and 2014 (Table 1.1).

Table 1.1. Record of revisions to the Second Generation Watershed Management Plan.

Number	Type	Date of Adoption	Summary of Revisions
1	Minor	12-Mar-08	Revises Appendix F. Water Quantity Standards to provide extended detention and/or runoff volume reduction to protect stream channels in the watershed.
2	Major	14-Nov-12	Clarifies process for identifying, prioritizing and funding CIPs. Updates listing of CIP projects, programs and studies. Amends anniversary date of Plan from July 2013 to October 2014.
3	Minor	8-Oct-14	Adopts new Rules and Standards as new Appendix O, and deletes all of existing Appendix F except for certain key policies and standards.

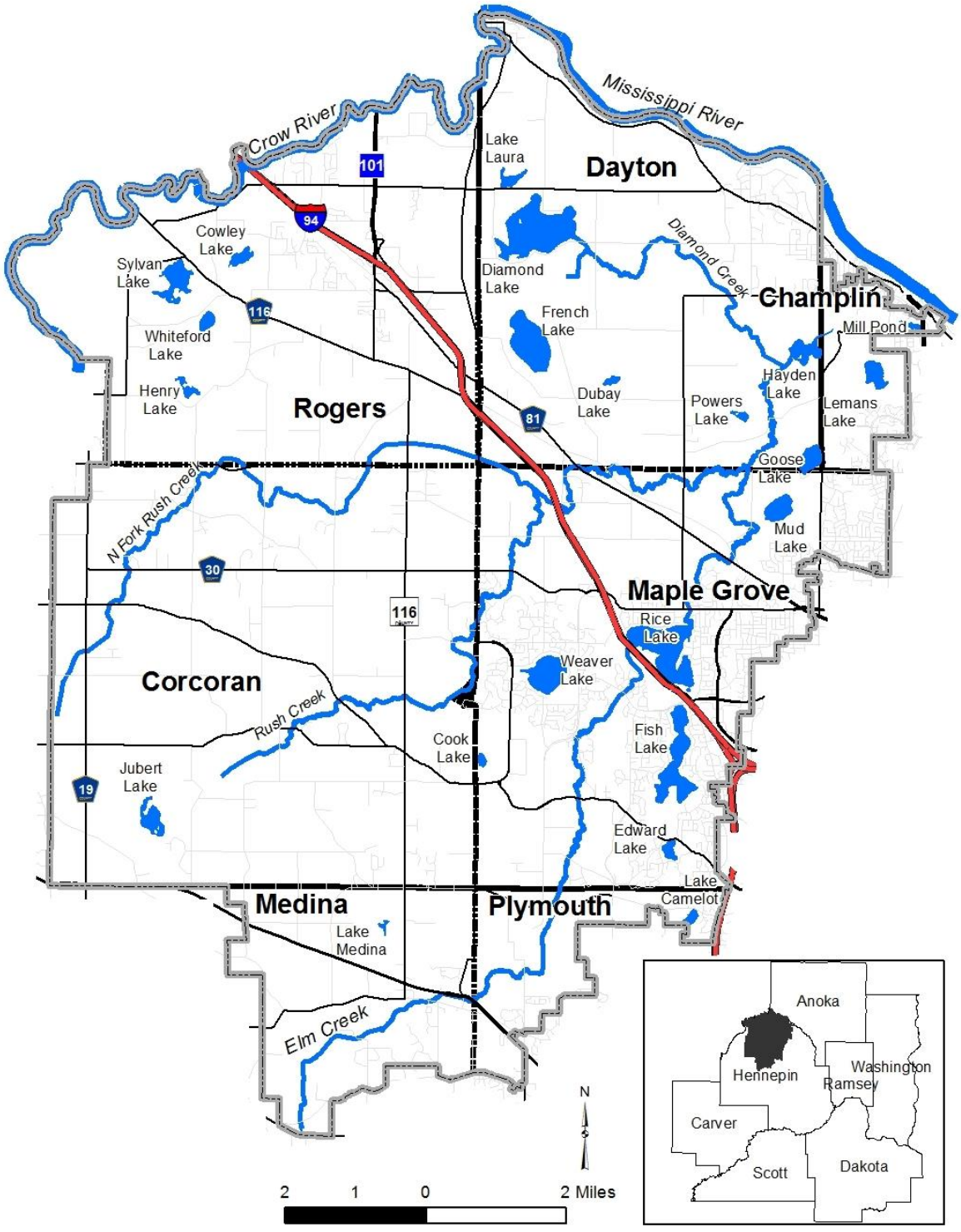

Figure 1.1. The Elm Creek watershed in Hennepin County, Minnesota.
Source: Minnesota DNR. Watershed boundary: Hennepin County Environmental Services.

Minnesota Statutes 103B.201 to 103B.253 and Minnesota Rules Chapter 8410 specify the basic content of the watershed management plan. The plan must:

- Describe the existing physical environment and land use in the area, as well as the proposed environment, land use, and development outlined in existing local and metropolitan comprehensive plans.
- Present information on the hydrologic system and its components and potential problems related thereto.
- State objectives and policies including management principles, alternatives and modifications, water quality, and protection of natural characteristics.
- Set forth a management plan including the desired hydrologic and water quality conditions and significant opportunities for improvement.
- Describe the effect of the plan on existing drainage systems.
- Identify high priority areas for wetland preservation, enhancement, restoration, and establishment and describe conflicts with wetlands and land use in those areas.
- Describe conflicts between the watershed plan and existing plans of Local Governmental Units (LGUs).
- Set forth an implementation program consistent with the management plan that includes a capital improvement program, standards, and schedules for amending the comprehensive plan and official controls of LGUs in the watershed to bring conformance with the plan.
- Set out procedures and timelines for amending the plan.

1.2 PLAN ORGANIZATION

This plan is divided into four sections:

1 – Introduction and Purpose: Describes the authority and composition of the EC WMC, the purpose of the Surface Water Management Act and the components of this watershed management plan.

2 – Inventory and Condition Assessment: A physical inventory of the watershed, it includes a profile of the watershed's existing environmental conditions. This profile contains descriptions of the area's geology, topography, soils, biological and human environment, and current land use and projected land use to the year 2020. This section also contains information on the lakes, streams, and wetlands in the watersheds.

3 – Watershed Organization and Operations: This section provides information about the Commission, how it is organized, its history, and its responsibilities, and discusses ongoing operations. This section also provides an evaluation of the successes of the Second Generation Plan and the areas where the Commission may have fallen short of its goals for the 2003-2014 period.

4 – Implementation Plan: This section sets forth the goals the Commission will work to achieve in the ten-year period covered by this Plan, and descriptions of the Commission's proposed operating programs, the Capital Implementation Program, and a discussion of implementation costs and financing. It also discusses the methods by which the Commission will evaluate progress towards achieving the goals set forth in the Plan, the process that will be followed should this Plan need to be Amended, and the requirements for Local Surface Water Management Plans prepared by the member cities in the watershed.

2.0 Inventory and Condition Assessment

This section documents existing conditions and resource characteristics within the Elm Creek watersheds. Where the Second Generation Watershed Management Plan included a detailed inventory of conditions, that data is not repeated here. A summary of that information is provided for context, with new or updated information presented in more detail.

The Physical Environment subsection describes the watershed's physical setting, geology and geomorphology, soils, and water resources. The Biological Environment subsection describes vegetation, biodiversity and native communities, unique features, and the biology of lakes and streams. The subsection Human Environment describes land use and growth patterns, recreational resources, and potential environmental hazards. The lakes, streams, and wetlands in the watershed are described in the Water Resources section.

2.1 WATERSHED PHYSICAL ENVIRONMENT

2.1.1 Location

The Elm Creek watershed covers just over 130 square miles in northwestern Hennepin County. There are six municipalities with land in the watershed (Figure 1.1 (page 1-1), Table 2.1).

Table 2.1. Cities in the Elm Creek watershed.

Cities	Area (sq mi)
Champlin	3.08
Corcoran	36.06
Dayton	25.17
Maple Grove	26.32
Medina	9.34
Plymouth	4.44
Rogers	26.20
Total	130.61

2.1.2 Topography and Drainage

The drainage pattern in the watershed is typical of a glaciated morainic area- gently rolling with low, round-top hills and numerous small wetlands in low areas. There are four primary landforms found in the watershed, each distinguished by varying patterns of glacial drift. Thinly spread drift formed till plains. The southern edge of the watershed is located within the Lonsdale-Lerdal Till Region, with characteristic low hills and depressions and clayey soils.

The central area of the watershed is located in the Waconia-Waseca Moraine or Emmons-Faribault Moraine. These landforms are similar, but the Waconia-Waseca landform is often dominated by loamy-silty soils and the Emmons-Faribault by silty-clayey soils. Moraines are formed from glacial till

dumped at the edges of glaciers creating belts of hills. Numerous rugged hills or "knobs" and deep irregular depressions called "kettles" dominate morainic landforms. Kettles are formed when isolated blocks of ice melted, often creating lakes, ponds, and wetlands. These depression areas tend to be poorly drained.

The Mississippi Valley Outwash Plain runs along the Crow and Mississippi Rivers. An outwash plain forms when glacial meltwater dropped sorted and stratified materials. When blocks of glacial ice melt they may form small shallow lakes. Landforms undulate and roll in gentle terraces and bottom lands.

Additional detail on the geologic history of the watershed can be found in the 2003 Elm Creek Watershed Management Plan and in the Hennepin County Geologic Atlas (Balaban 1989).

Four streams drain most of the watershed: Elm Creek and three tributaries: Rush Creek, North Fork Rush Creek, and Diamond Creek. Elm Creek discharges into the Mississippi River just downstream of the Champlin Mill Pond. The northwestern part of the watershed drains through small channels and ditches to the Crow River and a small portion of the north drains directly to the Mississippi River. Figure 2.1 shows the major watershed drainage features, including subwatershed boundaries, lakes, and streams.

2.1.3 Climate

The climate is predominately continental. Sitting close to the middle of North America, the weather in the watershed can vary widely and rapidly. Both temperature and precipitation can change abruptly. Table 2.2 shows the watershed's temperature normals, or averages, for the last 30 years.

Table 2.2. Temperature normals in °F for the Elm Creek watershed.

Twin Cities (1981-2010)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Maximum	23.7	28.9	41.3	57.8	69.4	78.8	83.4	80.5	71.7	58.0	41.2	27.1	55.3
Minimum	7.5	12.8	24.3	37.2	48.9	58.8	64.1	61.8	52.4	39.7	26.2	12.3	37.3
Mean	15.6	20.8	32.8	47.5	59.1	68.8	73.8	71.2	62.0	48.9	33.7	19.7	46.3
Crystal Airport (1981-2010)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Maximum	23.8	29.1	41.6	57.8	70.0	79.1	83.4	82.5	72.0	58.8	41.5	27.3	55.7
Minimum	6.7	11.5	22.6	35.7	46.9	57.2	62.0	60.1	50.4	37.9	24.9	11.7	35.8
Mean	15.2	20.3	32.1	46.8	58.4	68.2	72.7	71.3	61.2	48.4	33.2	19.5	45.7

Source: Minnesota State Climatology Office and National Climatic Data Center.

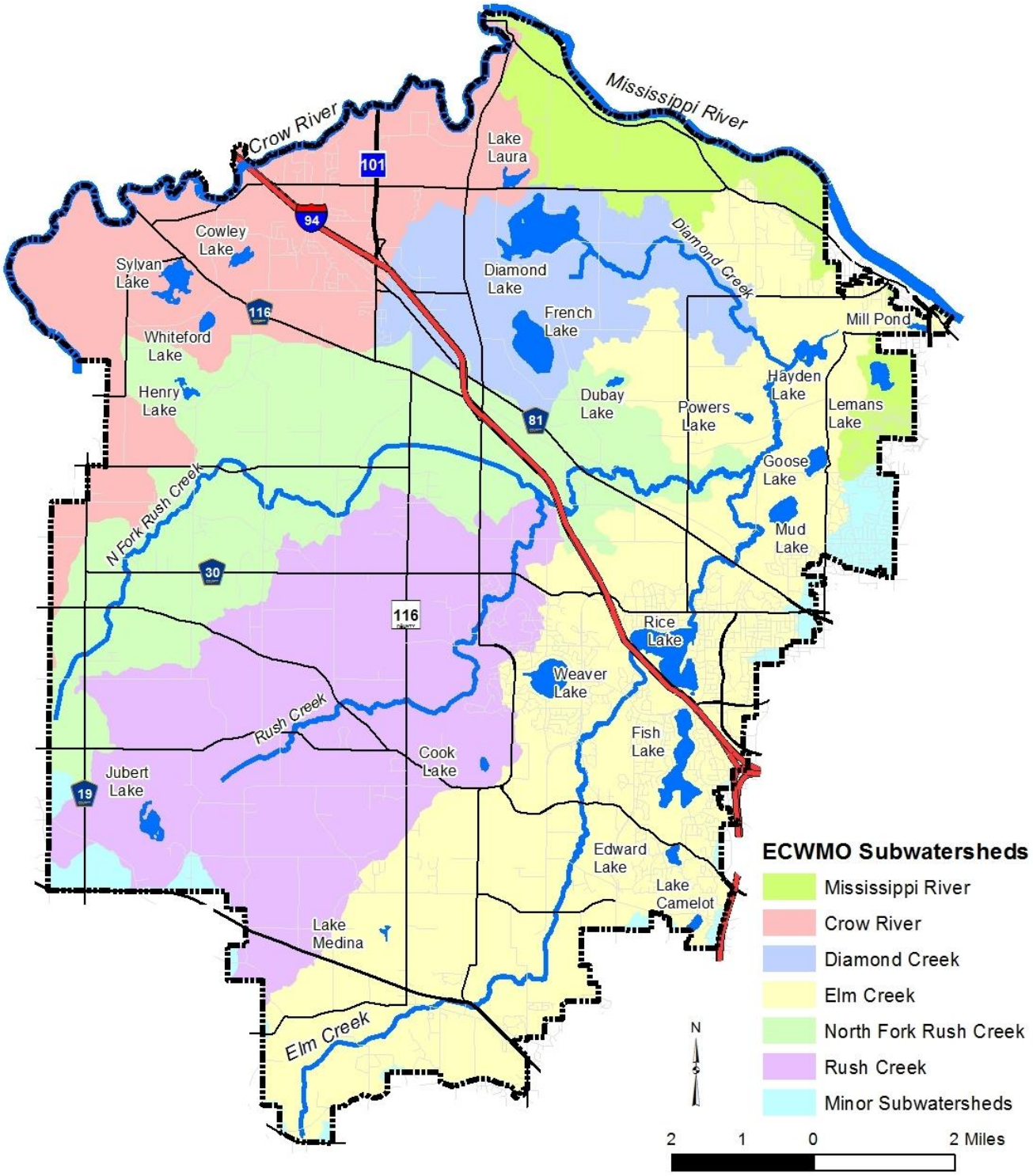

Figure 2.1. Elm Creek watershed drainage system.
Source: Minnesota DNR.

In a normal year, around 30 inches of precipitation falls on the watershed. Table 2.3 shows the watershed's precipitation normals. Winter snowfall averages about 40 inches, which is about 15 inches less than the Twin Cities receives annually. Snow generally stays on the ground from mid-December to early March. Snow and rainfall data for the watershed is obtained at weather stations in Minneapolis and Rockford.

Table 2.3. Precipitation normals in inches for the Elm Creek watershed.

Twin Cities (1981-2010)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Precipitation	0.90	0.76	1.89	2.65	3.36	4.25	4.04	4.29	3.07	2.43	1.76	1.15	30.57
Snow	11.7	8.5	10.8	2.8	0	0	0	0	0	0.6	8.9	12.2	55.5
Rockford (1981-2010)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Precipitation	0.92	0.86	1.55	2.67	3.36	4.44	3.84	4.00	3.44	2.37	1.71	1.08	29.46
Snow	7.2	6.8	7.8	3.0	0	0	0	0	0	0.3	7.0	10.8	39.9

Source: National Oceanic and Atmospheric Administration (NOAA) National Weather Service.

2.1.4 Soils

Most of the watershed is located within the Grantsburg Loamy Till Plain. The glacial till is interspersed with pockets of silt, sand, and gravel, mantled with patches of clayey, silty, or sandy sediments (Kennedy and Lueth 1976.) Perched water tables are common in these landscape units.

Soil texture is generally loamy or sandy with scattered organic or marsh soils areas. These soils have moderate to minimum infiltration rates ranging from 0.15 to 0.30 inches per hour when thoroughly wetted. Wind erodibility is also generally low to moderate. Highly to moderately permeable soils dominate the watershed (Figure 2.2). Soil hydrologic group characteristics are detailed in Table 2.4.

The soils information in Figure 2.2 is provided for use in describing the general characteristics of the major soil associations for summary purposes. The Hennepin County Soil Survey or site soil borings should be consulted for site-specific information.

2.1.5 Geology and Geomorphology

The bedrock underlying the watershed is generally St. Lawrence and Franconia Formation sandstone and shale 100 to 250 feet below the surface. A dendritic network of 200-400 foot deep bedrock valleys carved down to the Eau Claire Formation underlies the watershed, and many of the area's lakes and wetlands resulted from melting iceblocks deposited in or carried to these valleys. The surficial geology of the watershed is generally loamy glacial till, with sand and gravel outwash deposits along the Crow River, and Middle Terrace sand and gravelly sand deposits along the Mississippi (Balaban 1989).

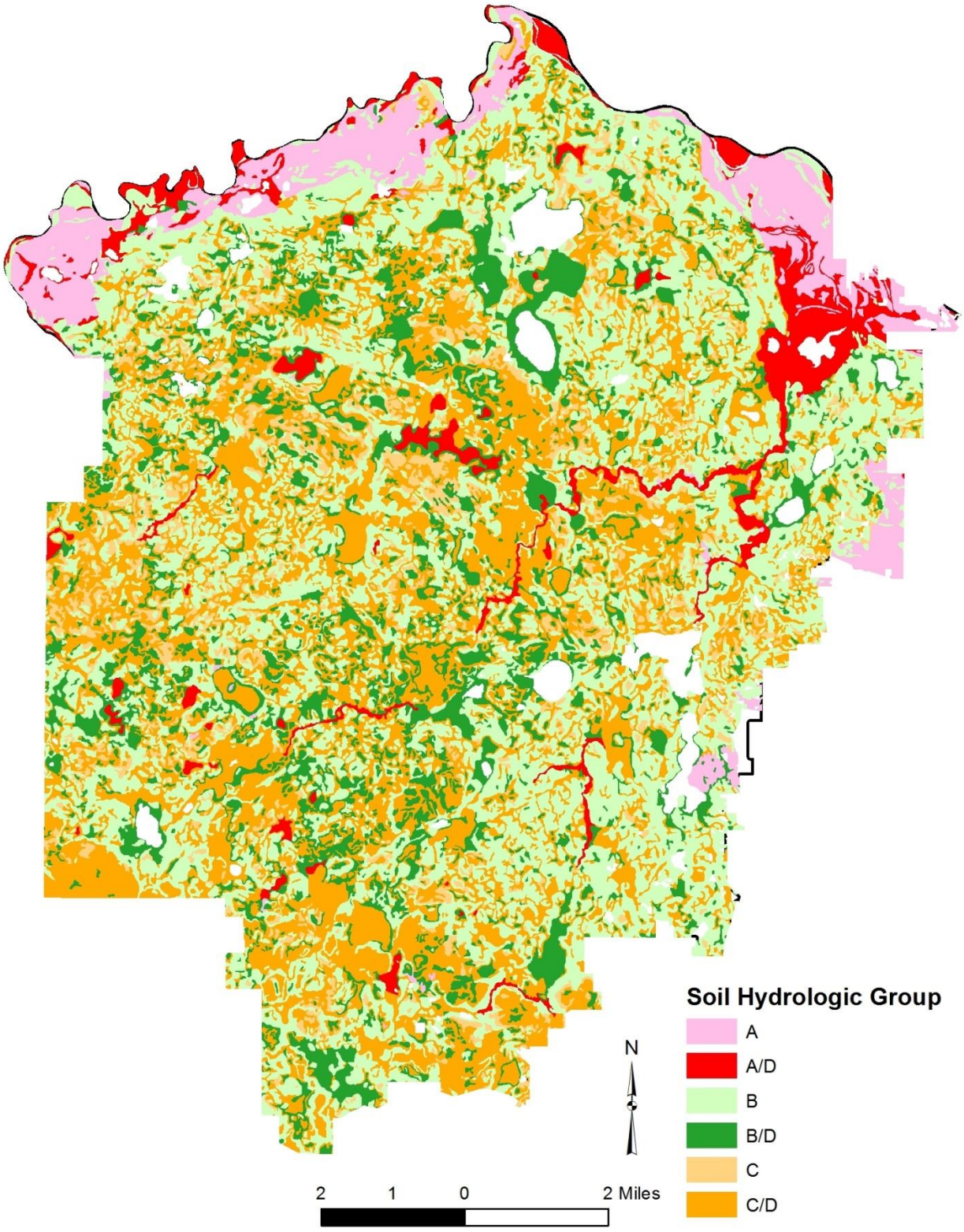

Figure 2.2. Soils by Hydrologic Soil Group classification.
Source: USDA NRCS SSURGO.

Table 2.4. Soil characteristics and infiltration rates by Hydrologic Soils Group (HSG).

HSG	Infiltration Rate/Hour	Texture	Unified Soil Classification System
A	1.63"	Gravel, sandy gravel and silt gravels	GW – well graded gravels, sandy gravels GPO – Gap-graded or uniform gravels, sandy gravels GM – Silty gravels, silty sandy gravels SW – Well-graded, gravelly sands
	0.8	Sand, loamy sand or sandy loam	SP – Gap-graded or uniform sands, gravelly sands
B	0.45	Silt loam	SM – Silty sands, silty gravelly sands
	0.3	Loam	MH – Micaceous silts, diatomaceous silts, volcanic ash
C	0.2	Sandy clay loam	ML – Silts, very fine sand, silty or clayey fine sands
D	0.06	Clay loam, silty clay loam, sandy clay, silty clay or clay	GC – Clayey gravels, clayey sandy gravels SC – Clayey sands, clayey gravelly sands CL – Low plasticity clays, sandy or silty clays OL – Organic silts and clays of low plasticity CH – Highly plastic clays and sandy clays OH – Organic silts and clays of high plasticity

Source: Minnesota Stormwater Manual.

Four major geomorphic regions are found in the watershed: the Lonsdale-Lerdal Till Region along the southwest border of the watershed; the Waconia-Waseca Moraine in the central part of the watershed; the Emmons-Faribault Moraine in the north; and Mississippi Valley Outwash along the Crow and Mississippi Rivers (University of Minnesota 1975).

There are a series of glacial eskars - long, narrow ridges of sand and gravel deposited by a glacial stream running below a melting glacial lobe – in the vicinity of Elm Creek Park Reserve. One eskar runs north-northeast along the west side of Powers Lake to near the intersection of Pineview Lane and 129th Avenue North. Another runs from Territorial Road along the west side of Mud Lake to the south side of Hayden Lake. A third runs north-northeast along the east side of Mud Lake and Goose Lake and the west side of Lemans Lake.

2.2 WATERSHED BIOLOGICAL ENVIRONMENT

2.2.1 Vegetation

Prior to settlement by the Europeans in the mid-19th century, vegetation in the watershed was primarily Big Woods, dominated by maple-basswood forest and punctuated by patches of wet prairie (Figure 2.3). The eastern edge of the watershed was a transition zone from the oak savanna/prairie landscape to the east. The Minnesota Biological Survey (MBS) has identified locations in the watershed with intact native plant communities, and those with biodiversity significance (see Figure 2.4). Native plant communities are a group of native plants that interact with each other and the surrounding environment in ways not greatly altered by humans or by introduced plant or animal species. Table 2.5 details the native plant community types that have been identified in the watershed. Many of these are located in the Elm Creek and Crow-Hassan Park Reserves.

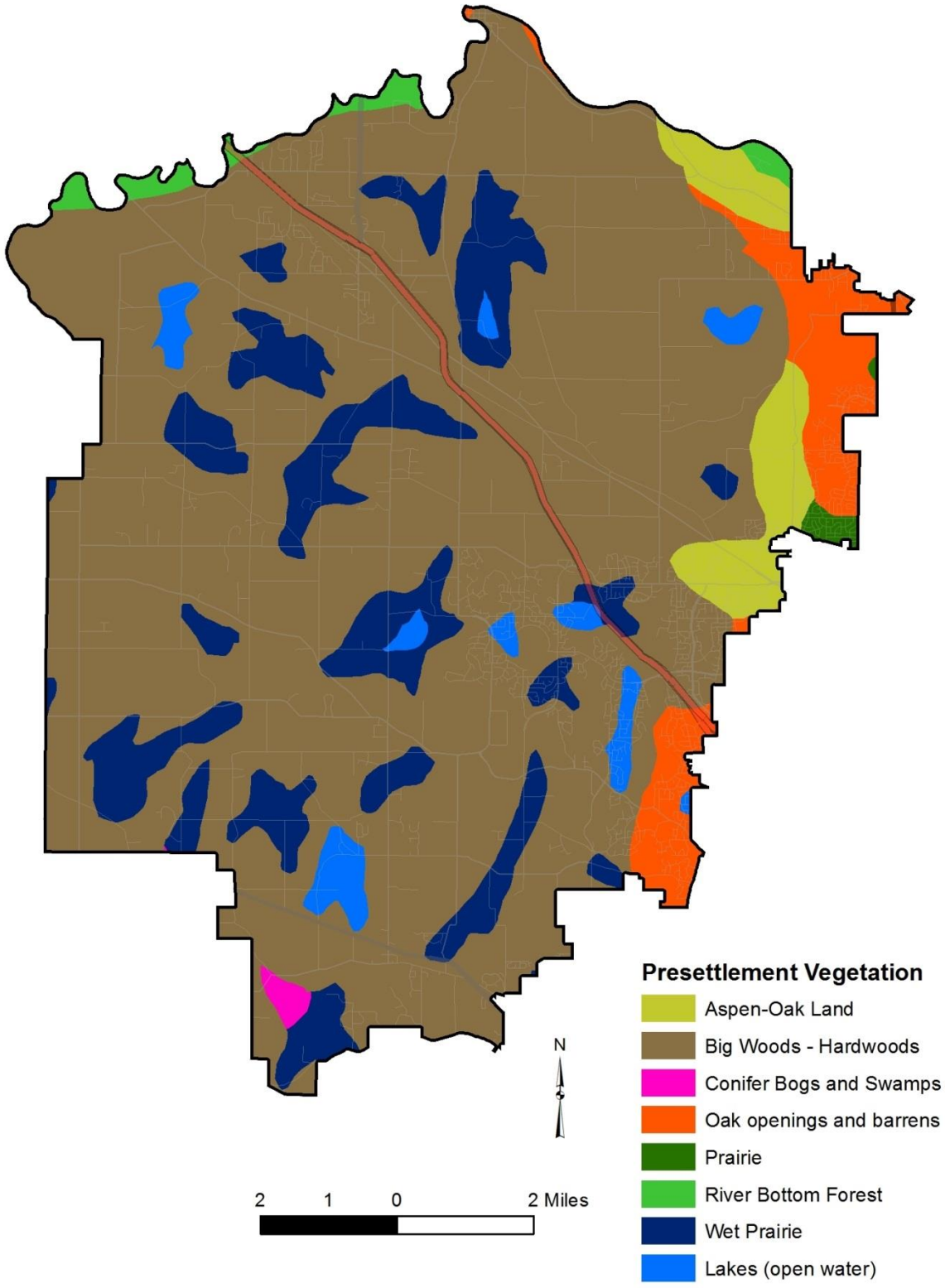

Figure 2.3. Presettlement vegetation in the Elm Creek watershed.
Source: Minnesota DNR.

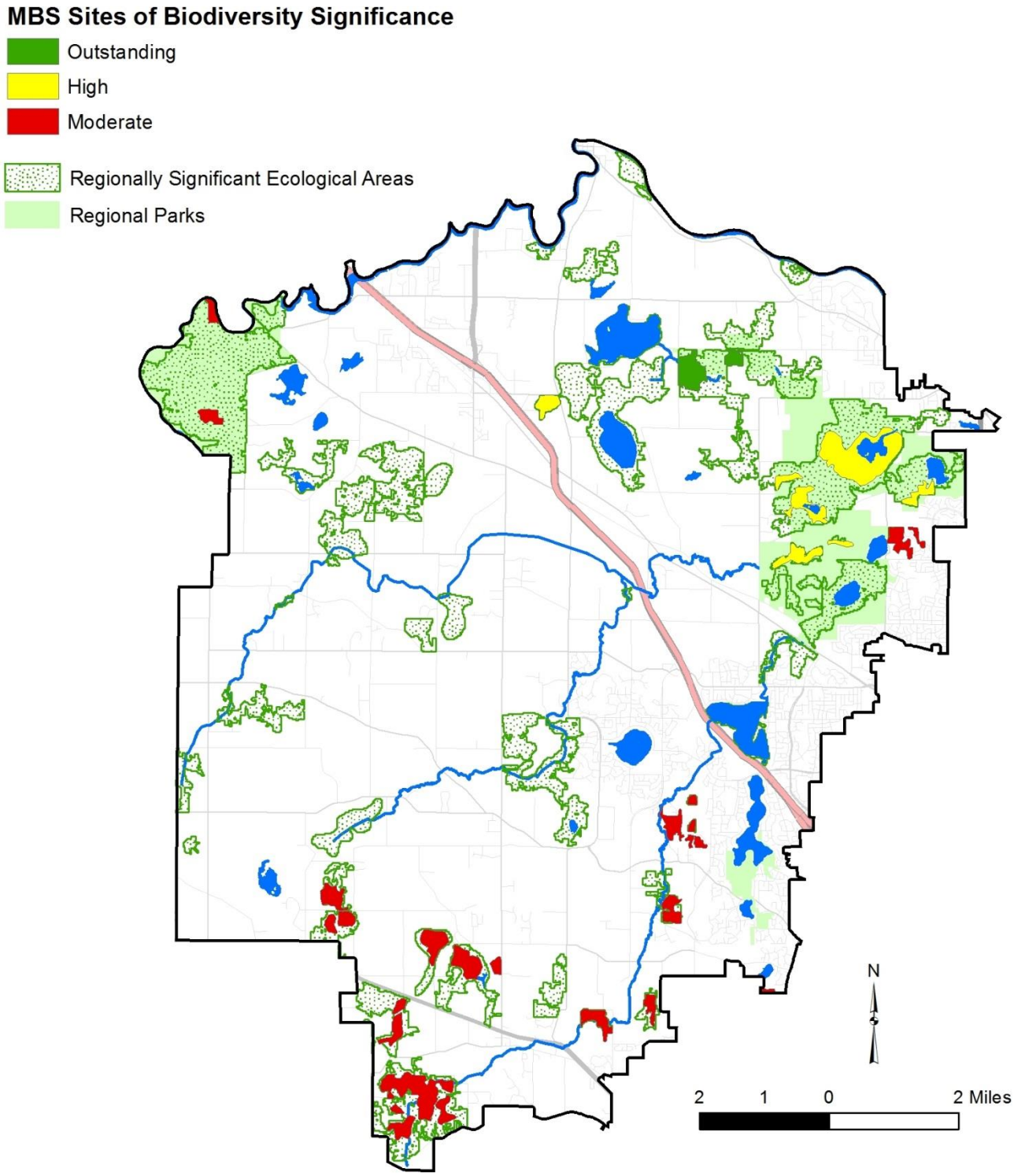

Figure 2.4. Sites of ecological diversity in the Elm Creek watershed.
Source: Minnesota DNR.

Table 2.5. Native plant community types observed in the Elm Creek watershed.

Community Type	Last Observed
Black Ash Swamp	1995
Lowland Hardwood Forest	1996
Mixed Hardwood Swamp	1995
Wet Meadow	1996
Shrub Swamp Seepage Subtype	1996
Oak Forest (Big Woods)–Mesic Subtype	1995
Floodplain Forest Silver Maple Subtype	1998
Maple-Basswood Forest (Big Woods)	1995
Tamarack Swamp Minerotrophic Subtype	1995

Note: Current as of 2013. Not based on a comprehensive survey of the state or watershed. Absence of observation does not mean other species or community types are not present.
Source: Natural Heritage and Nongame Research Program of the Division of Ecological and Water Resources, Minnesota Department of Natural Resources (DNR).

Rare, Threatened, and Endangered Species. The DNR Natural Heritage and Nongame Research Program maintains a database of observations of rare plant and animal species compiled from historical records from museum collections and published information supplemented with data from years of field work. Table 2.6 shows the rare plant species listed in that database as being observed recently or at some time in the past within the watershed.

Table 2.6. Rare plant species observed in the Elm Creek watershed.

Scientific Name	Name	Last Observed	Federal Status	State Status
Panax quinquefolius	American Ginseng	1997	None	Special Concern

Note: Current as of 2013. Not based on a comprehensive survey of the state or watershed. Absence of observation does not mean other species are not present. Some species may have multiple observations.
Source: Natural Heritage and Nongame Research Program of the Division of Ecological and Water Resources, Minnesota Department of Natural Resources (DNR).

2.2.2 Fish and Wildlife

Lakes. Fishing is possible on many of the lakes in the Elm Creek watershed, with many having a public access and several a DNR fishing pier or shore access. Mill Pond and Boundary Creek Park Ponds are included in the DNR's Fishing in the Neighborhood (FIN) program, which provides education and programming to encourage and support youth fishing. Weaver Lake and the FIN lakes have been stocked with fish by the DNR (Table 2.7.) The Elm Creek Commission has not conducted any fish surveys on the lakes in the watershed. The DNR Lakefinder website may be consulted to find the latest fish survey information for each lake.

Table 2.7. DNR fish stocking in lakes in the Elm Creek watershed, 2003-2013.

Lake	Year(s) Stocked	Fish Stocked
Boundary Creek Ponds	2011-2012	Bluegill, Black Crappie
Mill Pond	2003 - 2012	Bluegill, Black Crappie
Weaver	2006	Tiger Muskie

Source: Minnesota DNR.

Streams. Elm Creek and its tributaries Diamond, Rush, and South Fork Rush Creeks are listed as Impaired Waters for biotic integrity. Minnesota uses an Index of Biotic Integrity (IBI) to assess the fish and macroinvertebrate communities in streams. The IBI evaluates and integrates multiple attributes of the aquatic community, or "metrics," to evaluate a complex biological system. Each metric is based upon a structural (e.g., species composition) or functional (e.g., feeding habits) aspect of the aquatic community that changes in a predictable way in response to human disturbance. Fish and macroinvertebrate IBIs are expressed as a score that ranges from 0-100, with 100 being the best score possible. A stream's biota is considered to be impaired when the IBI for fish or macroinvertebrates falls below the threshold established for that category of stream. Table 2.8 and Figure 2.5 and Figure 2.6 show the Index of Biotic Integrity scores used to evaluate these streams for biotic impairment.

A Stressor Identification Study ("Stressor ID") (Lehr 2015) is part of the WRAPS report completed for the watershed. That study evaluated the possible factors, or stressors, causing the impairments and identified those that are most likely affecting the fish and macroinvertebrate communities.

Table 2.8. Index of Biotic Integrity listing criteria and relevant data.

Stream	Reach	Site ID	Fish IBI		Macroinvertebrate IBI	
			Score	Threshold	Score	Threshold
Diamond Cr	French Lk to Unnamed Lk	99UM085	1	40	n/a	n/a
Diamond Cr	French Lk to Unnamed Lk	10UM008	19	40	46.8	46.8
Rush Cr	Headwaters to Elm Cr	07UM097	24	40	15.0	46.8
					5.7	46.8
Rush Cr	Headwaters to Elm Cr	99UM081	34	40	42.6	46.8
Rush Cr	Headwaters to Elm Cr	99UM081	26	40		
Rush Cr	S Fork (Unnamed Ditch to CD 16)	10UM013	1	40	31.4	46.8
Rush Cr	S Fork (Unnamed Lake to Rush Cr)	10UM011	20	40	31.3	46.8
Rush Cr	S Fork (Unnamed Lake to Rush Cr)	10UM014	1	40	37.9	46.8
Elm Cr	Headwaters to Mouth	10UM034	1	40	32.9	46.8
Elm Cr	Headwaters to Mouth	10UM035	6	40	45.6	46.8
Elm Cr	Headwaters to Mouth	10UM035	3	40		
Elm Cr	Headwaters to Mouth	10UM009	19	40	29.0	
Elm Cr	Headwaters to Mouth	97UM002	19	50	n/a	n/a
Elm Cr	Headwaters to Mouth	97UM002	29	50		
Elm Cr	Headwaters to Mouth	97UM002	35	50		
Elm Cr	Headwaters to Mouth	99UM082	28	50	n/a	n/a
Elm Cr	Headwaters to Mouth	00UM085	26	50	65.1	46.8
Elm Cr	Headwaters to Mouth	10EM167	24	50	45.1	46.8

Source: Elm Creek Stressor ID study (Lehr 2015).

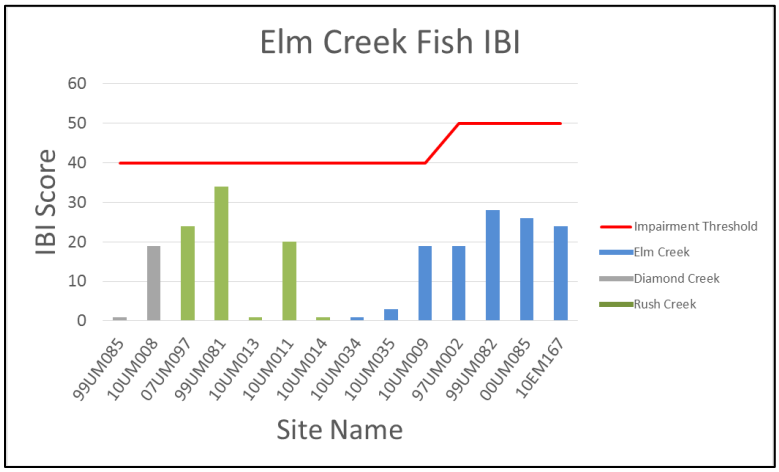

Figure 2.5. Fish IBI scores compared to the impairment threshold.
Source: Elm Creek Stressor ID study (Lehr 2015).

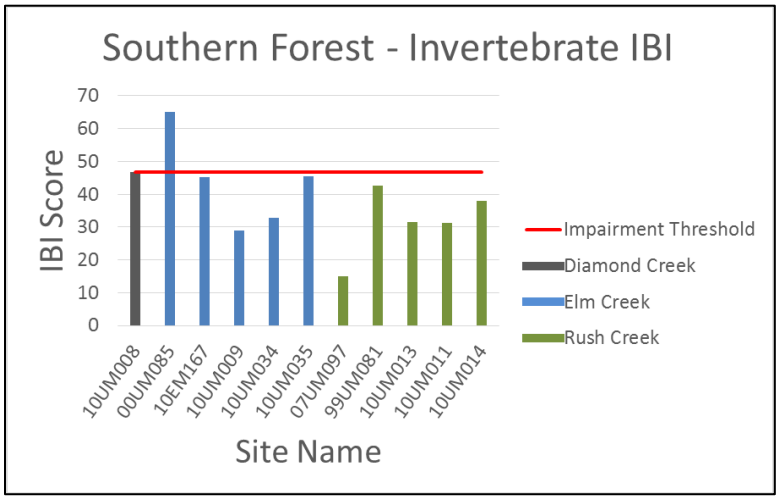

Figure 2.6. Macroinvertebrate IBI scores compared to the impairment threshold.
Source: Elm Creek Stressor ID study (Lehr 2015).

Rare, Threatened, and Endangered Species. The DNR Natural Heritage and Nongame Research Program maintains a database of observations of rare plant and animal species compiled from historical records from museum collections and published information supplemented with data from years of field work. Table 2.9 shows the rare fish and wildlife species listed in that database as being observed recently or at some time in the past within the watershed. Many of these observations were within one of the regional park reserves in the watershed.

Table 2.9. Rare animal species observed in the Elm Creek watershed.

Scientific Name	Name	Last Observed	Federal Status	State Status
Ammodramus henslowii	Henslow's sparrow	1997	None	Endangered
Bartramia longicauda	Upland sandpiper	1983	None	Watchlist
Botaurus lentiginosus	American bittern	1992	None	Watchlist

Scientific Name	Name	Last Observed	Federal Status	State Status
Cygnus buccinator	Trumpeter Swan	2011	None	Special Concern
Empidonax virescens	Acadian flycatcher	1997	None	Special Concern
Emydoidea blandingii	Blanding's Turtle	2008	None	Threatened
Gallinula galeata	Common gallinule	1991	None	Special Concern
Haliaeetus leucocephalus	Bald eagle	1998	None	Watchlist
Lanius ludovicianus	Loggerhead shrike	1994	None	Endangered
Notropis anogenus	Pugnose shiner	1948	None	Threatened
Pituophis catenifer	Gopher snake	1992	None	Special concern
Ligumia recta	Black sandshell	2007	None	Special concern

Note: Current as of 2013. Not based on a comprehensive survey of the state or the watershed. Absence of observation does not mean other species are not present. Some species may have multiple observations.
Source: Natural Heritage and Nongame Research Program of the Division of Ecological and Water Resources, Minnesota Department of Natural Resources (DNR).

Aquatic Invasive Species. Three lakes in the watershed have been determined by the Department of Natural Resources (DNR) to be infested with Eurasian watermilfoil, an invasive exotic plant species: Rice Lake, Weaver Lake, and Fish Lake.

2.2.3 Unique Features and Scenic Areas

The Elm Creek Watershed has many natural areas, water resources, and local parks. Three Rivers Park District operates three regional facilities: Fish Lake, Elm Creek and Crow-Hassan Regional Park Reserves. At Fish Lake Regional Park, swimming, boating, paddling, and ice fishing are popular activities, along with hiking and biking and picnicking.

The 4,900 acre Elm Creek Regional Park Reserve features picnic grounds, a large creative play area, a swimming pond, a winter sports area, and an extensive bicycle/pedestrian trail system that allows users to view the park's lakes, wetlands, and Elm and Rush Creeks. The Eastman Nature Center in Elm Creek Park features quiet reading and observation rooms, large classrooms, a professional exhibit area with wildlife watching, and outdoor learning facilities such as display gardens, a floating boardwalk, pond observation blind, amphitheater, orienteering courses, and demonstrative plantings for wildlife.

Crow-Hassan Regional Park Reserve is operated as a nature reserve, with limited facilities but extensive hiking, cross country skiing, and horse riding trails, and several campgrounds along the Crow River. The Reserves are also home to many of the rare and endangered species and special habitats described above.

Those regional park facilities are shown on Figure 2.7, which also shows boat ramps, fishing beaches, and fishing piers. Local or private access to the lakes, streams and rivers are not shown on this figure.

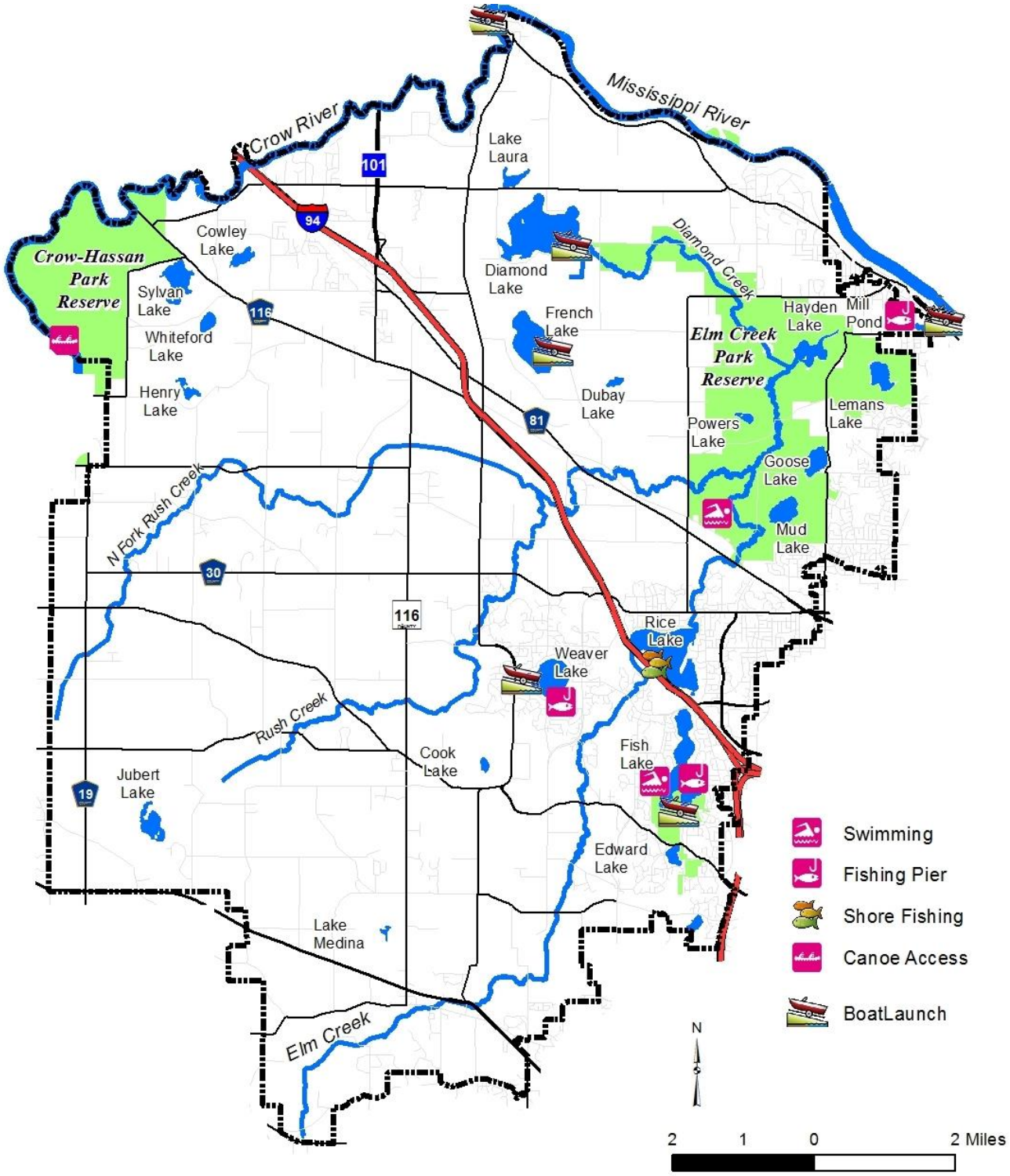

Figure 2.7. Water-based recreation in the Elm Creek watershed.
Source: Minnesota DNR.

2.3 WATERSHED HUMAN ENVIRONMENT

The notes of the Public Land Survey conducted in 1856 describe the townships of the watershed as being 'extremely timbered,' generally level, and with many lakes and marshes. The first known settler of European descent arrived in the Dayton area in 1851, settling on the site of a French fur trading post. Other claims followed, mostly along the Mississippi and Crow Rivers and near the lakes. In 1854 the first hotel in Dayton was erected near the confluence of the Crow and Mississippi Rivers, the post office was established in 1855, and in 1856 a mill was built just downstream of the Crow. A church followed in 1857 and a school in 1859, the year the village was organized. Territorial Road was authorized by the Territorial Legislature in 1855, fueling growth in the area, and the hamlet of Hassan was organized in 1869.

The area now known as Corcoran drew settlers as early as 1855. P.B. Corcoran was one of the earliest settlers, and was variously the school teacher, shop keeper, and post master. The town was organized at his house in 1858. Louis Gervais and Pierre Bottineau arrived in 1851 and staked their claims in what is now Maple Grove. At least two sawmills were operated in early Maple Grove: one on Elm Creek north of today's County Road 30, and one on Rice Lake. The watershed remained primarily agricultural until the mid-20th century (Rogers-Hassen, Dayton, and Maple Grove Historical Societies; City of Corcoran).

2.3.1 Current Land Use

The predominant land use in the watersheds is Agriculture (Table 2.10), followed by Undeveloped, a category which includes undevelopable wetlands and grasslands in addition to lands that are currently vacant and developable. Only about a quarter of the watershed is developed, clustered in the eastern part of the watershed, and along the I-94 corridor. About half the watershed is located within the Municipal Urban Services Area (MUSA), although most of the area draining through Rush Creek and North Fork Rush Creek lies outside the MUSA. The 2010 Census population of the watershed is approximately 93,000 persons in 33,600 households.

Table 2.10. 2010 land use in the Elm Creek watershed.

Land Use	Elm Creek	
	Area (acres)	%
Agricultural	25,634	31.0
Undeveloped	21,821	26.4
Single Family	15,584	18.8
Park, Recreational, or Preserve	10,317	12.5
Open Water	3,167	3.8
Industrial and Utility	1,440	1.7
Golf Course	1,297	1.6
Institutional	1,044	1.3
Commercial	1,001	1.2
Farmstead	896	1.1

Land Use	Elm Creek	
	Area (acres)	%
Railway and Highway	251	0.3
Multifamily	159	0.2
Extractive	76	0.1
Mixed Use (Commercial/Residential)	33	<0.1
Total	82,720	100

Source: Metropolitan Council.

2.3.2 Current Land Cover

The Minnesota Land Cover Classification System (MLCCS) is a tool to systematically categorize areas in terms of land cover rather than land use. It is especially useful for natural resource managers as it is a hierarchical system of classification that allows users to graphically depict high-level general classifications or detailed specific plant species. Figure 2.9 shows the high-level general classification of land cover types in the watershed.

2.3.3 Future Land Use

Areas of projected urban growth are shown in Figure 2.10. This data was compiled by the Metropolitan Council from cities' most recent Comprehensive Plans, and represents cities' expected 2020 land use. Significant growth and development is expected in Corcoran, Medina, Dayton and Rogers, along major transportation corridors and within the 2020 MUSA.

2.3.4 Potential Environmental Hazards

Groundwater connections, hazardous waste, leaking above- and below-ground storage tanks, and feedlots can be potential sources of surface and groundwater contamination. The MPCA maintains a current on-line mapping tool with information about air quality, hazardous waste, remediation, solid waste, tanks and leaks, and water quality. This tool is available at www.pca.state.mn.us/udgx680.

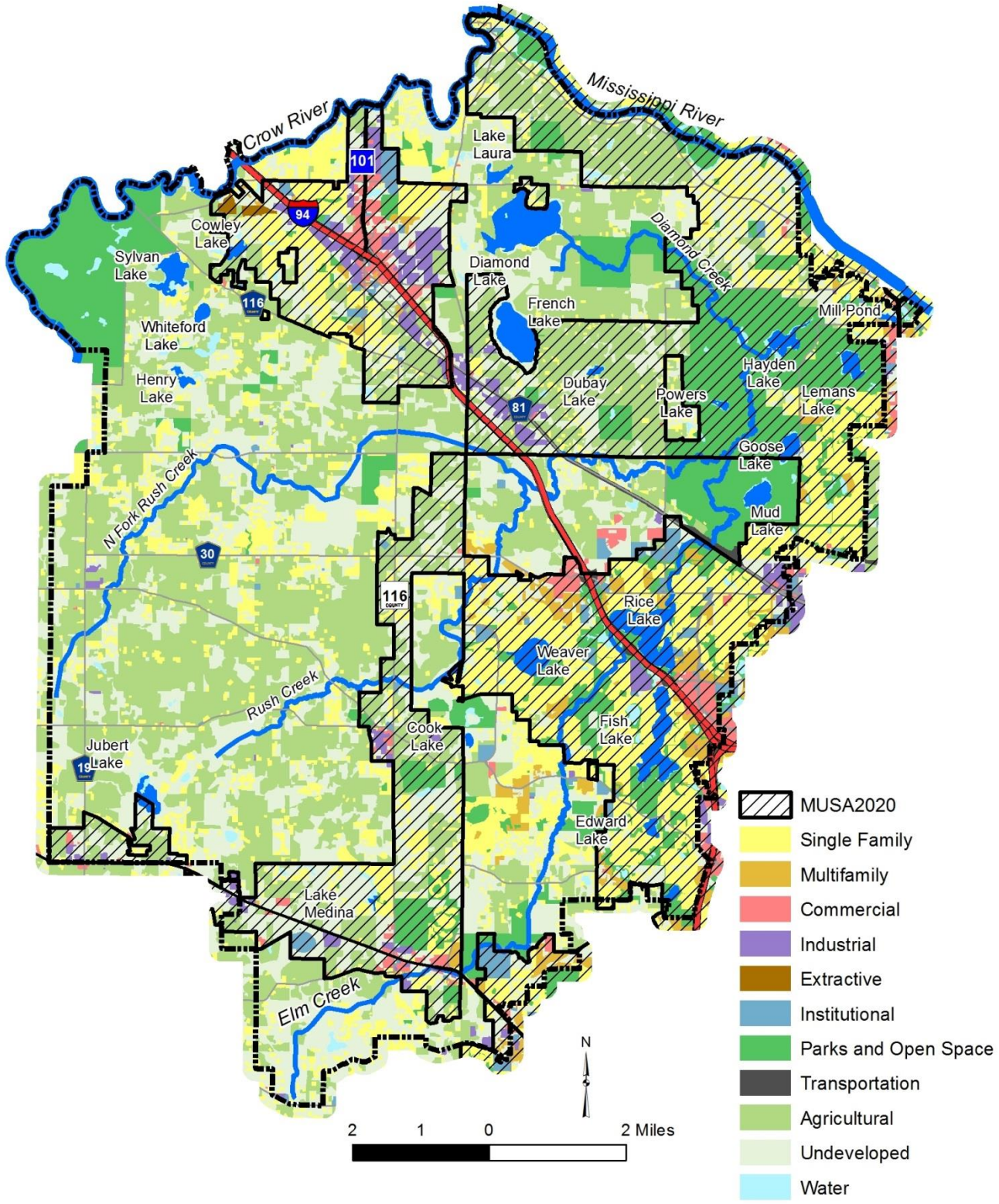

Figure 2.8. 2010 land use in the Elm Creek watershed.
Source: Metropolitan Council.

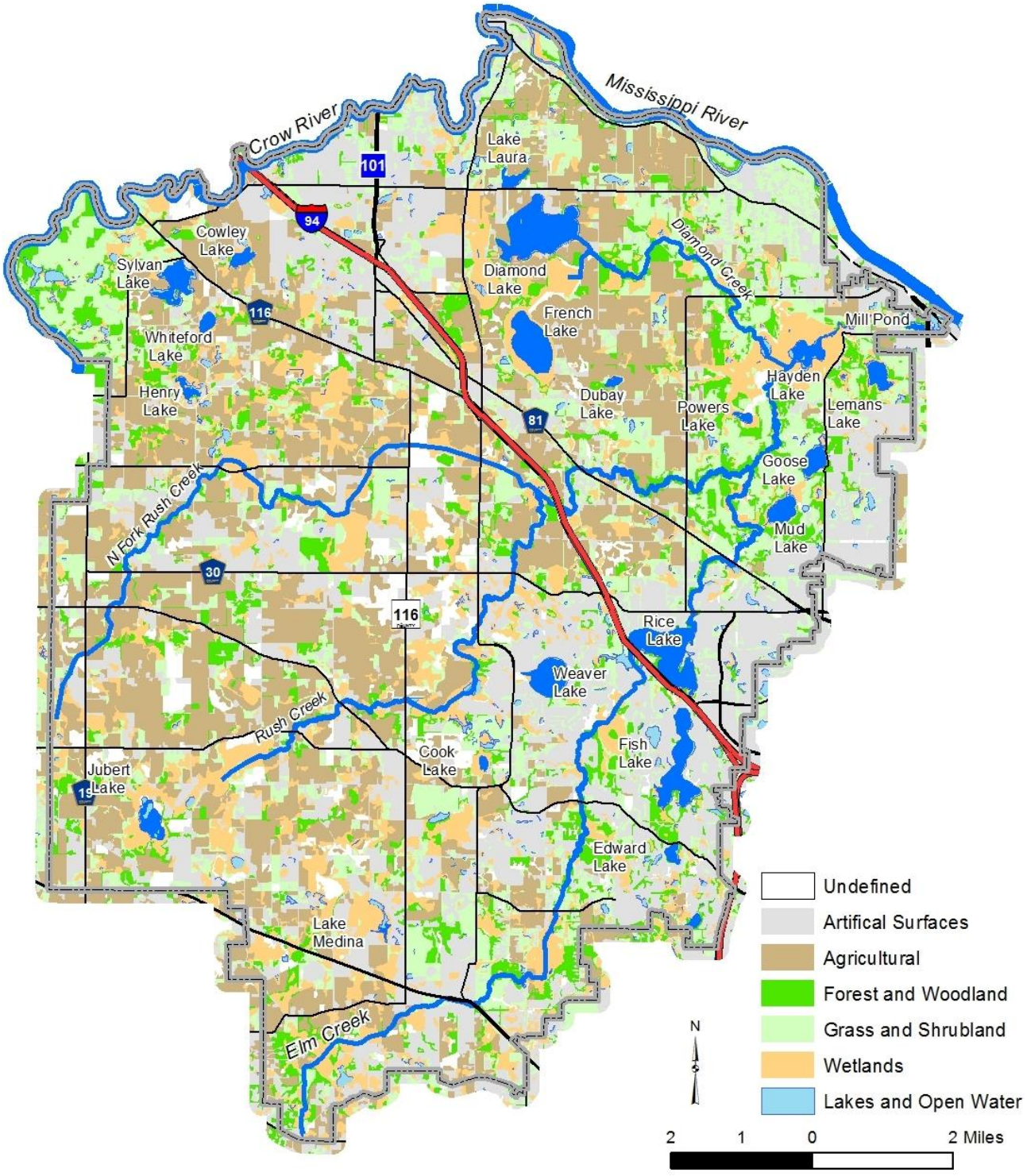

Figure 2.9. MLCCS land cover classification of the Elm Creek watershed.
Source: Minnesota DNR.

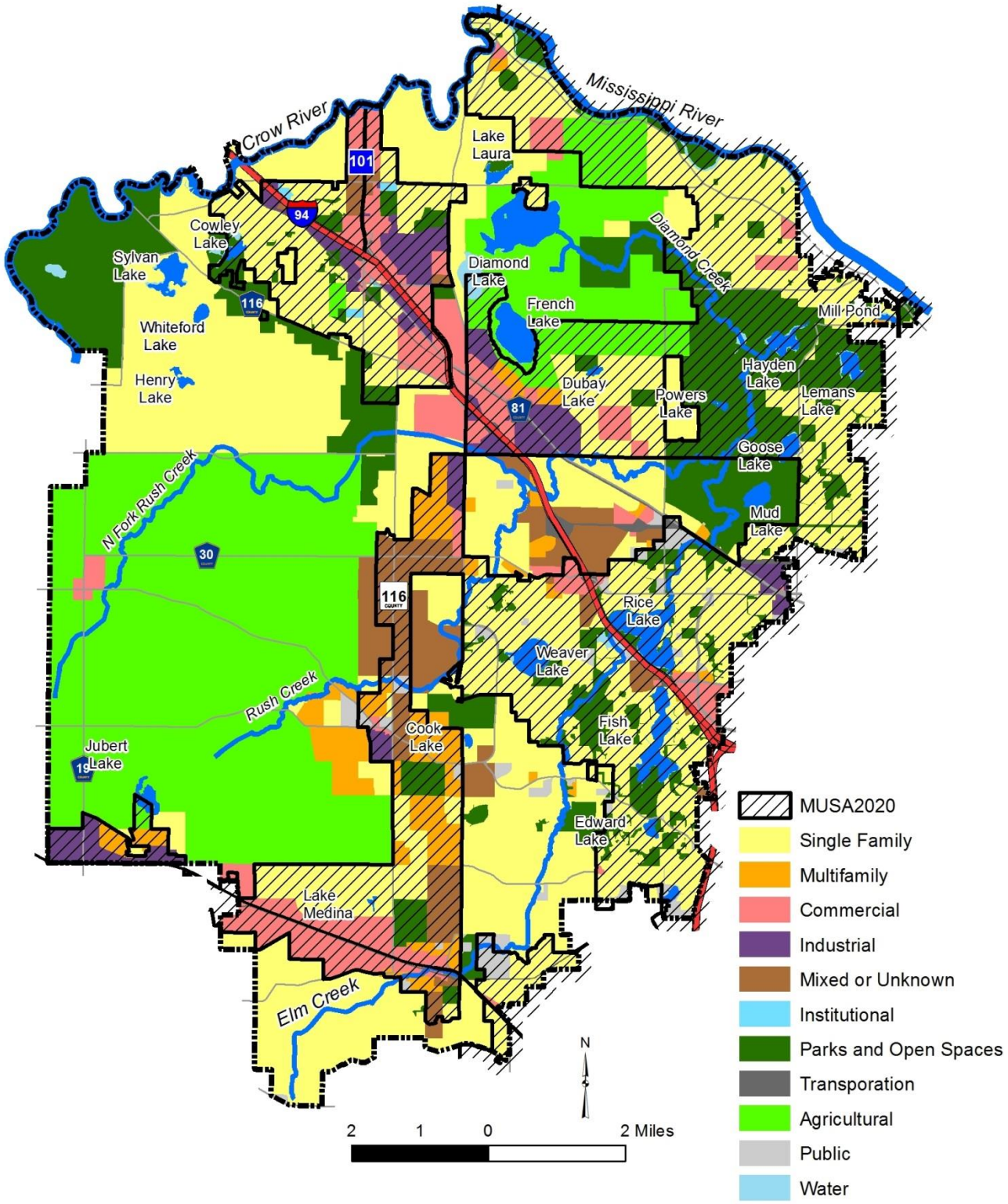

Figure 2.10. Planned 2020 land use in the Elm Creek watershed.
Source: Metropolitan Council.

2.4 WATERSHED WATER RESOURCES

2.4.1 Lakes

There are 22 lakes in the Elm Creek watershed; two - French and Medina - are considered by the MPCA to be wetlands. The lakes in the watershed are shown on Figure 2.11. Minnesota's standards for lake water quality vary depending on the depth classification of the lake (Table 2.11). Shallow lakes are less than 15 feet deep, or 80% or more of the lake area supports rooted aquatic plants. The DNR lake number and shoreland classification, lake morphometry, and water quality data are shown in Table 2.12. Lake water quality trends are shown in Appendix B. More information can be found at the DNR's LakeFinder website: www.dnr.state.mn.us/lakefind/index.html.

Table 2.11. Water quality standards for lakes in the North Central Hardwood Forest Ecoregion.

Parameters	Shallow Lakes	Deep Lakes
Total Phosphorus (TP) (µg/L)	≤60	≤40
Chlorophyll-*a* (chl-a) (µg/L)	≤20	≤14
Secchi Depth transparency (SD) (meters)	≥1.0	≥1.4

Table 2.12. Characteristics of lakes in the Elm Creek watershed, 2004-2013.

Lake	Location	DNR ID#	Surface Area (ac)	Max Depth (ft)	Depth Class	DNR Class	Summer Average			Years of Data
							TP (µg/L)	Chl-a (µg/L)	SD (m)	
Camelot	Plymouth	27-0099-00	22	n/a	n/a	NE	76	11	1.1	2
Cook	Maple Grove	27-0120-00	13	n/a	Shallow	NE	n/a	n/a	n/a	0
Cowley	Rogers	27-0169-00	47	7	Shallow	NE*	626	57	0.6	3
Diamond	Dayton	27-0125-00	406	8	Shallow	RD	170	68	0.8	9
Dubay	Dayton	27-0129-00	15	n/a	Shallow	NE	n/a	n/a	n/a	0
Edward	Maple Grove	27-0121-00	28	n/a	n/a	RD	n/a	n/a	n/a	0
Fish	Maple Grove	27-0118-00	238	48	Deep	RD	47	26	1.3	10
French	Maple Grove	27-0127-00	217	6	Shallow	RD	214	152	0.5	8
Goose	Dayton	27-0122-00	59	6	Shallow	NE	175	111	0.3	2
Hayden	Dayton	27-0128-00	93	n/a	Shallow	NE	n/a	n/a	n/a	0
Henry	Rogers	27-0175-00	44	5	Shallow	RD*	162	41	0.8	7
Jubert	Corcoran	27-0165-00	64	41	Deep	NE	n/a	n/a	n/a	0
Laura	Dayton	27-0123-00	35	n/a	Shallow	NE	n/a	n/a	n/a	0
Lemans	Champlin	27-0066-00	60	n/a	Shallow	NE	n/a	n/a	n/a	0
Medina	Medina	27-0146-00	8	n/a	Shallow	NE	n/a	n/a	n/a	0
Mill Pond	Champlin	27-0061-00	34	11	Shallow	NE	276	8	2.0	5
Mud	Maple Grove	27-0112-00	73	n/a	n/a	NE	67	16	1.3	2
Powers	Dayton	27-0130-00	15	n/a	Shallow	NE	n/a	n/a	n/a	0
Rice West Rice	Maple Grove Maple Grove	27-0116-01 27-0116-02	314 32	11.5 11	Deep Shallow	RD	322 218	95 26	0.8 1.4	6 2
Sylvan	Rogers	27-0171-00	110	10	Shallow	NE*	447	28	1.7	1
Weaver	Maple Grove	27-0117-00	152	57	Deep	RD	33	13	2.6	10
Whiteford	Rogers	27-0172-00	30	n/a	n/a	NE*	n/a	n/a	n/a	0

Sources: Minnesota DNR, MPCA EQuIS, Elm Creek WRAPS. *City's Shoreland Classification
NE = Natural Environment; RD = Recreational Development (Shoreland Management Classification)

Impaired Lakes. Five lakes in the watershed do not meet state nutrient standards and have been designated by the MPCA and USEPA as Impaired Waters. A Watershed Restoration and Protection Strategies (WRAPS) study was begun in 2009 to conduct additional monitoring and develop TMDLs for the nutrient-impaired lakes as well as protection strategies for the lakes that currently meet water quality standards. Those two studies will be complete in 2015. Two lakes are impaired for mercury in fish tissue, and TMDLs for those impairments were included in the statewide 2007 mercury TMDL. The WRAPS study found that the water quality in Sylvan and Goose Lakes does not meet state standards and those lakes will likely be added to the 2016 Impaired Waters list. More information can be found in the Elm Creek Watershed TMDL (Brasch 2015).

Table 2.13. Draft 2014 303(d) List impaired lakes in the Elm Creek watershed.

Lake	DNR Lake #	Affected Use	Pollutant	TMDL/WRAPS Process
Fish Lake	27-0118-00	Aquatic consumption Aquatic recreation	Mercury FT[1] Nutrients	TMDL Approved 2007 WRAPS Project
Weaver Lake	27-0117-00	Aquatic consumption	Mercury FT	TMDL Approved 2007
Diamond Lake	27-0125-00	Aquatic recreation	Nutrients	WRAPS Project
Cowley Lake	27-0169-00	Aquatic recreation	Nutrients	WRAPS Project
Rice Lake	27-0116-01	Aquatic recreation	Nutrients	WRAPS Project
Lake Henry	27-0175-00	Aquatic recreation	Nutrients	WRAPS Project
Sylvan Lake	27-0171-00	Not yet listed impaired	Nutrients	WRAPS Project
Goose Lake	27-0122-00	Not yet listed impaired	Nutrients	WRAPS Project

Source: MPCA.

2.4.2 Streams

Elm Creek drains the eastern portion of the watershed, flowing northeast from its headwaters in Medina to its confluence with the Mississippi River in Champlin, and through Rice Lake in Maple Grove (Figure 2.11). Rush Creek and the North Fork of Rush Creek drain the center of the watershed. The North Fork joins the main stem just upstream of I-94, and the main stem joins Elm Creek in the Elm Creek Park Reserve. Diamond Creek flows out of Diamond Lake, joining Elm Creek just upstream of Hayden Lake. In the northwest, several small channels drain directly to the Crow River, and a small area in Dayton flows directly to the Mississippi River.

Table 2.14. Stream characteristics in the Elm Creek watershed.

Elm Creek Watershed	
Stream	**Length (mi)**
Elm Creek	21.08
Diamond Creek	5.69
Rush Creek	9.10
North Fork Rush Creek	16.92

Stream Conditions. Water quality data at the USGS monitoring site in Elm Creek Park is available from 2008-2013. Additional monitoring at other sites along Elm Creek and the other major streams in the watershed has been completed for the WRAPS study and for general assessment purposes. As noted in Table 2.15 below, the four major streams exceed state water quality standards for *E. coli* bacteria. Other impairments include low dissolved oxygen and excess chloride. Data on stream conditions and trends is detailed in the TMDL. Summary data can be found in Appendix B.

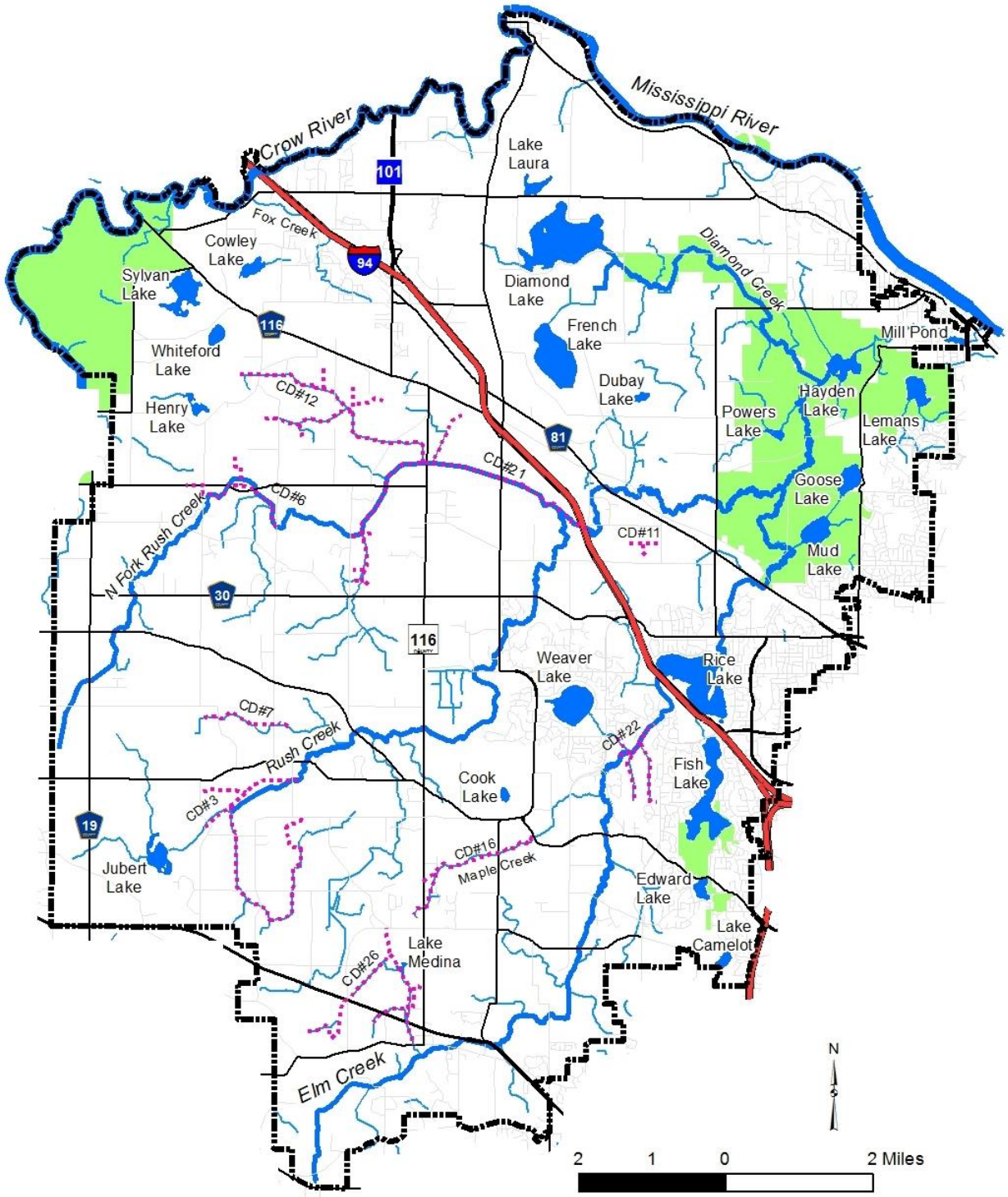

Figure 2.11. Major lakes, streams and ditches in the Elm Creek watershed.
Source: Minnesota DNR. Ditches: Hennepin County Environment and Energy.

Impaired Streams. Diamond, Rush, North Fork Rush, and Elm Creeks and the Crow River have been designated by the Minnesota Pollution Control Agency (MPCA) and Environmental Protection Agency (EPA) as Impaired Waters, and are listed on the state's draft 2014 303(d) list for not meeting water quality standards as shown in Table 2.15. More information about these impairments can be found in the Elm Creek Watershed TMDL (MPCA 2015). A WRAPS study will be complete in 2015 and will address the bacteria, DO, and biotic impairments in the four creeks. A TMDL for two of the impairments on the Crow was completed in 2013, with the other impairments addressed in the Crow River WRAPS completed in 2015.

Table 2.15. Draft 2014 303(d) List impaired streams in the Elm Creek watershed drainage area.

Stream	Stream AUID #	Affected Use	Pollutant	TMDL/WRAPS Process
Diamond Cr	07010206-525	Aquatic life/ Aquatic recreation	*E. coli,* DO, M-IBI[1], F-IBI[1]	WRAPS Project
Rush Creek	07010206-732	Aquatic life/ Aquatic recreation	*E. coli,* M-IBI, F-IBI, chloride	WRAPS Project
Rush Creek	07010206-760	Aquatic life	M-IBI, F-IBI	WRAPS Project
North Fork Rush Creek	07010206-528	Aquatic life/ Aquatic recreation	*E. coli,* DO, M-IBI, F-IBI	WRAPS Project
Elm Creek	07010206-508	Aquatic life/ Aquatic recreation	*E. coli,* DO, M-IBI, F-IBI, chloride	WRAPS Project
Crow River	07010204-502	Aquatic life/ Aquatic recreation	TMDL: Fecal coliform, turbidity WRAPS: DO, F-IBI, M-IBI	TMDL Approved 2013 WRAPS Approved 2015
Mississippi R	09010206-567	Aquatic life	Mercury FT[2], PCB FT[2]	Approved

[1] Index of Biotic Integrity. A measure of the quantity and quality of aquatic life. M-IBI denotes macroinvertebrate impairment and F-IBI denotes fish impairment.
[2] "FT" means fish tissue.
Source: MPCA.

The Elm Creek watershed member cities will be impacted by several regional TMDLs. The Elm Creek watershed is excluded from the draft Upper Mississippi Bacteria TMDL because the WRAPS study is being completed as a stand-alone project. The watershed will be impacted by the South Metro Mississippi Turbidity TMDL. Finally, the MPCA is currently preparing a Twin Cities Metro Chloride Management Plan which will serve as a metro-wide TMDL for all chloride-impaired waters.

2.4.3 Ditches

There are several county ditches in the watershed (Figure 2.11). Parts of the North Fork Rush Creek are under the ditch authority of Hennepin County as County Ditch (CD) #21 and CD #6. CD #12 is an extensive system with multiple branches tributary to the North Fork. Part of the upper reaches of Rush Creek and several laterals are CD #3, and a short segment of Elm Creek is CD #22. CD #7, CD #16, CD #26, and CD #11 are ditch systems not directly connected to one of the primary stream systems in the watershed.

2.4.4 Wetlands

The US Fish and Wildlife Service (FWS) compiled wetland maps from aerial photo interpretation as part of the National Wetland Inventory (NWI) (Figure 2.12). Wetland scientists use two common

classification schemes to identify wetland type – the FWS's "Circular 39" system, and a replacement system developed by Cowardin et al., commonly referred to as the Cowardin system. The Circular 39 system was originally developed to classify wetlands for waterfowl habitat purposes. Eight of the Circular 39 freshwater wetland types are found in Minnesota. The Cowardin scheme is a hierarchical classification based on landscape position, substrate, flooding regime, and vegetation. While the Cowardin scheme has been officially adopted by the FWS and other agencies, the Circular 39 system is still commonly used because of its simplicity and ease of use.

The original NWI was developed in the 1980s. The DNR is updating the NWI using remote sensing imagery; the East-Central region of Minnesota, including Hennepin County, was reevaluated using 2010 and 2011 imagery. According to the updated NWI, wetlands, including lakes, cover about 21 percent of the watershed's surface (Table 2.16.) A delineation of wetland boundaries is required to be completed any time development or other impacts may occur near or in a wetland.

Table 2.16. NWI wetland area by type for Elm Creek watershed.

Circular 39 Type	Acres	Percent
1 - Seasonally Flooded	6,911	8.3
2 - Wet Meadow	75	0.1
3 - Shallow Marsh	5,739	6.9
4 - Deep Marsh	666	0.8
5 - Shallow Open Water	2,838	3.4
6 - Shrub Swamp	757	0.9
7 - Wooded Swamp	99	0.1
8 - Bogs	4	<0.1
80 - Mun. and Indus. Activities	18	<0.1
90 - Riverine	465	0.6
98 - Uplands	66,018	79.0
Grand Total	83,590	100

Cowardin Type	Acres	Percent
Emergent (EM)	10,947	13.1
Unconsolidated Bottom (UB)	3,120	3.7
Forested (FO)	1,880	2.2
Aquatic Bed (AB)	867	1.0
Scrub-Shrub (SS)	757	0.9
Unconsolidated Shore (US)	1	<0.1
Upland	66,018	79.0
Grand Total	83,590	100

Source: Minnesota DNR, 2013 Update East-Central Minnesota.

2.4.5 Public Waters

State Statutes classify certain waterbodies as Waters of the State and the DNR maintains maps and lists on the Public Waters Inventory (PWI). Public Waters wetlands include all type 3, type 4, and type 5 wetlands (as defined in U.S. Fish and Wildlife Service Circular No. 39, 1971) that are 10 acres or more in size in unincorporated areas or 2.5 acres or more in size in incorporated areas. Public watercourses are defined as natural and altered watercourses with a total drainage area greater than two square miles or natural and altered watercourses designated by the DNR commissioner as trout streams. Work within waterbodies designated on the PWI is regulated by the DNR. Public waters wetlands and watercourses are listed in the tables below and shown on Figure 2.13. Public Waters basins, wetlands, and watercourses are listed in Appendix F.

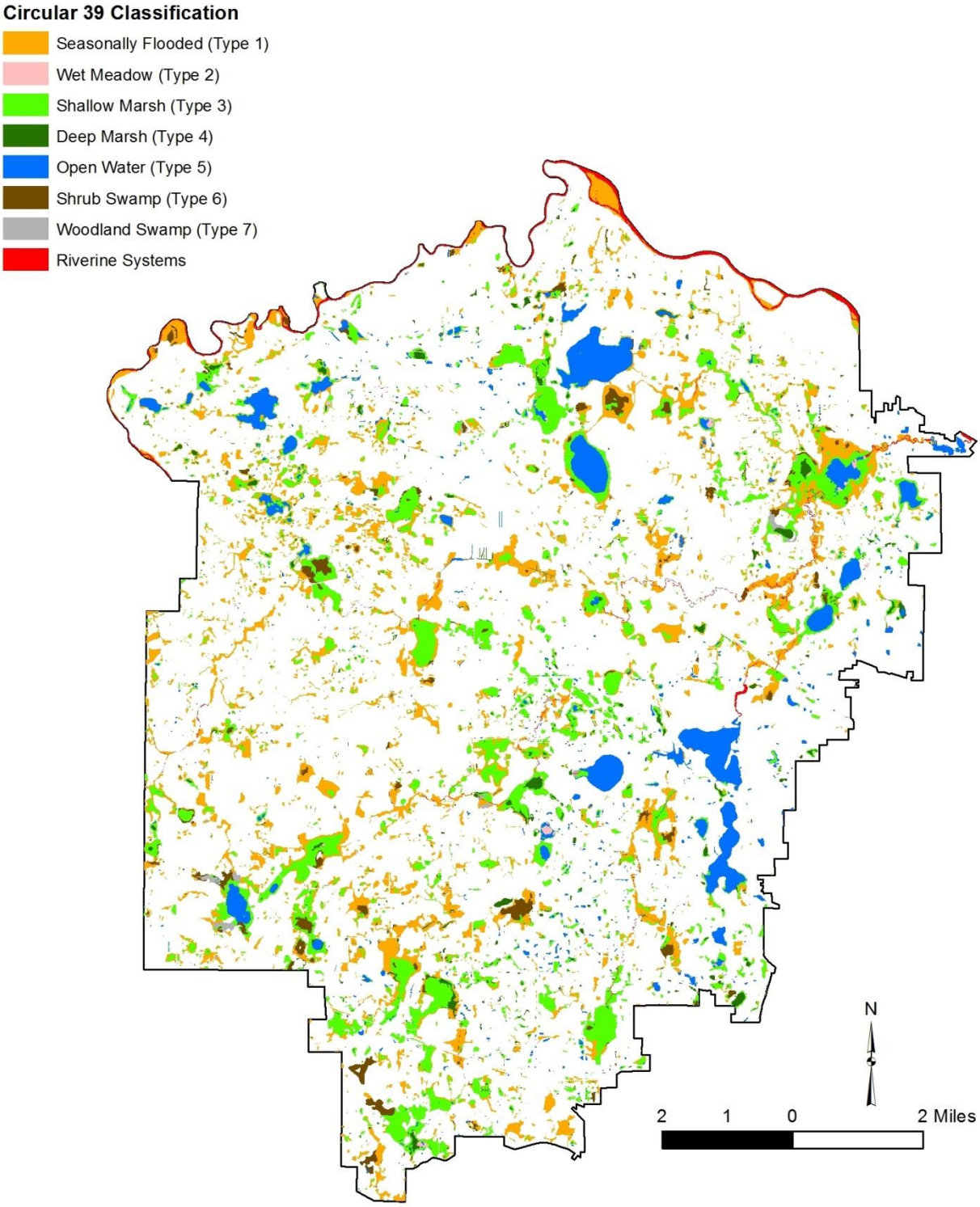

Figure 2.12. National Wetlands Inventory wetlands in Elm Creek.
Source: Minnesota DNR, 2013 Update East-Central Minnesota.

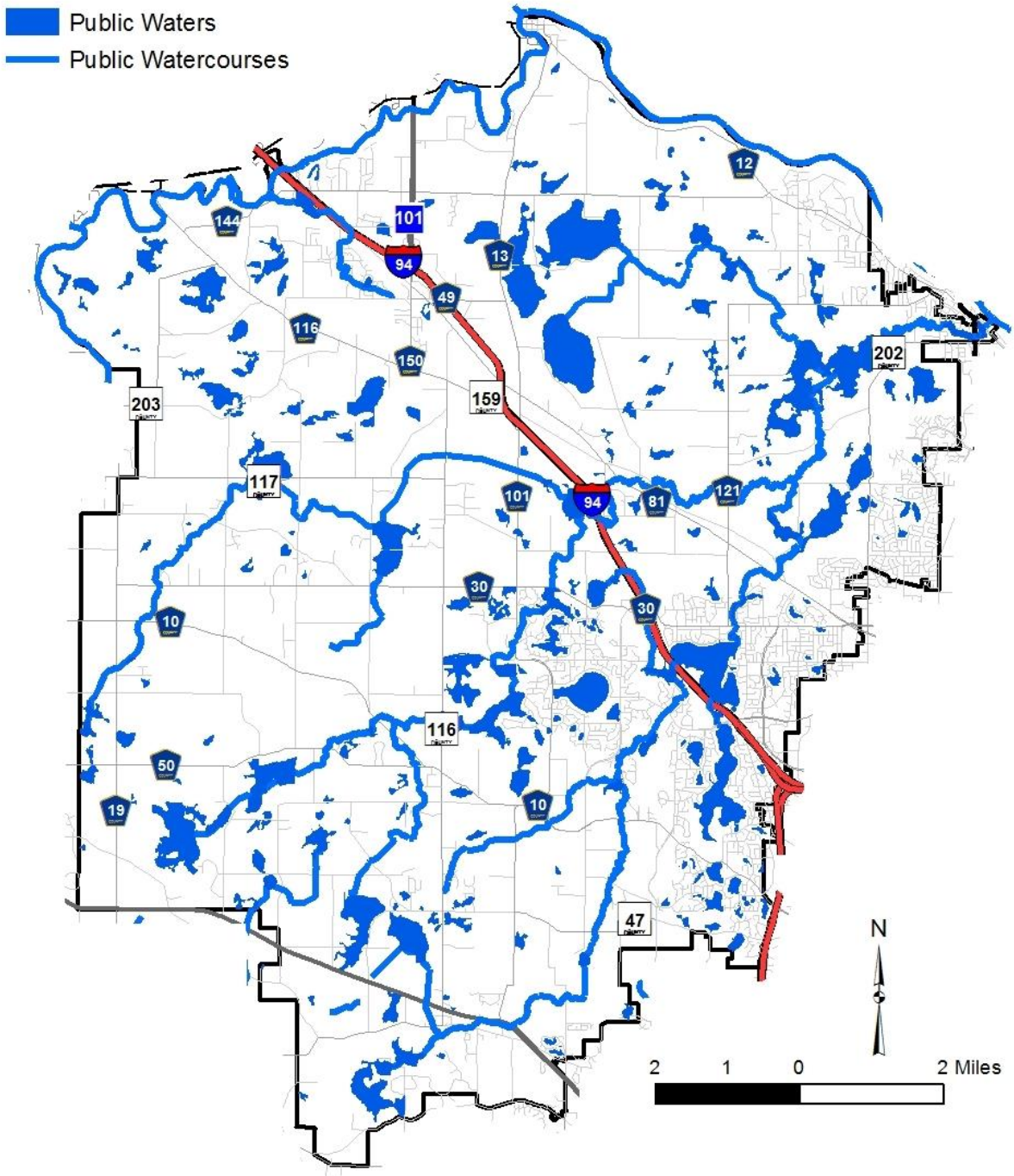

Figure 2.13. Public Waters in the Elm Creek watershed.
Source: Minnesota DNR

2.4.6 Floodplain

Flooding effects may range from personal nuisance to property damage or loss to injury or death. Floodplain areas flood most often and severely. Land use regulations define the floodplain as the area covered by the flood that has a one percent chance of occurring each year, also known as the

100-year flood. The floodplain is divided into two zoning districts: the floodway and flood fringe. The floodway includes the river channel and nearby land areas which must remain open to discharge the 100-year flood. The flood fringe, while in the flood plain, lies outside the floodway. Regulations usually allow development in the flood fringe but require flood-proofing or raising to the legal flood protection elevation.

In 1968, Congress created the National Flood Insurance Program (NFIP) to make flood insurance available to property owners at federally subsidized rates. The NFIP required communities to adopt local laws to protect lives and future development from flooding. The Federal Emergency Management Agency (FEMA) first must formally notify a community that it has special flood hazard areas (SFHA) before it can join the NFIP. FEMA notifies communities by issuing a Flood Hazard Boundary Map (FHBM). This map shows the approximate boundaries of the community's 100-year flood plain. Each participating community has a Flood Insurance Study (FIS). Each of the communities in Elm Creek has a Flood Insurance Study, which can be viewed at the respective City Hall or through Hennepin County Environmental Services. Figure 2.14 shows the approximate 100-year and 500-year floodplain in the watersheds.

2.4.7 Groundwater

Much of the watershed is underlain by loamy and clayey glacial till, and groundwater is less vulnerable to contamination because the unsorted sediment with grains of different sizes is more closely packed together with less void space than sediments comprised of particles of more uniform size. However, the Crow River corridor is underlain with sand, loamy sand, and gravel outwash and is considered to be very highly sensitive to potential pollution. Wetlands and areas near wetlands and lakes are moderately susceptible to contamination due to the proximity to the water table.

Most of the cities obtain their municipal water supplies from the deep Franconia-Ironton-Galesville aquifer, although a few wells draw from more shallow quaternary formations. The Franconia formation is comprised of fine grained sandstone and shale while the Ironton-Galesville sandstones are fine to medium grained sandstone with interbedded shale. Corcoran does not operate a municipal water system. Property owners rely on private wells for potable water. A large development currently under construction in Corcoran will be supplied with municipal water purchased from the city of Maple Grove. The water supply for Plymouth is located outside the Elm Creek watershed.

The cities that obtain their water from groundwater have completed Wellhead Protection Studies. These studies model groundwater flow and identify areas that should be specially managed to reduce the risk of contamination of groundwater (see Figure 2.15). Emergency Response Areas show where immediate action should be taken to clean up spills of contaminants to protect groundwater.

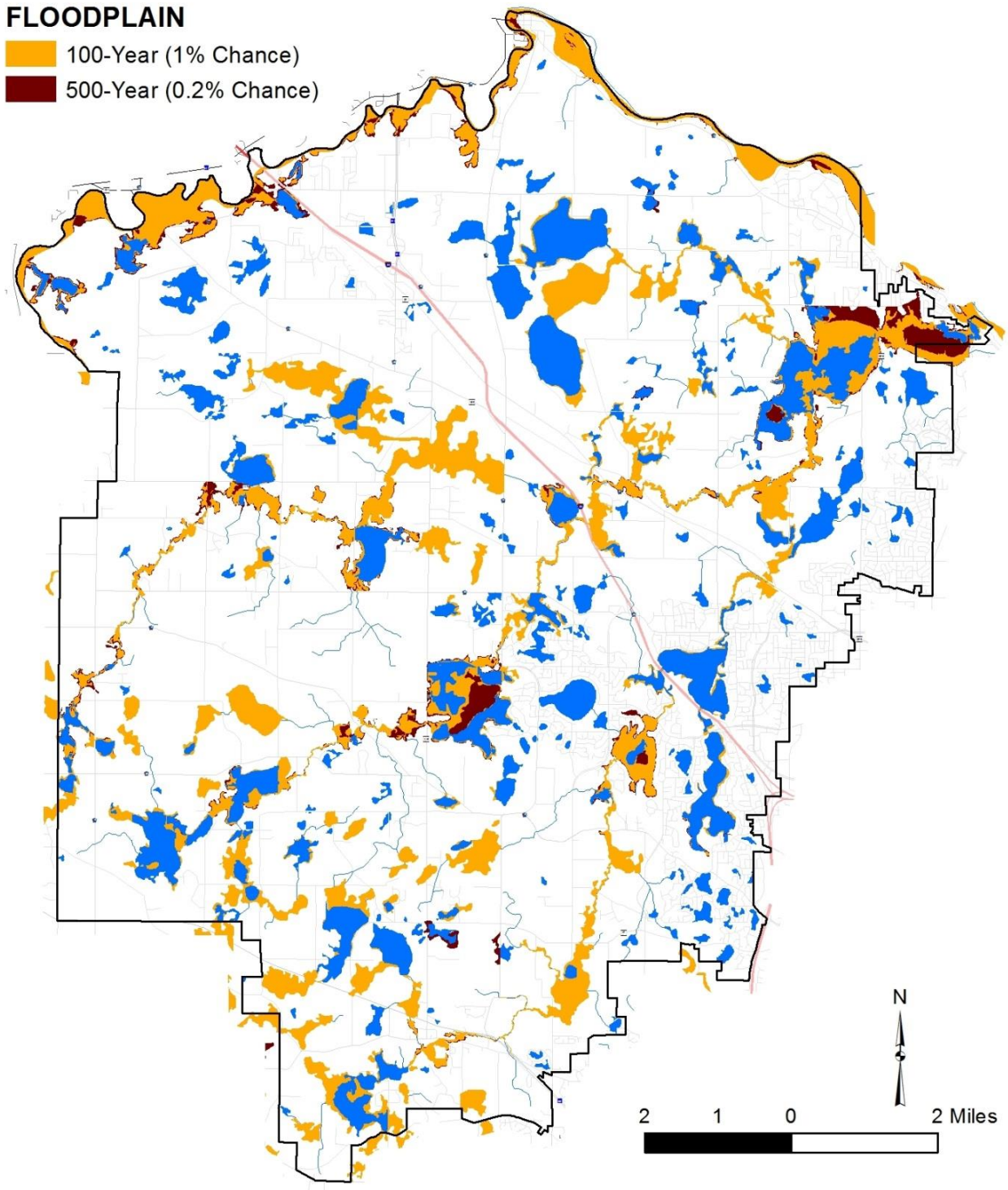

Figure 2.14. Floodplain in the Elm Creek watershed.
Source: Minnesota DNR.

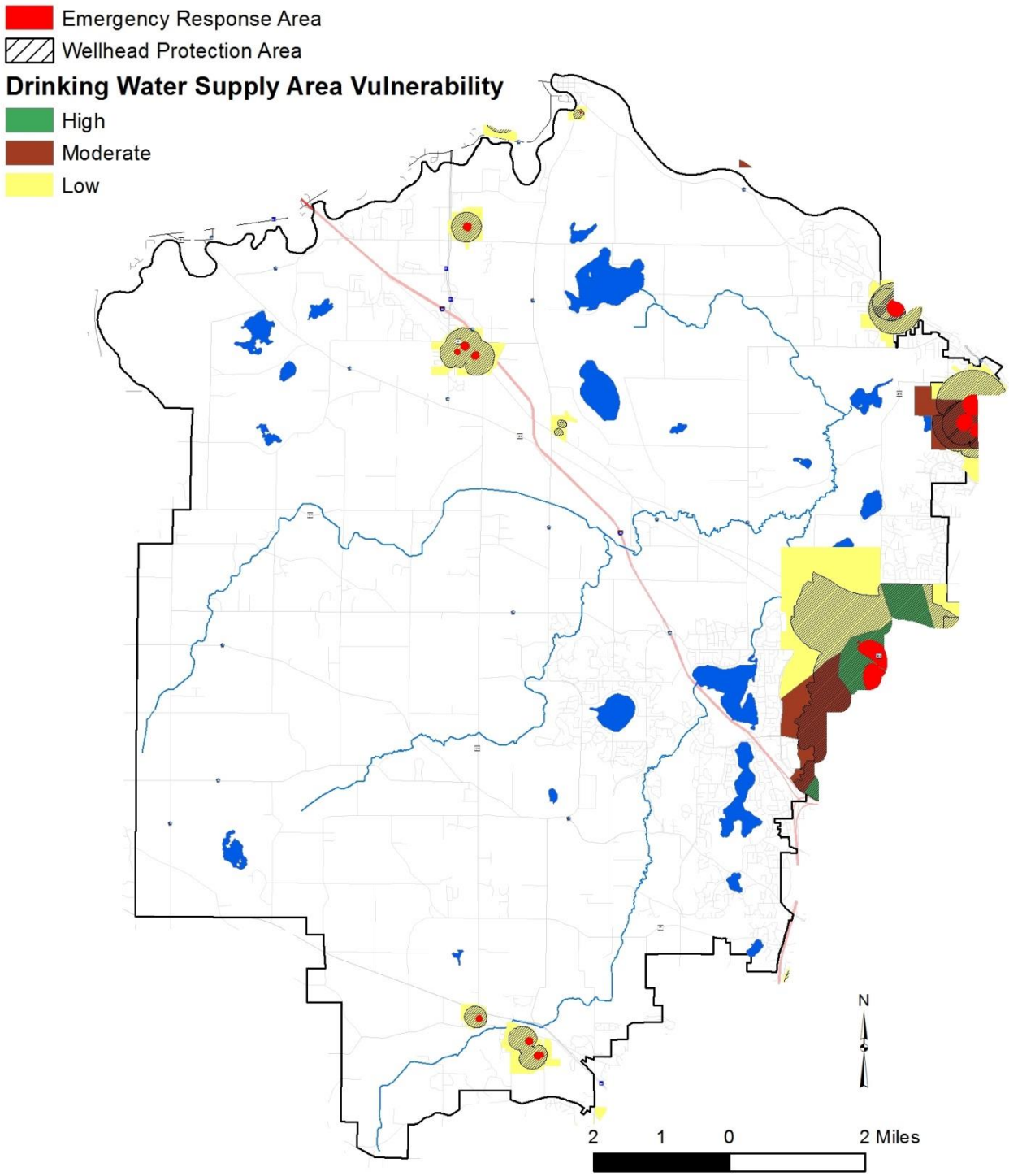

Figure 2.15. Drinking Water Wellhead Protection Areas.
Source: Minnesota Department of Health.

3.0 Watershed Organization and Operations

This section describes how the Elm Creek Watershed Management Commission is organized, its purpose and authorities, and its various operating programs under its current Watershed Management Plan. The section concludes with an assessment of progress towards meeting the goals in the current watershed management plan.

3.1 Elm Creek Watershed Management Commission

3.1.1 Purpose and Authority

The Elm Creek Watershed Management Commission (EC WMC) was formed on February 1, 1973, under a Joint Powers Agreement developed under authority conferred to the member communities by Minnesota Statutes 471.59. The parties to that JPA were Champlin, Corcoran, Dayton, Maple Grove, Medina, Plymouth, and Hennepin Conservation District. In 1981 Hassan Township entered the agreement. The cities of Greenfield and Rogers became non-voting, non-paying members of the Commission in 1982. In 2000 Rogers became a full member of the Commission and the City of Corcoran withdrew from the Pioneer-Sarah Creek Commission in order to include all of its area under the Elm Creek Commission. The following year the City of Greenfield voted to withdraw from the Elm Creek Commission and to include all its area in the Pioneer-Sarah Creek Watershed Management Commission. Hassen was fully annexed by Rogers in 2012.

The Commission's purpose is set forth in Minnesota Statutes 103B.210, Metropolitan Surface Water Planning, which codified the Metropolitan Surface Water Management Act of 1982. Minnesota Statutes 103B.231 and Minnesota Rules 8410 establish requirements for watershed management plans within the Twin Cities Metro Area. The law requires the plan to focus on:

(1) protecting, preserving, and using natural surface and groundwater storage and retention systems;
(2) minimizing public capital expenditures needed to correct flooding and water quality problems;
(3) identifying and planning for means to effectively protect and improve surface and groundwater quality;
(4) establishing more uniform local policies and official controls for surface and groundwater management;
(5) preventing erosion of soil into surface water systems;
(6) promoting groundwater recharge;
(7) protecting and enhancing fish and wildlife habitat and water recreational facilities; and
(8) securing the other benefits associated with the proper management of surface and ground water.

3.1.2 Governance

The Elm Creek Watershed Management Commission is governed by a seven-member board comprised of representatives who are appointed by each City Council for a term determined by the city. The Commission currently meets monthly, holding a meeting on the second Wednesday of

each month. Meetings are open to the public. The Joint Powers Agreement setting forth the authorities granted to the Commission is included in Appendix A.

3.2 RESPONSIBILITIES

3.2.1 Commission

A Board of Commissioners has been established as the governing body of the Commission. A Technical Advisory Committee (TAC) comprised of member city staff designees meets as requested by the Commission. There is no standing Citizens Advisory Committee.

Operating expenses are funded through an annual apportionment to each city based on their proportionate share of taxable market value of real property within the watershed. These expenses include the cost of technical, administrative, and legal services; programs such as water quality monitoring, public information and education, and special studies; and matching funds for grant-funded projects and studies. The Commission's mechanisms for funding capital improvements are identified in the current Joint Powers Agreement and policies adopted by the Commission.

The Commission cannot directly levy taxes or special assessments but has the ability to assess members who subsequently decide how they want to generate the funds. Options available to the members include *ad valorem* tax, creation of a watershed management tax district, special assessments, or Chapter 444 storm sewer utility financing. The Commission may also request bonding from Hennepin County. In 2012 the Commission adopted an amendment to the Second Generation Plan that revised the Capital Improvement Program (CIP), and adopted a policy to contribute up to 25 percent of the cost of a qualifying project.

3.2.2 Relationship to Other Agencies

Cities. Member cities all have approved stormwater management plans that assist the Commission in implementing the Second Generation Watershed Management Plan. The cities have in place ordinances codifying the Commission's development rules and standards, including stormwater management, erosion control, and wetland and floodplain management. City stormwater management programs vary by community, depending on fiscal capacity, degree of development, and water resources.

All the member cities except Rogers are National Pollutant Discharge Elimination System (NPDES) Municipal Separate Small Storm Sewer Systems (MS4s) and have approved NPDES permits and Stormwater Pollution Prevention Programs (SWPPPs) that include numerous activities to manage stormwater and prevent water resource degradation. Those SWPPPs also contain TMDL implementation actions to reduce pollutant loading and manage the rate and volume of stormwater runoff.

The Joint Powers Agreement does not authorize the Commission to directly contract for capital improvement projects. The Commission may order capital projects for construction by member cities, often as regional projects which several cities may agree to cooperatively construct and fund.

In addition to Commission projects member cities may undertake projects, such as including BMPs in routine street reconstruction projects.

Member cities also engage in various water management-related activities such as Adopt-A-Park programs, urban forestry and Arbor Day activities, promotion of recycling and composting, and environmental education published in the city newsletter and website. In many cities the Park Commission or some other Commission is charged with providing advice to the City Council on environmental matters, including watershed related matters.

Hennepin County. The Hennepin County Environment and Energy Department (HCEED) operates a number of programs to conserve natural and water resources in the county. Educational and outreach services are focused on proper lawn and garden care, proper use of herbicides and pesticides, and composting; assistance to communities in identifying and conserving high-value natural resources; promotion of and assistance with agricultural best management practices; and managing public accesses to water resources. HCEED technical staff provide technical services to the Commission under a contract between the Commission and the County.

The County also participates in the education and outreach programming coordinated by the West Metro Water Alliance (WMWA) consortium of watershed management organizations in west Hennepin County.

In addition, HCEED operates volunteer education and monitoring programs, including the RiverWatch stream macroinvertebrate monitoring program for elementary and secondary school students, Stream Health Evaluation Program (SHEP) for adult volunteers, and the Wetland Health Program (WHEP), also for adult volunteers. The HCEED is responsible for administration and implementation of the Minnesota Wetlands Conservation Act and of cost-share conservation programs that financially assist landowners with the protection of their land, and administers conservation easements.

The Hennepin County Public Health Department administers permitting and inspection of residential and commercial Subsurface Sewage Treatment Systems in most of the member cities.

Metropolitan Council. The Metropolitan Council's *Water Resources Management Policy Plan* spells out a wide range of programs and activities undertaken by a variety of governmental and private agencies for management of water resources in the Metro area. Among the many programs and activities are several of particular interest to the Commission: the development of targeted watershed pollutant loads; review of watershed and local water plans and comprehensive plans for consistency with Metro goals and objectives; grant programs; the Citizens' Assisted Lake Monitoring Program (CAMP); and the Environmental Information Management System. The Elm Creek Commission has regularly partnered with the Metropolitan Council's CAMP program of citizen volunteer lake water quality monitoring since 2005, although a few lakes were occasionally monitored back to 1998.

Minnesota Pollution Control Agency. The MPCA operates several programs applicable to watershed planning. The MPCA monitors water quality, sets standards, and implements various controls. Of particular interest are the National Pollutant Discharge Elimination System (NPDES) program and

implementation of the Clean Water Act. The MPCA manages the NPDES Phase I construction and industrial stormwater discharge permitting. MPCA also manages the NPDES Phases I and II permitting for municipal separate storm sewer systems (MS4s). Hennepin County and Mn/DOT are also MS4s with conveyances in the Elm Creek watershed.

The MPCA implements the Clean Water Act's requirement that states adopt water quality standards to protect the nation's waters. The Environmental Protection Agency (EPA) and MPCA assists managers of water resources that have lakes and streams that fail to meet these established standards to prepare a Total Maximum Daily Load (TMDL) study identifying the source of the pollutant and a plan for bringing the water resource into compliance.

The Elm Creek Commission worked closely with the MPCA and received funding from that agency to complete a Watershed Restoration and Protection Strategy (WRAPS) study for several lake and stream impairments in the watershed that is expected to be complete by the end of 2015.

Board of Water and Soil Resources. The board is the state's administrative agency for 90 soil and water conservation districts, 46 watershed districts, 23 metropolitan watershed management organizations, and 80 county water managers. BWSR's core functions include implementing the state's soil and water conservation policy, comprehensive local water management, and the Wetland Conservation Act (WCA). BWSR periodically assesses watershed organizations as part of its Performance Review and Assistance Program (PRAP).

BWSR wetland specialists participate in Technical Evaluation Panels in the watersheds to assess potential wetland impacts and mitigation strategies. BWSR also periodically audits the Commissions to assure that WCA is being administered properly. Finally, BWSR is the implementation agency for the Clean Water Funds grant program funded by the Clean Water, Land, and Legacy Amendment.

Minnesota Department of Agriculture. The MDA is statutorily responsible for the management of pesticides and fertilizer other than manure to protect water resources. The MDA implements a wide range of protection and regulatory activities to ensure that pesticides and fertilizer are stored, handled, applied and disposed of in a manner that will protect human health, water resources and the environment. The MDA works with the University of Minnesota to develop pesticide and fertilizer BMPs to protect water resources, and with farmers, crop advisors, farm organizations, other agencies and many other groups to educate, promote, demonstrate and evaluate BMPs, to test and license applicators, and to enforce rules and statutes. The MDA has broad regulatory authority for pesticides and has authority to regulate the use of fertilizer to protect groundwater.

Minnesota Department of Health. The Environmental Health Division of the MDH operates many programs of interest to the Commissions. Programs include Drinking Water Protection, Wellhead Protection, Lake and Fish Monitoring (in partnership with DNR/MPCA), Environmental Health Services, Health Risk Assessment, Site Assessment, and Consultation and Well Management.

Minnesota Department of Natural Resources. The DNR manages and protects the state's natural resources and operates numerous programs. The department provides technical assistance and information regarding best management practices, natural resource management, incorporating natural resource conservation in land use planning, and lakescaping.

The Fisheries Division monitors and improves fisheries within the state including many of the lakes within the watershed. It also promotes fishing opportunities and provides grants to assist in the construction of fishing piers. The Ecological and Water Resources (EWR) Division focuses on an overarching vision of "Healthy Watersheds throughout Minnesota." "Healthy Watersheds" include: 1) sustainable quantities and qualities of water; 2) sustainable levels of biodiversity; 3) well-functioning ecosystem services; and 4) sustainable and vibrant natural resource economies and recreational opportunities. The EWR Division also provides the following services:

- It maintains an inventory of public waters and operates permit programs for working in public waters or for appropriating public waters;
- Oversees the state's floodplain management program;
- Provides local stewardship by coordinating the Mississippi River Critical Area and MNRAA programs and the Shoreland Management program;
- Collects, analyzes, and provides ecological information, including:
  - Location and management of rare resources (endangered and threatened species, critical habitats, high quality natural communities);
  - Management of harmful exotic species, fish and wildlife diseases, and negative environmental impacts of human development;
  - Management and restoration of important ecological processes in river systems and key natural areas; and
  - Development of information about Minnesota's ecosystems and their significance to a sustainable quality of life.

The DNR's webpage at www.dnr.state.mn.us/lakefind/index.html is LakeFinder, a DNR supported tool that combines information from various DNR Divisions, as well as other state agencies, such as Minnesota Pollution Control Agency (water quality) and Minnesota Department of Health (fish consumption). This tool contains data for more than 4,500 lakes and rivers throughout Minnesota.

The DNR also provides a variety of specialized programs oriented to property owners or neighborhood groups, such as the Aquatic Plant Management, Urban Fisheries and Fishing in the Neighborhood, Neighborhood Wilds, and Metro Greenways programs.

3.3 OPERATIONS

This section describes the current programs operated by the Elm Creek Watershed Management Commission.

3.3.1 Education and Outreach

The Commission initially established an Education Program as part of its Second Generation Plan. The Commission later joined the joint Education and Public Outreach Committee (EPOC) of the Bassett Creek, Pioneer-Sarah Creek, Shingle Creek and West Mississippi Commissions and Blue Thumb. These organizations, along with Three Rivers Park District, Hennepin County Department of Environmental Services and the Freshwater Society, then formally formed the West Metro Water

Alliance (WMWA) and developed the West Metro Education and Outreach Plan (EOP) to guide shared activities.

Details regarding the education and outreach activities may be found in the Commission's Annual Report. Some highlights over the past ten years are:

- Maintained a website - www.elmcreekwatershed.org - to provide news to residents of the watershed and beyond. The Watershed Management Plan, monthly meeting materials, project reviews, Annual Reports, water monitoring results, and other watershed-related information are posted there.
- Provided news releases to the member cities and their official newspapers for publication
- Participated in a professional survey of watershed knowledge conducted in 2007 in the Elm Creek, Bassett Creek, Shingle Creek, and West Mississippi watersheds.
- Participated in developing the brochure *Ten Things You Can Do to Improve Minnesota's Lakes and Streams*. 8,500 copies were distributed to the member cities.
- Promoted river stewardship through the River Watch program. Under the guidance of the Hennepin County Department of Environmental Services (HCDES), students from various schools have regularly monitored two sites on Rush Creek and two to three sites on Elm Creek since 1998. Some additional sites on Elm Creek have also been periodically monitored.
- Cosponsored rain garden workshops through Metro Blooms.
- Awarded a $1,000 water quality education grant to Kaleidoscope Charter School to purchase two compound microscopes to enhance water quality education. The school regularly participates in the RiverWatch macroinvertebrate monitoring program.
- Participated in a 2011 workshop series. The WMWA in partnership with the Freshwater Society developed and presented a series of three workshops in 2011 aimed at educating City Councils, Planning Commissions, Parks and other Commissions, and city staff about water quality issues. The workshops focused on runoff volume management, water quality, and TMDLs and management planning. Sixty-five individuals attended, including city councilors, city officials, advisory commission members, lake association representatives, agency staff, and interested private citizens. Twenty-two cities and 14 agencies/associations/citizens were represented.

3.3.2 Monitoring Program

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." Flow and water quality are routinely monitored at one site on Elm Creek, and five lakes have been routinely monitored with other lakes monitored on a rotating schedule. Flow and water quality data on the other major streams and other stations on Elm Creek as well as additional lake monitoring data was collected as part of the WRAPS study currently under way.

The Commission publishes monitoring data in its Annual Report which presents data from the current year as well as water quality and quantity trends. That trend data is included in this Plan in Appendix B. The following are short descriptions of the current monitoring program.

Streams. With cost-share funding from the Commission, the USGS operates a monitoring station on Elm Creek, with flow data available online back to 1978. The Commission started partnering with USGS in 1988 to monitor that site, measuring the following parameters: nitrate, ammonia, nitrate plus nitrite, total nitrogen, organic nitrogen, chloride, total phosphorus, total suspended solids, dissolved oxygen, pH, chemical oxygen demand, conductivity, and temperature.

Student and adult volunteers monitor macroinvertebrates and water chemistry and clarity at sites around the watershed through RiverWatch and Stream Health Evaluation Program, both managed by Hennepin County Environmental Services.

Lake Monitoring. The Commission has monitored Fish Lake and Weaver Lake since 1985 and French and Diamond Lakes since 2004. Other lakes have been occasionally monitored. Parameters monitored typically include total phosphorus, soluble reactive phosphorus, total nitrogen, Secchi depth, and chlorophyll-a. In addition, two to three lakes are monitored each year by volunteers through the Citizen Assisted Monitoring program (CAMP), and those parameters include total phosphorus, Secchi depth, and chlorophyll-a as well as general lake usability observations.

3.3.3 Rules and Standards and Project Reviews

The Commission does not issue permits but does require development and redevelopment projects to meet requirements for runoff rate control and water quality treatment. The Commission acts as the Local Government Unit (LGU) for Wetland Conservation Act (WCA) administration for Champlin and Corcoran.

Development and redevelopment projects that meet certain size and other criteria are required to incorporate into their developments Best Management Practices (BMPs) sufficient to meet the Commission's standards. Engineering plans, hydrologic calculations, wetland delineations, and other supporting material is submitted to the Commission's technical services consultant, who conducts a Project Review and discusses the proposal and any necessary revisions with the developer and the city. Findings are summarized in a report to the Commission, which will either recommend to the city that the plans as submitted or with minor modifications are acceptable, or will recommend to the city that the plans be rejected. It is the responsibility of the city to see that the standards are met. Table 3.1 summarizes the project reviews that have been completed during 2004-2013. These project reviews include private development and redevelopment as well as public projects such as street and highway projects.

Table 3.1. Project reviews, 2004-2013.

Year	Project Reviews	Wetland Only	Year	Project Reviews	Wetland Only
2004	84	16	2009	34	6
2005	96	16	2010	37	10
2006	79	21	2011	34	6
2007	62	12	2012	38	5
2008	42	3	2013	54	11
TOTAL				560	106

3.3.4 Administration

Administration includes preparing for and attending routine and special meetings; taking minutes and record keeping; grant writing; correspondence; maintaining the web site; providing bookkeeping services; filing; and annual and financial reporting. Administrative and technical consulting staff also administers grants on behalf of the Commission: completing work plans, preparing interim and final reports, and preparing invoices.

3.4 ASSESSMENT OF SECOND GENERATION MANAGEMENT PLAN PERFORMANCE

The Commission has completed or will have completed by 2014 many of the work plan activities and strategies identified in the Second Generation Plan. The most successful achievements of the Second Generation Plan were:

- Routinely monitored Elm Creek and five lakes, with other lakes monitored on occasion.
- Participated in joint education activities as part of the West Metro Water Alliance (WMWA) and Blue Thumb, and offered volunteer monitoring programs as citizen outreach.
- The Second Generation Plan identified stream bank instability as the top priority issue to be addressed by the Commission. In 2005-2007, the Commission undertook the Elm Creek Channel Study, including:
    - Identified unstable areas of Elm, Rush, North Fork Rush, and Diamond Creeks;
    - Determined the bankfull channel capacity at surveyed locations;
    - Undertook scenario modeling to assess the impact of increased watershed imperviousness on overall stream stability under the then-current development rules and standards and various modifications to those requirements;
    - Determined that a 24-hour extended detention of a channel protection volume would adequately protect downstream channels.

  Following this study, the Commission adopted a Major Plan Amendment to revise the rules and standards to incorporate a new extended detention requirement.
- To administer the Wetland Conservation Act more effectively, in 2007 the Commission developed the *Wetland Review Process.* This guide includes an overview of wetland requirements, a flow chart showing the review process, a WCA sequencing worksheet, the Commission's performance standards for wetland mitigation, and the Commission's monitoring report requirements.
- In 2007 the Commission received a Surface Water Assessment Grant (SWAG) for the Elm, Rush and Diamond Creek Stream Monitoring Project. This project is a program to monitor Elm Creek, Rush Creek, North Fork Rush Creek, and Diamond Creek at four sites above the confluence of Elm Creek for dissolved oxygen, invertebrate populations, bacteria levels, and pollutant transport (phosphorus, nitrogen, and sediment) and to monitor Weaver, Fish, Diamond, Cowley, Henry and Rice lakes for total phosphorus, total Kjeldahl nitrogen, chlorophyll-a, surface temperature and water transparency. In addition to these parameters, Weaver, Fish, and Diamond Lakes are also monitored for soluble reactive phosphorus, dissolved oxygen,

conductivity, and pH. The data collected will supplement other monitoring data as the Commission undertakes the current WRAPS study.

- In 2009, the Commission requested and received funding from the MPCA to prepare a Watershed-Wide TMDL and Implementation Plan. The MPCA has since renamed these as Total maximum Daily Load (TMDL) studies and Watershed Restoration and Protection Strategies (WRAPS) studies. The TMDL report will set pollution reduction requirements for the impaired streams and lakes in the watershed. The WRAPS document is a summary of the monitoring and assessment, stressor identification, the TMDL reports and includes an implementation table with actions to restore impaired waters and protect waters that are not impaired. The WRAPS is expected to be complete in 2015.
- In 2012 the Commission adopted a major plan amendment revising the Capital Improvement program and adopting a Cost Share Policy.

Areas that fell short of Second Generation expectations or which could be improved include:

- While the Elm Creek Channel Study identified numerous potential capital projects, only one – stabilizing 800 feet of Elm Creek stream through Jo Nunn Park in Champlin – has been completed. An additional project in Champlin - reconstructing the Mill Pond Dam and stabilizing the downstream streambank – is currently scheduled for construction in the next few years.
- The Commission has had limited success persuading agricultural and livestock operations to undertake voluntary phosphorus and sediment load reductions. Modeling completed for the WRAPS indicates that these land uses are sources of pollutant load, including bacteria, phosphorus, and sediment that not only impacts water chemistry and clarity in the lakes and streams, but also impacts the biological communities.
- A goal of the Second Generation Plan was to establish manure management standards and a model ordinance related to manure management, feedlots, and fencing/setback standards for livestock near water bodies. This was not completed. However, other watershed management organizations with agricultural land uses may be interested in collaborating on this as part of WRAPS implementation.

4.0 Implementation Plan

This Plan section discusses the problems and issues that were identified during the Plan development process, and the goals and actions the Commission will pursue to address them. Each of the operating programs were reviewed during the planning process, and modifications to the monitoring plan, education program, and development rules and standards are described in this section and presented in more detail in appendices. This section includes a cost estimate for operations over the coming ten year period and the estimated member assessments, and a Capital Improvement Program of potential capital projects and special studies. Finally, this section concludes by summarizing the requirements for member city local water management plans and procedures for amending this Plan.

4.1 Assessment of Problems and Issues

4.1.1 Gaps Analysis

The Commission performed a Gaps Analysis and visioning exercise to identify problems and issues confronting water resources management in the watershed. Table 4.1 shows the problems/issues in four general categories, in no particular order of priority.

Table 4.1. Problems and issues identified in the Gaps Analysis.

#	Problem or Issue	Discussion
Water Quality		
1.1	Numerous impairments on the primary streams and several lakes.	Meeting state water quality and biotic integrity standards will require significant and likely costly load reductions from both urban and rural sources as well as internal lake and stream actions.
1.2	Land is transitioning from lightly-developed and agriculture to more densely developed land uses at higher imperviousness.	Land use change can create new pollutant loading and increase the volume and rate of stormwater runoff.
1.3	Erosion and sedimentation issues continue on Elm Creek and the other streams and conveyances in the watershed.	Stream instability can exacerbate other water quality issues in the streams and receiving waters.
Agricultural Impacts on Water Quality		
2.1	Need to increase the number and distribution of agricultural BMPs in the watershed.	Modeling completed for the WRAPS indicates that agricultural land uses are a source of nutrient, sediment, and bacteria loading in lakes and streams in the watershed.
2.2	Need to develop an effective mechanism to achieve voluntary adoption of BMPs	Some options are: identifying key persons to model best practices, providing financial incentives, and partnering with other agencies such as Extension.
2.3	Need more effective outreach to agricultural operators and hobbyists.	The most effective outreach is person to person, which is time and labor intensive.
Funding Needs		

#	Problem or Issue	Discussion
3.1	Additional funding is necessary to take on the actions identified in the Channel Study and WRAPS implementation study.	Competition for grant funding is fierce, and the Commission and cities have a limited ability to contribute matching funds
3. 2	Identify a sustainable funding level and sources that minimize impacts to city levies.	Are there other sources of funding that could supplement or replace the current city contributions to reduce the cost burden on the member cities?
Other Issues		
4.1	Need to expand activities for education and outreach to increase knowledge about water resources issues and create behavioral change.	Need to improve the visibility of the Commission, its responsibilities and achievements. Build a reputation as a leader in water quality.
4.2	The Commission should be realistic about its Capital Improvement Program.	The Commission and member cities should prioritize potential improvements, and focus on achieving the highest priority.
4.3	All the member cities need to be involved in watershed management.	Should the Technical Advisory Committee (TAC) meet on a semi-regular basis rather than ad hoc?
4.4	There are too many agencies involved in water management, and nothing gets done.	An ongoing and effective TAC can be a place for collaboration and cooperation.

4.1.2 TMDL and WRAPS Findings

The Elm Creek Watershed TMDL (MPCA 2015) addresses 22 impairments in the Elm Creek hydrologic watershed and two impairments in the Crow River watershed (see Table 2.13 and Table 2.15 above). These include nutrient impairments on seven lakes, and *E. coli*, dissolved oxygen (DO), and fish and macroinvertebrate community biological impairments on Elm, Rush, South Fork Rush, and Diamond Creeks. The findings are summarized below. Refer to the TMDL document (Brasch 2015) for more detail.

Nutrients. There are three sources of nutrient loading to lakes: watershed or external sources, internal sources, and atmospheric deposition. Watershed load is phosphorus carried from the land to a receiving water, or contributed from an upstream source such as an upstream lake in a chain, or by a stream. Internal load is usually the result of the release of phosphorus from lake bottom sediments. Atmospheric deposition falls directly on a lake surface, and is typically only a small component of the overall lake nutrient load. The role of watershed versus internal loading varies by lake, and thus the amount of phosphorus load reduction from each source will vary, as seen in Table 4.2.

Table 4.2. Elm Creek Watershed TMDL draft lake TP load reductions.

Lake	Current TP Load Lbs/Year	TMDL TP Allocation Lbs/Year	External Load Reduction Lbs/Year (%)	Internal Load Reduction Lbs/Year (%)
Fish	1,251.6	1,125.0	182.7 (29%)	0.2 (<1%)
Rice	12,551.1	2,307.1	8,411.7 (91%)	1,947.6 (61%)
Diamond	2,871.1	831.6	1,450.6 (73%)	630.4 (82%)
Goose	133.2	26.7	36.7 (82%)	71.2 (100%)
Cowley	844.1	94.6	336.7 (80%)	416.7 (100%)
Sylvan	1,179.3	199.9	507.5 (77%)	481.9 (100%)
Henry	908.3	183.2	631.5 (91%)	102.8 (50%)

Source: Elm Creek Watershed TMDL Draft March 2015.

E. coli. A source assessment completed for the TMDL suggests that fecal matter from livestock is the primary potential source of bacteria loading into Diamond, Rush, and South Fork Rush Creeks, while both livestock and urban sources contribute to the Elm Creek impairment. Fecal matter sources include wash-off from pastures, runoff from feedlots and domestic animals, application of manure to fields as fertilizer, direct access of livestock to streams, wildlife, and sewage treatment systems. Monitoring indicates that exceedances of the *E. coli* standard are most severe in the upper watershed, where land use is dominated by agriculture. Bacteria load reductions to meet the standard vary by stream and flow regime and by season, and range from no reduction to a 66 percent reduction.

Dissolved Oxygen (DO). Low dissolved oxygen in streams stresses aquatic life. Streams are complex systems, and there are numerous potential causes of low DO. The Stressor Identification Study completed for the biotic impairments (Lehr 2015) concluded that the likely cause of low DO in these streams is excess nutrients, which increases productivity and results in increased carbonaceous biochemical oxygen demand from breakdown of organic matter. Monitoring suggests that the DO impairment is most severe in the upstream stream reaches, and is also influenced by the numerous riparian and flow-through wetlands. Total phosphorus load reductions to meet the standard vary by stream and flow regime, and range from a 53 percent reduction to an 85 percent reduction. The numerous flow-through and riparian wetlands also affect DO dynamics in the streams.

Biotic Integrity (Fish and Macroinvertebrates). The Elm Creek Watershed Stressor Identification Study used a structured assessment tool called CADDIS, developed by the EPA as a "strength of evidence" approach to evaluating potential causes of biotic impairments. Numerous potential stressors were evaluated and ruled out due to a lack of evidence. Six potential stressors were identified as being probable causes of the impairments; however, the relative impact of these stressors varies by stream reach. The six are: Altered Hydrology, Altered Physical Habitat, Excess Sediment, Excess Phosphorus, Low Dissolved Oxygen, and Excess Chlorides.

The Total Phosphorus TMDL addresses the excess phosphorus and low dissolved oxygen impairments. Total Suspended Sediment (TSS) load reductions to address the excess sediment stressor for Diamond and Elm Creeks vary by stream and flow regime. The impairment is less severe in Diamond Creek, with reductions ranging from no reduction to 47 percent reduction. In Elm Creek reductions ranging from 48 to 64 percent would be necessary to meet the TSS standard.

Altered Hydrology and Altered Physical Habitat are parameters with no numerical standard, so no TMDL can be established. However, the TMDL document identifies actions that can be taken to address these stressors. For altered hydrology, those actions should focus on reducing the rate and volume of runoff and increasing groundwater and baseflow recharge. Improvements to physical habitat such as streambank stabilization and added stream complexity would enhance the ability of the streams to support fish and macroinvertebrates and other aquatic life.

4.2 IDENTIFICATION OF PRIORITY ISSUES

Identification of priority issues was completed through ongoing discussions with the Commissioners and Technical Advisory Committee, and discussion at the joint meeting of representatives from

each member city Citizens Advisory Committee and at a meeting of City Managers and their representatives. Based on input from the Commissioners, TAC, member city staff, and CAC, the following issues have been identified as of high priority for this Management Plan.

THIRD GENERATION MANAGEMENT PLAN PRIORITIES

1. Begin implementing priority projects and actions in 2015, providing cost-share to member cities to undertake projects to achieve WRAPS lake and stream goals.
2. Use the results of the WRAPS study to establish priority areas, and complete subwatershed assessments to identify specific Best Management Practices that feasibly and cost-effectively reduce nutrient and sediment loading to impaired water resources. Convene a TAC of agencies specializing in ag outreach to help guide assessments in agricultural subwatersheds.
3. Develop a model manure management ordinance regulating the placement of new small non-food animal operations using the City of Medina ordinance as a reference, and require member cities to adopt that ordinance or other ordinances and practices that will accomplish its objectives.
4. Partner with other organizations to complete a pilot project for targeted fertilizer application and to increase and focus outreach to agricultural operators.
5. Continue participating in joint education and outreach activities with WMWA and other partners.

4.3 THIRD GENERATION MANAGEMENT GOALS AND ACTIONS

Guided by the identification and prioritization of issues in the watersheds, the Commission has developed goals that will guide activities over the coming decade. These goals were derived from the Gaps Analysis and a review of the accomplishments and unfinished business from the Second Generation Plan; discussions with Commissioners, Technical and Citizens Advisory Committee members, state agency staff, and other city staff.

The framework to achieve these goals is set forth in the Implementation Plan and Capital Improvement Program detailed in the following sections. Member cities supplement and complement these actions with additional policies and programs tailored to their unique priorities and needs. The philosophy of the Joint Powers Agreement and this Plan is that the management plan establishes certain common goals and standards for water resources management in the watershed, agreed to by the member cities, and implemented by those cities by activities at both the Commission and local levels. Successful achievement of the goals in this Plan is dependent on those member cities and their dedication to this effort.

4.3.1 Water Quantity

A statutory responsibility of watershed management organizations is to prevent and mitigate flooding. This Plan accomplishes this by ensuring that development and redevelopment does not create excessive new volumes and rates of runoff that may cause downstream flooding. A second responsibility is promoting groundwater recharge, which impacts stream baseflow and lake levels, and maintaining adequate hydrology to wetlands.

The Third Generation management goals for water quantity are focused on reducing, or at minimum achieving no increase in, the rate of runoff discharging to the streams in the watershed, to reduce potential for erosive velocities and minimize further streambank erosion and mass wasting. An additional management goal is to maintain the current flood profile of Elm Creek and tributaries.

Goal Area A. Water Quantity

Goal A.1. Maintain the post-development 2-year, 10-year, and 100-year peak rate of runoff at pre-development level for the critical duration precipitation event.
Goal A.2. Maintain the post-development annual runoff volume at pre-development volume.
Goal A.3. Prevent the loss of floodplain storage below the established 100-year elevation.
Goal A.4 Reduce peak flow rates in Elm, Diamond, and Rush Creeks and tributary streams to the Crow and Mississippi and preserve conveyance capacity.

Water Quantity Actions:

a. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to meet runoff rate control and runoff volume and infiltration requirements.
b. Landlocked depressions that presently do not have a defined outlet and do not typically overflow may only be allowed a positive outlet provided the downstream impacts are addressed and the plan is approved by the Commission.
c. The local communities shall be responsible for removing deadfall in creek channels as appropriate provided that the deadfall is no longer attached to the land. For deadfall that remains attached to the land, it is the responsibility of the landowner to remove the deadfall. The Commission shall mediate deadfall removal issues as requested by the member communities.
d. Member cities shall adopt local controls and local stormwater management plans that are at least as stringent as the Commission Water Quantity goals and policies and the Commission Rules and Standards.
e. Crossings of watercourses for roads, driveways, or utilities must maintain the 100-year flow profile and hydraulic capacity and mimic 1- and 2-year conditions.
f. The Commission will, as necessary and requested, coordinate intercommunity stormwater runoff design and planning with the member communities.

Goal Area A. Water Quantity

Floodplain Actions:

a. The Commission adopts the current FEMA study as part of the Elm Creek floodplain for parts of Hassan (now Rogers) and Dayton that drain to the Crow and Mississippi Rivers. The Commission adopts the Elm Creek Watershed Study and its associated flood elevations.
b. The Commission requires a plan review by the local permitting authority for development or redevelopment if any part of the development is within or affects a 100-year floodplain
c. The Commission shall maintain Rules and Standards requiring development and redevelopment affecting the 100-year floodplain to meet Commission compensatory storage, low flow elevation, and timing requirements.
d. Member cities shall adopt a floodplain ordinance and any other required local controls, and local stormwater management plans that are at least as stringent as Commission Floodplain goals and policies and the Commission Rules and Standards.

4.3.2 Water Quality

The Elm Creek Watershed TMDL report and the Elm Creek Watershed WRAPS plan establish water quality improvement and protection goals for several lakes and the major streams in the watershed. The Third Generation goals for water quality are focused on making progress to improve the lakes and streams in the watershed as well as protect those that are not impaired waters. The goals are aggressive; some of them will require much dedication and effort and public and private resources to achieve. However, public input received for this Plan, the WRAPS, and other sources show that achieving a high standard of water quality is a priority for the public as well as required by state statute, and the Implementation Plan includes actions to help meet these goals.

Goal Area B. Water Quality

Goal B.1. Improve Total Phosphorus concentration in the impaired lakes by 10% over the 2004-2013 average by 2024.

Goal B.2. Maintain or improve water quality in the lakes and streams with no identified impairments.

Goal B.3. Conduct a TMDL/WRAPS progress review every five years following approval of the TMDLs and WRAPS study.

Goal B.4. Identify high priority areas where the Commission will partner with cities and other agencies to provide technical and financial assistance.

Water Quality Actions:

a. The Commission adopts as water quality goals the standards for Class 2b waters in the North Central Hardwood Forest ecoregion as set forth in Minn. Rules 7050.0222.
b. The Commission shall undertake a routine lake and stream monitoring program to assess progress toward meeting these goals.
c. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to meet water quality requirements.
d. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to meet erosion control requirements.
e. The Commission will develop and implement a program to provide technical and financial assistance to the member cities in identifying appropriate and cost-effective nutrient and sediment load-reducing Best Management Practices in priority areas.
f. The Commission shall contribute to the cost of TMDL capital implementation projects as established in the current Cost Share policy, under the authority provided by Minn. Stat. 103B.251 Section VIII, Subd. 5, to certify for payment by the county all or part of the cost of an approved capital improvement.
g. The Commission shall work in partnership with other organizations and agencies to pursue grant and other funding to implement improvement projects and feasibility studies.
h. The Commission shall update this Plan as necessary following TMDL/WRAPS progress reviews.

Goal Area B. Water Quality

i. Member cities shall adopt local controls and local stormwater management plans that are at least as stringent as Commission Water Quality goals and policies and the Commission Rules and Standards.

j. Member cities shall adopt a manure management ordinance using the Commission's model ordinance for guidance, or adopt other standards and practices that will accomplish the objective of reducing phosphorus loading from new livestock operations.

4.3.3 Groundwater

The Commission has undertaken limited groundwater management activities in the past, primarily by encouraging projects requiring project review to infiltrate a portion of runoff. Over the past decade cities that rely on groundwater for drinking water have worked with the Minnesota Department of Health to adopt wellhead protection plans and to implement policies and official controls to protect drinking water sources. In this Third Generation Plan, the Commission has adopted a new infiltration requirement for new development and redevelopment to promote groundwater recharge and reduce runoff.

Goal Area C. Groundwater

Goal C.1. Promote groundwater recharge by requiring abstraction/infiltration of runoff from new development and redevelopment.

Goal C.2. Protect groundwater quality by incorporating wellhead protection study results into development and redevelopment Rules and Standards.

Groundwater Actions:

a. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to meet abstraction/infiltration requirements.
b. Member cities shall adopt local controls and local stormwater management plans that are at least as stringent as Commission Groundwater goals and policies and the Commission Rules and Standards.
c. The Commission will partner with the DNR, USGS, MDH, and other agencies to educate the member cities and watershed community officials about groundwater issues and their relation to stormwater management and surface water quality.
d. The Commission shall develop and maintain a map showing the wellhead protection zones within its boundaries upon completion of a local wellhead protection plan for use in determining vulnerable areas that should be exempted from infiltration.
e. The Commission will develop and implement a program to provide technical and financial assistance to the member cities in identifying appropriate and cost-effective abstraction/infiltration and groundwater recharge Best Management in priority areas to reduce stormwater runoff.

4.3.4 Wetlands

The Commission's primary tool for managing wetlands is the Wetland Conservation Act (WCA). The Commission serves as the Local Government Unit (LGU) for WCA administration in Champlin and Corcoran, and the other five member cities administer WCA themselves. The Commission requires submittal of a functions and values assessment using the latest version of MnRAM whenever an applicant proposes wetland impacts.

Goal Area D. Wetlands

Goal D.1. Preserve the existing functions and values of wetlands within the watershed.
Goal D.2. Promote wetland the enhancement or restoration of wetlands in the watershed.

Wetland Actions:

a. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to provide buffers adjacent to wetlands, lakes, and streams.
b. Member cities shall adopt local controls and local stormwater management plans that are at least as stringent as Commission wetland goals and policies and the Commission Rules and Standards.
c. The Commission shall act as the Local Government Unit (LGU) for the Wetland Conservation Act for those communities that choose to so designate.
d. Developers must complete a wetland delineation by a wetland professional to identify the location and extent of any wetlands present within the development site.
e. For any development or redevelopment proposing impacts to any wetlands in the watershed, a functions and values assessment using the most recent version of the MnRAM protocol must be completed and submitted to the Commission and to the respective LGU.

4.3.5 Drainage Systems

Hennepin County retains ditch authority over several jurisdictional ditches in the watershed. The primary Third Generation activity related to drainage systems is to periodically review the advantages and disadvantages of ditch authority and if requested to reconsider jurisdiction.

Goal Area E. Drainage Systems

Goal E.1. Continue current Hennepin County jurisdiction over the county ditches in the watershed.

Drainage System Actions:

a. If requested, reconsider the jurisdiction over the county ditches in the watershed.

4.3.6 Operations and Programming

These goals guide the routine programs and operations of the Commission, and include the education and outreach program; maintenance of rules and standards; the annual monitoring program; and programs and activities to stay abreast of changing standards and requirements, search for grant and other funds to supplement the regular budget, and operate a capital improvement program and share in the cost of projects.

Goal Area F. Commission Operations and Programming

Goal F.1. Identify and operate within a sustainable funding level that is reasonable to member cities.

Goal F.2. Foster implementation of priority TMDL and other implementation projects by sharing in their cost and proactively seeking grant funds.

Goal F.3. Operate a public education and outreach program to supplement the NPDES Phase II education requirements for the member cities.

Goal F.4. Operate a monitoring program sufficient to characterize water quantity, water quality, and biotic integrity in the watersheds and to evaluate progress toward meeting goals.

Goal F.5. Maintain rules and standards for development and redevelopment that are consistent with local and regional TMDLs, federal guidelines, source water and wellhead protection requirements, nondegradation, and ecosystem management goals.

Goal F.6. Serve as a technical resource for member cities.

Operations and Programming Actions:

a. Annually review and adopt the budget and Capital Improvement Program.
b. Prepare and implement an annual monitoring plan and summarize the results in an annual report.
c. According to the schedules set forth in the WRAPS study, periodically evaluate progress toward meeting those water quality goals, and adjust the Implementation Plan as necessary to achieve progress.
d. Every five years or as necessary review the development rules and standards for adequacy and make revisions as necessary.

4.4 THIRD GENERATION IMPLEMENTATION PLAN AND CAPITAL IMPROVEMENT PROGRAM

To achieve the goals set forth above the Commission will operate a regulatory program, implement monitoring and education and outreach programs, and undertake capital improvement projects. The following sections summarize these programs, which are described in more detail in attached appendices. Following the descriptions,

Table 4.7 describes how the programs and projects in this Implementation Program address the Problems and Issues identified in the Gaps Analysis and subsequent public review and input and Table 4.4 details the Implementation Program and its estimated cost.

4.4.1 Rules and Standards and Project Reviews

In preparing this Third Generation Watershed Management Plan, the Commission developed modifications to its standards for new development and redevelopment, codifying them in a Rules and Standards document. The Commission chose to adopt those new standards in advance of this Plan, effective January 1, 2015. The modifications bring those standards closer to consistency with those of other jurisdictions and with state and other requirements, and provide additional nutrient and sediment load and runoff volume reductions as identified in the various TMDLs. The revised Rules and Standards are set forth in Appendix C.

Project Review Size Thresholds. The mandatory size threshold for application of water quality and water quantity standards had been either 5 or 8 acres for single-family detached projects, depending on density, and 1 acre for all other development types. Projects proposing impacts to wetlands or floodplains were also required to meet certain standards and be reviewed by the Commission. All single family residential projects that disturb more than one acre and all other non-single family residential land-disturbing projects regardless of size were required to submit erosion control plans for review.

The water quality and quantity review threshold for many other WMOs is one acre regardless of land use, with some even smaller, based on the amount of disturbed surface. During this planning process it was determined that the current review thresholds miss many smaller projects that could incorporate BMPs to provide pollutant load and volume reductions. The threshold of project size for application of Commission water quality and quantity rules and standards was lowered in the revised standards. That review threshold is now one acre, regardless of density of land use.

Member cities may now elect to take on project review responsibilities for all projects less than five acres by demonstrating that they have in place the necessary local ordinances, policies, practices, and expertise and executing a Memorandum of Understanding with the Commission. This MOU must provide for periodic performance reviews by the Commission, and a method to rescind this delegated authority should the member city be found out of compliance.

Infiltration. The standards adopted in the Second Generation Plan promoted but did not require infiltration of stormwater runoff. The new infiltration-from-net-new-impervious-surface requirement in the revised standards is 1.1 inches infiltrated within 48 hours. This is consistent with the MPCA's Minimal Impact Design Standards (MIDS) and the NPDES General and Construction Permits requirements of 1 inch, and with rules promulgated by other watershed management organizations. Where infiltration is not feasible, the revised rules require that runoff be filtered before discharge off the site. The rules include several credits toward meeting that infiltration volume requirement, including: disconnection of impervious surface; conservation of existing native vegetation; and the use of decompacted and amended soil as a BMP.

Rate Control. The standards adopted as a plan amendment to the Second Generation Plan required detention of a Channel Protection Volume to reduce the potential for erosive velocities in the streams in the watershed. Those standards were replaced in the revised standards with the new infiltration requirement.

Water Quality. The standards adopted in the Second Generation Plan required no net increase in pollutant loading from pre-development to post-development. As adopted in the revised standards, that requirement is now "the load reduction achieved by abstracting 1.1 inch from net new impervious or no net increase in TP or TSS, whichever is lower." From a practical standpoint, developers will need to calculate first, the loading from the pre-development condition, and second, the loading assuming the abstraction of 1.1 inch of impervious runoff from the post-development condition. The development must incorporate water quality BMPs to limit post-construction loading to the lesser of those two figures. Load reduction achieved by meeting the infiltration requirement can be applied toward meeting the water quality requirement.

Buffers. The Second Generation Plan required developers to provide a 50 foot buffer adjacent to Elm, Rush, North Fork Rush, and Diamond Creeks for any new or redevelopment, and encouraged property owners to provide a 20 foot buffer adjacent to wetlands, lakes, and streams. That requirement is revised in the new standards to require an average 50 foot, minimum 25 foot wide buffer adjacent to the aforementioned streams, and to require an average 25 foot, minimum 10 foot wide buffer adjacent to lakes, wetlands, PWI streams, and county ditches for any new development or redevelopment. This revised buffer requirement provides more flexibility in establishing the buffer while retaining the basic buffer functions.

4.4.2 2015-2024 Monitoring Program

The Third Generation Monitoring Program, which is set forth in more detail in Appendix D, has two organizing principles: continuation of routine flow and water quality monitoring Elm Creek and Sentinel Lakes, and rotating monitoring of other streams and lakes by the Commission and by volunteers.

The Third Generation Plan outlines a monitoring program for the next ten years. Each year the Commission will evaluate the proposed program and make modifications as necessary based on the most current data needs. The monitoring objectives guiding the Elm Creek monitoring program and the assessment of data are shown below.

MONITORING PROGRAM GOALS

1. To quantify the current status of streams and lakes throughout the watershed in comparison to state water quality standards.
2. To quantify changes over time, or trends, in stream and lake water quality in the watersheds.
3. To enhance the value of previous monitoring data by extending the period of record.
4. To track and quantify the effectiveness of implemented BMPs throughout the watersheds for the protection of water quality.
5. To evaluate progress toward meeting TMDL load reduction and other goals.

In general the components of the monitoring program include the following:

- Continuing routine flow and water quality monitoring on Elm Creek in partnership with the USGS.
- Periodic flow and water quality monitoring at additional upstream sites on Elm Creek (ECW and EC77); Rush Creek (RCSL); North Fork Rush Creek (RC116); and Diamond Creek (DCZ) on a rotating basis.
- Continuing the partnership with Hennepin County Environmental Services to obtain macroinvertebrate collections by volunteers each year through RiverWatch and the Stream Health Evaluation Program.
- Periodic macroinvertebrate collections on biotically-impaired streams to assess progress toward meeting those TMDLs, and periodic longitudinal dissolved oxygen surveys on those streams with a dissolved oxygen impairment. Annual monitoring of four "Sentinel Lakes:" Fish Lake, Rice Lake, Diamond Lake, and Weaver Lake. In the past this monitoring has been completed by the Three Rivers Park District under contract to the Commission.
- Continuation of the partnership with the Metropolitan Council to conduct lake surface water quality monitoring of other lakes by volunteers every two to three years through the Citizen Assisted Monitoring Program (CAMP).
- Each year Three Rivers Park District prepares a report on current water quality and trends, and reports water quality monitoring data to the state's EQuIS database.

The schedule and monitoring program set forth in Appendix D is intended to collect data sufficient to evaluate progress toward meeting TMDL goals, and is consistent with the recommendations in the draft Elm Creek Watershed TMDL.

4.4.3 2015-2024 Education and Outreach Program

Education and Public Outreach is a core function of the Elm Creek Watershed Management Organization. The Commission has conducted some education and outreach activities and has also collaborated with other organizations in Hennepin County as part of the West Metro Water Alliance (WMWA) and participated in Metro-wide education and outreach initiatives such as Blue Thumb, Watershed Partners and Northland NEMO.

This Third Generation Education and Public Outreach Program expands the Commission's education and outreach activities. The program is set forth in more detail in Appendix E. The following sections set forth the program goals and strategies.

WATERSHED EDUCATION AND PUBLIC OUTREACH PROGRAM GOALS

The goal of the Elm Creek Watershed Management Commission's Education and Outreach Program is to educate and engage everyone in the watershed by increasing awareness of water resources, and creating and supporting advocates willing to protect and preserve the resources in the watershed.

Implementation Strategies. Each year the Commission will evaluate the proposed Education and Outreach program and establish education and outreach activities for the coming year. The WRAPS study may identify additional goals and strategies to be pursued in the coming years. The

Commission will rely on the following and other strategies to implement the program and achieve the Plan's education and outreach goals:

- Participate with collaborative groups such as WMWA and Blue Thumb to pool resources to undertake activities in a cost-effective manner, promote interagency cooperation and collaboration, and promote consistency of messages.
- Use the Commission's, member cities', and educational partners' websites and newsletters, social media, co-ops, local newspapers and cable TV to share useful information to stakeholders on ways to improve water quality.
- Prominently display the Commission's logo on information and outreach items, project and interpretive signs, and other locations to increase visibility.
- Provide opportunities for the public to learn about and participate in water quality activities.
- Provide education opportunities for elected and appointed officials and other decision makers.
- Enhance education opportunities for youth.

2015-2017 Priority Areas for Education and Outreach. The following are the priority areas by stakeholder group for the first few years of the Third Generation Plan:

1. All stakeholders: use multiple strategies to deliver simple messages: "where does our water go" and "why do we manage water quality."
2. Homeowners: Disseminate education materials to all stakeholders about actions they can take to protect and improve water quality. Targeted messages:
    a. Redirect your runoff onto pervious areas.
    b. Clean up after your pets.
    c. Keep organic matter (leaves, grass clippings, seeds, etc.) out of streets, ditches, lakefronts, and storm sewers.
    d. Reduce chemical and salt use.
3. Lakeshore property owners: sponsor workshops on basics of limnology, learning about AIS, and how to undertake lakescaping.
4. Elected officials and city staff: Sponsor watershed and water resources training opportunities such as NEMO (Nonpoint Education for Municipal Officials) for the city councils and planning commissions in the member cities. Develop a mechanism to share information about BMPs between the cities and with developers.
5. Students: expand the Watershed PREP program to all elementary schools in the watershed, and begin developing a companion program for older students.
6. Agricultural producers and hobbyists: identify and work with influential persons to spread the water quality and BMP message. Undertake a demonstration project with a co-op.

4.4.4 TMDL/WRAPS Implementation

The TMDL report and WRAPS study identified very significant TP, TSS, and *E. coli* annual load reductions from watershed runoff that are summarized in Section 4.1.2 above. Implementation in the coming years will rely on three key strategies: regulation, targeted load reductions, and agricultural outreach.

Regulation. A key TMDL/WRAPS implementation strategy to reduce nutrient and sediment loading to the lakes and streams in the watershed is to maximize load and volume reductions at the time of land use change. City Comprehensive Plans indicate that about 40 percent of the area of the Elm Creek hydrologic watershed is expected to change land use by 2030. In the Crow River hydrologic watershed, 60 percent of the Cowley Lake drainage area and 79 percent of the Sylvan Lake drainage area is expected to be converted.

An assessment of the impact of potential rule changes such as an infiltration requirement was completed as part of the development of this Plan (Wenck 2013). This assessment started with estimating the change in runoff volume and nutrient loads when agricultural or undeveloped lands are converted to various types of developed uses. The change in volume and loading was then estimated assuming 1.1 inches of infiltration based on the MPCA's Minimal Impact Design Standards (MIDS). This analysis found that when hayland, cropland, pasture, and grassland land covers are converted to various types of developed land uses, infiltrating or filtering the first 1.1" of runoff on average results in a net *reduction* of unit area TP load. Only when converting woodland would the area loading rate be expected to increase (Wenck 2013).

Implementing more rigorous development and redevelopment standards, including an infiltration requirement, should over time reduce watershed loads, improving water quality in impaired waters and preventing degradation in waters that currently meet water quality standards. Recognizing the value of this regulatory tool, the Commission elected to adopt these more stringent standards in advance of the Plan and the TMDL/WRAPS, effective January 1, 2015.

Targeted Load Reductions. The Commission will partner with member cities and to undertake subwatershed assessments to identify potential retrofit BMPs. The watershed modeling completed for the TMDL/WRAPS identified subwatersheds where nutrient and sediment loading potentially occurs at higher rates than average. Detailed, subwatershed assessments and modeling will systematically focus load reduction efforts to areas where even small actions such as retrofitting existing ponds with iron-enhanced filter benches, mitigating stream erosion, enhancing stream buffers, improving individual site manure management, or adding new bioinfiltration basins are most cost-effective.

Figure 4.1 shows the estimated TP loading rate (left figure) and annual load (right figure) as modeled for the Elm Creek TMDL/WRAPS. The subwatersheds in darker blues and reds, which are generally the headwaters of Rush Creek and North Fork Rush Creek have the potential to contribute higher amounts of TP to those impaired waters, and monitoring data confirms that exceedances of the state water quality standards are most severe in the upper watershed. The Commission will prioritize those areas for subwatershed assessment in the first five years of Plan implementation.

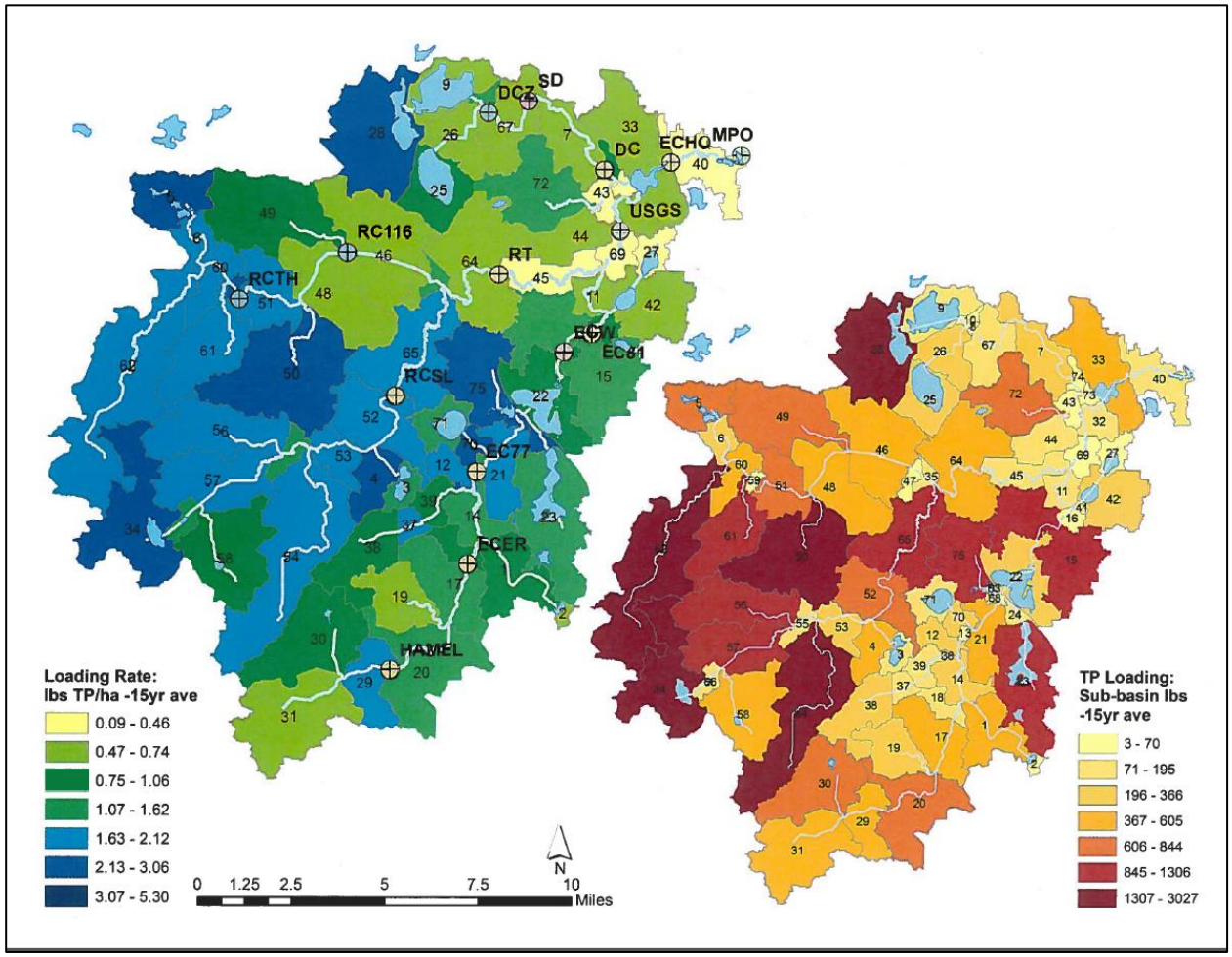

Figure 4.1. Modeled TP loading by subwatershed.
Source: Elm Creek TMDL.

Agricultural Outreach. There are significant agricultural operations in the watershed, ranging from row crop production to horse hobby farms. The TMDL/WRAPS identified sources of agricultural loading, not only nutrients and sediment but also sources of bacteria. The Commission will periodically convene an agricultural TAC comprised of federal, state, and local specialists from U of M Extension, Minnesota Department of Agriculture, BWSR, Hennepin County, and other interested parties to craft partnerships in specialized education and other programs and BMPs such as targeted fertilizer application, erosion and sediment control, and manure management. This TAC will also advise the Commission as it completes subwatershed assessments in the agricultural parts of the watershed. The TAC will help identify appropriate implementation actions, and focus their technical expertise and resources on high-loading locations in subwatersheds of focus.

The TMDL identifies eight general strategies for the achievement of the TMDL load reduction goals. Table 4.3 shows how those strategies have been incorporated into this Plan.

Table 4.3. Actions in this Plan addressing Elm Creek Watershed TMDL implementation strategies.

Strategy	Actions in 3rd Generation Plan
Maintain stringent stormwater mitigation standards to maximize load reductions during development and redevelopment.	More stringent standards, including a new infiltration requirement, were adopted effective January 1, 2015, and are included in Appendix C.

Strategy	Actions in 3rd Generation Plan
Adopt new standards governing siting and management of new non-production livestock operations.	This Plan requires member cities to develop and enforce such an ordinance, using the City of Medina's ordinance as a guide.
Increase outreach to existing agricultural operations to identify and implement projects and target existing and new agricultural management resources.	The general operating budget includes funding to enhance education and outreach programs. The Commission will prioritize areas of the watershed and will partner with other agencies and organizations to target outreach.
Prioritize areas for the completion of subwatershed assessments to systematically identify and prioritize loading and volume management BMPs and other management practices.	The general operating budget includes funding to cost-share completion of subwatershed assessments. The Commission will use the monitoring and modeling completed for the TMDL to prioritize areas for assessments, and will convene a TAC of agency representatives specializing in ag BMPs and other interested parties to focus outreach and resources in agricultural areas.
Incorporate BMPs into road and highway projects, and other public projects as opportunities arise.	The Plan requires member cities to demonstrate how they will meet the load reductions in the TMDL, including identifying known upcoming projects such as street or highway reconstruction projects that will provide opportunities to include load and volume reduction BMPs.
Identify areas where increased infiltration would most beneficially enhance stream baseflow, and implement projects.	The Commission will use the monitoring and modeling completed for the TMDL and partner with the DNR, USGS, and other agencies to identify priority infiltration areas.
Incorporate habitat enhancements into stream stabilization and other projects.	The Commission will provide review and guidance to member cities to incorporate habitat enhancements on all projects impacting the streams in the watershed, and other projects that will protect and improve biotic integrity in the watershed's natural resources.

4.4.5 Capital Improvement Projects

The Commission's Joint Powers Agreement authorizes the Commission to undertake capital improvement projects. Those projects may be funded entirely by a member city, by the benefitting cities with the shares determined as set forth in the JPA or as agreed to by those cities, or by certifying for payment by the county all or any part of the cost of the capital improvement as set forth in Minn. Stat. 103B.251.

Capital projects that have been identified for inclusion in the Commission's Capital Improvement Program will be funded in accordance with the Commission's most current Capital Improvement Program Cost Share Policy. The Commission will actively pursue grant funding to supplement member city and cost-share funds for high priority projects.

This CIP will be amended from time to time as necessary to incorporate new projects, provide more detail for the "Other Projects" placeholder projects, and to provide specificity for the period 2020-2024.

Table 4.4. Elm Creek Third Generation Plan Implementation Plan estimated cost.

	2014 Approved	2015 Approved	2016	2017	2018	2019	2020	2021	2022	2023	2024
GENERAL OPERATING BUDGET											
Expenses											
Administrative	90,000	89,000	90,780	92,600	94,450	96,340	98,270	100,240	102,240	104,280	106,370
Watershed-wide TMDL Admin	8,000										
Grant Writing		5,000	5,100	5,200	5,300	5,410	5,520	5,630	5,740	5,850	5,970
Website	4,000	5,000	5,100	5,200	5,300	5,410	5,520	5,630	5,740	5,850	5,970
Legal Services	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Audit	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Insurance	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Miscellaneous	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Subtotal	***113,500***	***110,500***	***112,480***	***114,500***	***116,550***	***118,660***	***120,810***	***123,000***	***125,220***	***127,480***	***129,810***
Project Reviews											
Technical HCEED	72,000	77,500	79,050	80,630	82,240	83,880	85,560	87,270	89,020	90,800	92,620
Technical Support Consultant	3,000	3,000	3,060	3,120	3,180	3,240	3,300	3,370	3,440	3,510	3,580
Admin Support	8,000	8,000	8,160	8,320	8,490	8,660	8,830	9,010	9,190	9,370	9,560
Subtotal	***83,000***	***88,500***	***90,270***	***92,070***	***93,910***	***95,780***	***97,690***	***99,650***	***101,650***	***103,680***	***105,760***
Wetland Conservation Act											
WCA Expense HCEED	8,000	12,500	12,750	13,010	13,270	13,540	13,810	14,090	14,370	14,660	14,950
WCA Expense Legal	500	500	500	500	500	500	500	500	500	500	500
WCA Expense Admin	3,000	2,000	3,100	3,100	3,100	3,250	3,250	3,250	3,250	3,250	3,250
Subtotal	***11,500***	***15,000***	***16,350***	***16,610***	***16,870***	***17,290***	***17,560***	***17,840***	***18,120***	***18,410***	***18,700***
Monitoring											
Stream Monitoring											
Stream Monitoring USGS	21,000	21,700	22,000	22,000	22,000	22,000	22,000	22,500	22,500	22,500	22,500
Stream Monitoring TRPD		7,000	7,140	7,280	7,430	7,580	7,730	7,880	8,040	8,200	8,360
Macroinvertebrate: River Watch	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Gauging Station Elec Bill	190	190	190	190	190	190	190	190	190	190	190
Rain Gauge Network	100	100	100	100	100	100	100	100	100	100	100
Lake Monitoring											
Lake Monitoring CAMP	1,750	1,650	1,650	1,100	1,650	1,100	1,650	1,100	1,100	1,650	1,650
Lake Monitoring TRPD	3,600	4,240	4,410	4,120	4,590	4,680	4,370	4,870	4,970	5,070	5,930
Wetland Monitoring WHEP	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Stream Health SHEP	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Subtotal	***42,640***	***50,880***	***51,490***	***50,790***	***51,960***	***51,650***	***52,040***	***52,640***	***52,900***	***53,710***	***54,730***
Education											
Education City/Citizen Programs	5,000	5,500	6,000	6,500	6,500	7,000	7,000	8,000	8,000	8,000	8,000
WMWA General Admin	3,750	4,000	4,080	4,160	4,240	4,320	4,410	4,500	4,590	4,680	4,770
WMWA Implementation Activities	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Rain Garden Workshops	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000

	2014 Approved	2015 Approved	2016	2017	2018	2019	2020	2021	2022	2023	2024
Education Grants	3,000	3,0 00	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Ag Specialist	5,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Subtotal	***25,750***	***23,500***	***24,080***	***24,660***	***24,740***	***25,320***	***25,410***	***26,500***	***26,590***	***26,680***	***26,770***
Special Projects											
Special Projects General	0	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
BMP Implementation Program	0	0	0	0	0	0	0	0	0	0	0
South Metro Miss TMDL	0	0	0	0	0	0	0	0	0	0	0
Upper Miss Bacteria TMDL	0	2,000	0	0	0	0	0	0	0	0	0
CIPs/Studies/Project Identification	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Subtotal	***13,500***	***37,000***	***35,000***	***35,000***	***35,000***	***35,000***	***35,000***	***35,000***	***35,000***	***35,000***	***35,000***
Contingency	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Subtotal	***3,000***	***3,000***	***3,000***	***3,000***	***3,000***	***3,000***	***3,000***	***3,000***	***3,000***	***3,000***	***3,000***
Total Operating Expense	***$289,390***	***$328,380***	***$332,670***	***$336,630***	***$342,030***	***$346,700***	***$351,510***	***$357,630***	***$362,480***	***$367,960***	***$373,770***
Project Review Fees	52,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Water Monitoring TRPD Coop Agreement	5,500	5,500	5,610	5,720	5,830	5,950	6,070	6,190	6,310	6,440	6,570
WCA Fees	1,500	4,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Membership Dues	203,000	209,000	215,360	221,820	228,470	235,320	242,380	249,650	257,140	264,850	272,800
Interest Income	100	100	100	100	100	100	100	100	100	100	100
From (To) Cash Reserves	27,290	29,190	30,100	27,490	26,130	23,830	21,460	20,190	17,430	15,070	12,800
Total Operating Revenue	***$289,390***	***$328,380***	***$332,670***	***$336,630***	***$342,030***	***$346,700***	***$351,510***	***$357,630***	***$362,480***	***$367,960***	***$373,770***

	2014 Approved	2015 Approved	2016	2017	2018	2019	2020	2021	2022	2023	2024
Membership Dues	$209,000	$215,360	$221,820	$228,470	$235,320	$242,380	$249,650	$257,140	$264,850	$272,800	$209,000
Per Capita	$2.23	$2.30	$2.37	$2.44	$2.51	$2.59	$2.66	$2.74	$2.83	$2.91	$2.23
Per $100,000 market value	$2.30	$2.37	$2.44	$2.52	$2.59	$2.67	$2.75	$2.83	$2.92	$3.01	$2.30
% Increase	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Dollar Increase	$6,000	$6,360	$6,460	$6,650	$6,850	$7,060	$7,270	$7,490	$7,710	$7,950	$6,000
Increase per Capita	$0.06	$0.07	$0.07	$0.07	$0.07	$0.08	$0.08	$0.08	$0.08	$0.08	$0.06
Increase per $100,000 Market Value	$0.07	$0.07	$0.07	$0.07	$0.08	$0.08	$0.08	$0.08	$0.08	$0.09	$0.07
Contribution from Reserves		29,190	30,100	27,490	26,130	23,830	21,460	20,190	17,430	15,070	12,800
Reserves End of Year Cash Balance (est)	$282,685	$253,495	$223,395	$195,905	$169,775	$145,945	$124,485	$104,295	$86,865	$71,795	$58,995

2010 Estimated Population: 93,700
2013 Estimated Market Value: $9,072,723,913

Table 4.5. Elm Creek Third Generation Plan Capital Improvement Program.
See Appendix G for project descriptions.

Description	Location	Priority	Estimated Project Cost	Partners	Funding Source(s)	Estimated Commission Cost					
						2015	2016	2017	2018	2019	2020-2024
Special Studies											
TMDL implementation special study	Watershed	H	50,000	Cities, HCEED	Operating budget	0	25,000	25,0000	25,000	25,000	125,000
Stream segment prioritization	Watershed	H	10,000	Cities, HCEED, TRPD	Operating budget	10,000	0	0	0	10,000	0
High Priority Stream Restoration Projects				Cities, TRPD	Cities, TRPD, county levy, grants						
Elm Cr Reach E	Plymouth	H	1,086,000			250,000	0	0	0	0	0
Fox Cr, Creekview	Rogers	H	150,000			0	37,500	0	0	0	0
Mississippi Point Park Riverbank Repair	Champlin	M	300,000			0	75,000	0	0	0	0
Elm Creek Dam	Champlin	H	7,001,220			0	187,500	0	0	0	0
Tree Thinning and Bank Stabilization Project	Watershed	H	50,000			0	50,000	0	50,000	50,000	250,000
Fox Cr, Hyacinth	Rogers	M	360,000			0	0	90,000	0	0	0
Fox Cr, South Pointe, Rogers	Rogers	M	90,000			0	0	22,500	0	0	0
Other High Priority Stream Project	Watershed	H	500,000			0	0	0	125,000	125,000	250,000
High Priority Wetland Improvements				Cities	Cities, commission						
DNR #27-0437	Maple Grove	L	75,000			0	0	0	0	0	18,750
Stone's Throw Wetland	Corcoran	M	450,000			0	0	112,500	0	0	0
Other High Priority Wetland Projects	Watershed	L	100,000			0	0	0	0	0	25,000
Lake TMDL Implementation Projects				Cities, lake assns.	Cities, Commission, grants, owners						
Mill Pond Fishery and Habitat Restoration	Champlin	H	5,000,000			0	0	250,000	0	0	0
Other Priority Lake Internal Load Projects	Watershed	M	100,000			0	0	0	0	0	25,000
Urban BMPs				Cities, HCEED	Cities, commission						
Stonebridge	Maple Gr	M	200,000			0	50,000	0	0	0	0
Rain Garden at Independence Avenue	Champlin	L	300,000			0	75,000	0	0	0	0
Mill Pond Rain Gardens	Champlin	M	400,000			0	0	100,000	0	0	0
Other Priority Urban BMP Projects	Watershed	L	200,000			0	0	0	0	0	50,000
Other											
Livestock Exclusion, Buffer & Stabilized Access	Watershed	M	50,000	Cities, owners, Extension, NRCS	Cities, owners, commission, NRCS	0	0	0	50,000	0	50,000
Agricultural BMPs Cost Share	Watershed	H	50,000	Cities, owners, Extension, NRCS	Cities, owners, commission, NRCS	0	50,000	50,000	0	50,000	100,000
Hydrologic & Hydraulic Modeling	Watershed	L	25,000	HCEED	Commission	0	0	0	25,000	0	0
Fourth Generation Plan	Watershed	H	70,000		Commission	0	0	0	0	0	$70,000
TOTAL			**$16,617,220**			**$260,000**	**$550,000**	**$875,000**	**$275,000**	**$260,000**	**$963,750**

Note: Plan amendment(s) will be required to provide more detail for the 2020-2024 period, and for the projects titled "Other Projects."

4.4.6 Commission Self-Assessment

A periodic robust and frank self-assessment is necessary to ensure that organizations stay on track to achieve goals. During this Third Generation Plan, the Commission will annually review progress towards goals. This self-assessment will use a matrix such as Table 4.6 below to systematically review and evaluate progress towards goals. This matrix will also be used to set each year's work plan as well as provide a "heads up" to member cities about future years' needs. This self-assessment will become part of the Commission's Annual Report.

Table 4.6. Conceptual self-assessment matrix.

Goal	Actions Taken this Past Year	Actions Taken to Date	Additional Actions to Achieve Goal	Schedule, Responsible Party(ies), Cost and Funding
Goal 1	*To be completed annually*	*To be completed annually*	*To be completed annually*	*To be completed annually*
Goal 2	*To be completed annually*	*To be completed annually*	*To be completed annually*	*To be completed annually*
…	…	…	…	…

4.4.7 Addressing Identified Problems and Issues

As noted above, this planning process revealed a number of problems and issues to be considered in this Third Generation Watershed Management Plan. Table 4.7 below repeats the problems and issues set forth in Table 4.1, and describes how each were addressed in this Implementation Plan.

Table 4.7. Actions in this Plan addressing the identified problems and issues.

#	Problem or Issue	Actions in 3rd Generation Plan
Water Quality		
1.1	Numerous impairments on the primary streams and several lakes.	Expanded monitoring program to track the impacts of BMPs. Continued the capital projects cost-share policy. Added a line item in the cost estimate to fund the development of grant applications.
1.2	Land is transitioning from lightly-developed and agriculture to more densely developed land uses at higher imperviousness.	Revised the development rules and standards to increase required load reductions and added an abstraction/infiltration requirement.
1.3	Erosion and sedimentation issues continue on Elm Creek and the other streams and conveyances in the watershed.	The CIP includes high-priority stream restoration projects. Revised the development rules and standards to increase required load reductions and added an abstraction/infiltration requirement.

Table 4.7 Actions in this Plan addressing the identified problems and issues (continued)

#	Problem or Issue	Actions in 3rd Generation Plan
Agricultural Impacts on Water Quality		
2.1	Need to increase the number and distribution of agricultural BMPs in the watershed.	Modeling completed for the WRAPS identified high-loading areas where BMPs would be most cost effective. This may help assure producers what they are being asked to do will make a difference.
2.2	Need to develop an effective mechanism to achieve voluntary adoption of BMPs	The Commission has identified key stakeholder actions and messages and will work with other ag –interested agencies as a Technical Advisory Committee (TAC) to focus technical resources and financial incentives.
2.3	Need more effective outreach to agricultural operators and hobbyists.	See above.
Funding Needs		
3.1	Additional funding is necessary to take on the actions identified in the Channel Study and WRAPS implementation study.	Continued the capital projects cost-share policy. Added a line item in the cost estimate to fund the development of grant applications.
3. 2	Identify a sustainable funding level and sources that minimize impacts to city levies.	The cost estimate in this Plan assumes no more than a 3 percent annual increase in member assessments.
Other Issues		
4.1	Need to expand activities for education and outreach to increase knowledge about water resources issues and create behavioral change.	The Education and Outreach Plan identifies key message for stakeholder groups. The commission will continue to partner with collaborative groups such as WMWA to increase the scope and delivery of educational messages.
4.2	The Commission should be realistic about its Capital Improvement Program.	The Commissioners have prioritized capital projects to include on the CIP only those that could be feasibly completed in 2015-2024.
4.3	All the member cities need to be involved in watershed management.	Following adoption of the Plan, the Commission will consider requesting the TAC to meet semi-regularly to enhance information sharing and collaboration.
4.4	There are too many agencies involved in water management, and nothing gets done.	See above.

4.5 IMPACT ON LOCAL GOVERNMENTS

Following approval and adoption of the Elm Creek Third Generation Watershed Management Plan pursuant to Minnesota Statutes 103B, governmental units having land use planning and regulatory responsibility are required by statute to prepare or amend their local water management plans. Local plan content is driven primarily by Minnesota Rules 8410 and must include a capital improvement program and implementation plan to bring the local water management plan into conformance with the Commission's Plan. The local water management plans must be submitted to the Commission and the Metropolitan Council within two years after approval of the Watershed Management Plan by the Board of Water and Soil Resources (BWSR).

4.5.1 Local Plan Content

Local water management plans adopted by member cities pursuant to Minnesota Statutes, Section 103B.235 shall be consistent with the Third Generation Watershed Management Plan. Local plans must comply with Minnesota Statutes, Section 103B.235 and Minnesota Rules 8410 regarding local plan content. The Commission strongly encourages communities to develop the scope of their local plan with assistance from the Commission. At a minimum, local water management plans are required to do the following:

- 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 sections of this Plan's Inventory and Condition Assessment by reference unless the city has more recent information, such as revised figures and data.
- Explain how the goals and policies, and rules and standards in this Plan will be implemented at the local level, including any necessary modifications of local ordinances, policies, and practices and specifically addressing adoption and enforcement of a manure management ordinance.
- 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 and the WRAPS study, including identifying known upcoming projects including street or highway reconstruction projects that will provide opportunities to include load and volume reduction BMPs.
- Show how the member city will, through an executed and recorded maintenance and inspection agreement, inspect or cause to be inspected and documented at least every five years privately owned permanent BMPs installed to meet the goals and policies, rules and standards of this Plan, and the actions the member city will take to assure that the BMPs are maintained and operated as designed.
- 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 through 6.
- Summarize the estimated cost of implementation and analyze the member city's ability to finance the recommended actions.
- 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.

4.5.2 Local Plan Review

Each member city shall submit its proposed local water management plan to the Commission and the Metropolitan Council for review before adoption by its governing body. The Metropolitan Council review period is 45 days and the Commission review period is 60 days after plan receipt.

The Commission recognizes that the member cities differ in land use, level of development, and capacity. As such, the level of detail required in local plans will also vary. In addition, member cities have land in multiple watersheds, and those WMOs are on differing management plan update schedules. The Commission will consider approval of phased planning efforts provided the Commission is notified of the phased approach prior to the start of planning activity.

4.5.3 Project Review Authority Delegation

Member cities may request that the Elm Creek Commission delegate its authority to conduct certain project reviews to the member city by a Memorandum of Understanding (MOU). To be so considered, the member city must have enacted local ordinances, policies, and practices at least as stringent as the Commission's; must have the resources and technical capacity to undertake these reviews; and must annually report to the Commission the numbers and types of reviews completed. The Commission will periodically audit the member city's project reviews, and will reserve the right to rescind its delegated authority if the city is not consistently operating under the terms of the MOU. Development and redevelopment projects that impact wetlands, floodplains, or watercourses must continue to be reviewed by the Commission.

4.5.4 Financial Impact

For the purpose of estimating future operating costs, this Plan limits the annual increase in member city assessments to 3 percent, with the difference between the proposed budget in a given year and the estimated revenue taken from the Commission's fund balance. Table 4.4 above shows the estimated member dues and the cost of Commission operations per capita and per $100,000 of market value. This table does not include the cost of capital improvement projects.

The JPA contains a provision allowing member cities to request Commission review of proposed budget increases prior to accepting an annual budget. The largest municipal cost is likely to be the result of local water planning efforts mandated by the State of Minnesota through the NPDES MS4 permit, and updating local plans. Costs to revise the in-place local plan will range from minimal to $40,000 depending on the level of activity anticipated by the community.

4.6 PLAN REVIEW, UPDATE AND REVISION

This Watershed Management Plan provides direction for the Elm Creek Watershed Management Commission activities through the year 2025. The Commission may initiate amendments to the Plan at any time. The Commission intends that the Plan provide a flexible framework for managing the watershed.

The Commission will annually review the Implementation Plan and Capital Improvements Program (CIP), and revisions to the IP and CIP may require future minor or major plan amendments. The CIP details projects for the first five years and provides a summary of potential 2020-2024 projects. Future plan amendments may be necessary to amend the CIP or the Implementation Plan based on new project opportunities, TMDL or regulatory requirements, policies, or standard practices.

4.6.1 Amendment Procedures

All amendments to the Plan except minor amendments shall adhere to the full review and process set forth in Minnesota Statutes 103B.231, and this section. The Commission shall adopt proposed major plan amendments upon their approval by the Board of Water and Soil Resources (BWSR) in accordance with Minnesota Statutes 103B.231.

The amendment procedure for minor plan amendments shall be in accordance with Minnesota Rules 8410.0140 as such rules now exist or as subsequently amended.

Neither a minor nor a major plan amendment will be required for the following situations:

1. If projects included in the approved CIP are implemented in a different year than shown.
2. When a capital project is included in the approved Capital Improvement Program and the Commission's share of an updated cost estimate does not exceed 125 percent of the Commission's share shown on the CIP, as adjusted by the Construction Cost Index as published by the Engineering News Record.
3. When a capital project is included in the approved CIP and the Commission's share of an updated cost estimate is less than the Commission's share shown on the CIP, as adjusted by the Construction Cost Index as published by the Engineering News Record. However, the Commission will review such projects to evaluate the extent to which the original project objectives are being met.

4.6.2 Form of the Amendment

Unless the entire document is reprinted, all amendments adopted by the Commission must be in the form of replacement pages for the Plan, each page of which must conform to the following:

1. On draft amendments being considered, show deleted text as stricken and new text underlined.
2. Be renumbered as appropriate.
3. Include the effective date of the amendment.

5.0 References

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Appendix A
Joint Powers Agreement

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AMENDED AND RESTATED
JOINT POWERS AGREEMENT ESTABLISHING
THE ELM CREEK. WATERSHED MANAGEMENT COMMISSION

RECITALS

WHEREAS, on May 12, 1993, pursuant to statutory authority, the Cities of Champlin, Corcoran, Dayton, Greenfield, Maple Grove, Medina, Plymouth and Rogers, the Town of Hassan, and the Hennepin Conservation District adopted a "Joint Powers Agreement for the Establishment of the Elm Creek Watershed Management Commission to Plan, Protect and Manage the Elm Creek Watershed and Adjacent Minor Watersheds" (the "Joint Powers Agreement"); and

WHEREAS, in 2001 the City of Greenfield withdrew from the Agreement; and

WHEREAS, the Cities of Champlin, Corcoran, Dayton, Maple Grove, Medina, Plymouth and Rogers, and the Town of Hassan, wish to amend and restate the Agreement's terms in this document.

NOW, THEREFORE, pursuant to the authority conferred upon the parties by Minn. Stat §§ 471.59 and 103B.201, et seq., the parties to this Agreement do mutually agree as follows:

SECTION ONE
DEFINITIONS

For purposes of this Agreement, each of the following terms, when used herein with an initial capital letter, will have the meaning ascribed to it as follows:

"Agreement" means the Joint Powers Agreement, as amended and restated in this document.

"Board" means the Board of Commissioners of the Commission.

"BWSR" means the Minnesota Board of Water and Soil Resources.

"Commissioner" means an individual appointed by a governmental unit to serve on the Board. The term Commissioner shall include both the representative and alternate representative appointed to serve on the Board.

"Elm Creek Watershed" or "Watershed" means the area within the mapped area delineated on the map filed with BWSR, as may be amended. A complete legal description defining the boundary of the Elm Creek Watershed is attached hereto and made apart hereof.

"Governmental Unit" means any signatory city or township.

"Member" means a governmental unit that enters into this Agreement.

"Watershed Management Organization ("WMO") means the organization created by this Agreement, the full name of which is "Elm Creek Watershed Management Commission." The Commission shall be a public agency of its respective governmental units.

SECTION TWO
ESTABLISHMENT

The parties create and establish the Elm Creek Watershed Management Commission. The Commission membership shall include the Cities of Champlin, Corcoran, Dayton, Maple Grove, Medina, Plymouth and Rogers, and the Town of Hassan. In addition to other powers identified in this Agreement, the Commission shall have all of the authority for a joint powers watershed management organization identified in Minn. Stat. § I03B.211.

SECTION THREE
PURPOSE STATEMENT

The purpose of this Agreement is to establish an organization within the Elm Creek Watershed to (a) protect, preserve, and use natural surface and groundwater storage and retention systems, (b) minimize public capital expenditures needed to correct flooding and water quality problems, (c) identify and plan for means to effectively protect and improve surface and groundwater quality, (d) establish more uniform local policies and official controls for surface and groundwater management, (e) prevent erosion of soil into surface water systems, (f) promote groundwater recharge, (g) protect and enhance fish and wildlife habitat and water recreational facilities, and (h) secure the other benefits associated with the proper management of surface and ground water, as identified in Minn. Stat. § 103B.201, including but not limited to aesthetic values when owned by the public or constituting public resources, as defined in Minn. Stat. Ch. 116B.

The Commission's Members agree to (a) provide a forum for exchanging information in the management of land use and land use techniques and control, (b) provide a forum for resolution of intergovernmental disputes relating to management and protection of the Elm Creek Watershed; and (c) cooperate on a united basis on behalf of all units of government within the Elm Creek Watershed with all other levels of government for the purpose of facilitating natural resource protection and management in the Watershed.

SECTION FOUR
BOARD OF COMMISSIONERS

4.1. Appointment. The governing body of the Commission shall be its Board. Each Member shall be entitled to appoint one representative to serve on the Board and one alternate who may sit when the representative is not in attendance, and said representative or alternative representative shall be called a "Commissioner."

4.2. Term. Each Member shall determine the term length for its Commissioner's appointment to the Board. Each Member agrees that it will not remove from the Board its appointed Commissioner before the expiration of his/her term except for just cause. The Commission and its Members shall fill all Board vacancies pursuant to Minn, Stat. §

103B.227, subd. 1 and 2, as may be amended from time to time.

4.3.Compensation. Commissioners shall serve without compensation from the Commission, but this shall not prevent a Member from providing compensation to its Commissioner for serving on the Board.

4.4. Officers. By the first meeting in March of each year, the Commission shall elect from its membership a chairperson, a vice-chairperson, a treasurer and a secretary and such other officers as it deems necessary to reasonably carry out the purposes of this Agreement. Except for the position of chairperson, any Commissioner may be elected to more than one office. All officers shall hold office for terms of one year and until their successors have been elected by the Commission, An officer may be reelected to the same office for unlimited terms. A vacancy in an office shall be filled from the Board membership by election for the remainder of the unexpired term of such office. The officers' duties include the following:

A. Chairperson. The Chairperson shall preside at all Board meetings and shall have all the same privileges of discussion, making motions and voting, as do other Commissioners. The Chairperson may delegate certain responsibilities to the Executive Secretary as necessary to carry out the duties of the office.

B. Vice-Chairperson. The Vice-Chairperson shall, in the absence or disability of the Chairperson, perform the duties and exercise the powers of the Chairperson.

C. Treasurer. The Treasurer shall have the custody of the funds and securities of the Commission and shall keep full and accurate accounts of receipts and disbursements in books belonging to the Commission and shall deposit all monies and other valuable effects in the name and to the credit of the Commission in such depository as may be designated by the Commission. He/she shall disburse funds of the Commission as approved by the Commission and shall render to the Commission at regular meetings, or as the Board may request, an account of all his/her transactions as Treasurer and of the financial condition of the Commission. The Treasurer may delegate certain duties to the Executive Secretary as necessary to carry out the duties of the office.

D. Secretary. The Secretary shall attend all Board meetings, shall act as clerk of such meetings, and shall record all votes and the minutes of all proceedings. He/she shall give notice of all Board meetings. The Secretary may delegate certain duties to the Executive Secretary as necessary to carry out the duties of the office.

E. Executive Secretary. The Commission may appoint an Executive Secretary to coordinate activities of the Commission, accept delegated duties by the Commission officers, and accept business duties not assigned to officers. All notices to the Commission shall be delivered or served at the office of the Executive Secretary.

4.5, Quorum and Voting. A minimum of four (4) Commissioners with voting privileges shall constitute a quorum. Once a quorum is present, a majority vote is required for approval on an action, unless as provided otherwise in this Agreement.

4.6.Meetings. The Board shall schedule meetings at least quarterly (every three months) on a uniform day and place selected by the Commission. Written notice of the location and time of all Commission meetings shall

be sent to all Commission representatives and alternate representatives and to the Clerk of each Member. Special meetings may be held at the call of the Chairperson or by any three Commissioners by giving not less than 72 hours written notice of the time, place and purpose of such meeting.

SECTION FIVE
COMMISSION POWERS AND DUTIES

5.1. Watershed Management Plan. The Commission shall develop a watershed management plan including a capital improvement program in conformance with Minn. Stat. § 103B.231. The Commission shall adopt the plan within 120 days after BWSR's approval of the plan. After adoption, the Commission shall implement the watershed management plan and enforce the regulations set out in the plan. A copy of the adopted plan shall be filed with the clerk of each Member governmental unit,

5.2.Local Water Management Plans. The Commission shall review Members' local water management plans as required by Minn. Stat. § 103B.235, subd. 3.

5.3.Review Services.

A. Where the Commission is authorized or requested to review and make recommendations on any matter, the Commission shall act on such matter in compliance with Minn. Stat. § 15.99,

B. The Commission may charge a reasonable fee for such review services. The Commission's standard fee schedule, as amended from time to time, will be a part of the Commission's Rules.

C. The Commission may charge an additional fee when it determines that a particular project will require extraordinary and substantial review services. Before undertaking such review services, the Commission shall provide the party to be charged the additional fee with written notice of the services to be performed and the additional fee therefor, Unless said party objects within 5 business days of receipt of such written notice to the amount of the additional fee to be charged, such review services shall be performed and the party shall be responsible for the cost thereof. If said party objects to the proposed additional fee for such services within 5 business days and the party and the Commission are unable to agree on a reasonable alternative amount for review services, such extraordinary and substantial review services shall not be undertaken by the Commission.

D. Upon request of any Member, the Commission shall review and evaluate any dispute between the Member and other unit(s) of government regarding land use and natural resource protection and management.

E. Where the Commission makes recommendations on any matter to a Member, a Member not acting in accordance with such recommendation shall submit a written statement of its reasons for doing otherwise to the

Commission within ten days of its decision to act contrary to the Commission's recommendation. The Commission shall review the written statement and, if determined insufficient by the Commission, request written clarification within an additional ten days.

5.4 Public Participation.

A. Technical Advisory Committee. A Technical Advisory Committee ("TAC") to the Commission is hereby created, TAC members and one or more alternate members shall be appointed by the governing body of each Member. TAC members may be, but need not be, Commissioners. TAC members shall serve at the pleasure of the governing body of each Member which appoints them and are not required to meet statutory qualifications for Commissioners. TAC members may attend and participate in all meetings of the Commission. TAC members shall not have the authority to make motions or vote on matters before the Commission, but shall otherwise have the rights of a Commissioner to question, discuss, debate and comment on all matters before the Commission.

B. Citizen Advisory Committee. If a need is determined by the Commission, the Commission will establish a Citizen Advisory Committee to the Commission,

5.5. Rules. The Commission shall adopt rules for (a) conducting its business, including but not limited to additional duties of the Commission's officers, (b) the scope of responsibilities of the Technical Advisory Committee and the Citizen Advisory Committee, if one is established, and (c) preparing the annual work plan.

5.6. Contracts. The Commission may make such contracts, and enter into any such agreements, as it deems necessary to make effective any power granted to it by this Agreement. No Commissioner shall receive a direct financial benefit from any contract made by the Commission. Every contract for the purchase or sale of merchandise, materials or equipment by the Commission shall be let in accordance with the Uniform Municipal Contracting Law (Minn. Stat. § 471.345) and the Joint Exercise of Powers statute (Minn. Stat. § 471.59). In accordance with Minn. Stat. § 471.59, subd. 3, contracts let and purchases made under this Agreement shall conform to the statutory requirements applicable to the Member cities with a population over 2,500.

5.7. Employment. The Commission may contract for services, may use staff of other governmental agencies, may use staff of the Members and may employ such other persons as it deems necessary. Where staff services of a Member are utilized, such services shall not reduce the financial contribution of such Member to the Commission's operating fund unless utilization of staff service is substantial and the Commission so authorizes.

5.8. Public/Private Organizations. The Commission may cooperate or contract with the State of Minnesota or any subdivision thereof or federal agency or private or public organization to accomplish the purposes for which it

is organized.

5.9. Annual Financial, Activity and Audit Reports; Newsletter. The Commission shall submit to its Members and BWSR a financial report, an activity report and an audit report for the preceding fiscal year, in compliance with state law. The Commission shall publish and distribute an annual newsletter in compliance with state law, The Commission shall transmit to the clerk of each Member copies of the reports/newsletter in a format ready for publication. Each Member shall publish/distribute the reports/newsletter as it deems necessary. All of the Commission's books, reports and records shall be available for and open to examination by any Member at all reasonable times.

5.10. Gifts, Grant, Loans. The Commission may, within the scope of this Agreement, accept gifts, apply for and use grants or loans of money or other property from the United States, the State of Minnesota, a unit of government or other governmental unit or organization, or any person or entity for the purposes described herein; may enter into any reasonable agreement required in connection therewith; may comply with any laws or regulations applicable thereto; and may hold, use and dispose of such money or property in accordance with the terms of the gift, grant, loan or agreement relating thereto.

5.11. Boundary Chance in the Elm Creek Watershed.

A. Enlargement. Proceedings for the enlargement of the Elm Creek Watershed shall be initiated by a request from affected Member(s) to the Commission, or as mandated by law. Such request should include a map and legal description of the affected area. In reviewing such a request, the Commission should consider, among other things, (a) whether the affected area is contiguous to the existing Elm Creek Watershed, (b) whether the affected area can be feasibly administered by the Commission; and (c) the reasons why it would be conducive to the public health and welfare to add the area to the existing Elm Creek Watershed. Upon deliberation, if it appears to the Commission that the enlargement of the Watershed as requested would be for the public welfare and public interest and the purpose of resource management would be served, or that in fact the enlargement is mandated by law, the Commission shall by its findings and order enlarge the Elm Creek Watershed and file a copy of said findings and order with the appropriate governmental offices.

B. Transfer of Territory. Proceedings to transfer territory that is within the Elm Creek Watershed to the jurisdiction of another watershed management organization or a watershed district shall be initiated by a request from affected Member(s) to the Commission, or as mandated by law. Such request should include a map and legal description of the affected area. Upon deliberation, if it appears to the Commission that the transfer of territory as requested would be for the public welfare and public interest and the purpose of resource management would be

served, the Commission shall by its findings and order change the Elm Creek Watershed boundaries accordingly and file a copy of said findings and order with the appropriate governmental offices.

5.12. Subdistricts. The Commission may define and designate drainage subdistricts within the Watershed and shall have authority to separate the Watershed into such different subdistricts and to allocate capital improvement costs to a subdistrict area if that subdistrict is the only area that materially benefits from the capital improvement.

5.13. Monitor Water Quality, The Commission will continue to monitor waterbodies and streams, to evaluate the success of its program to control non-point sources of pollution, and use the results of the water quality monitoring program to determine the progress towards these goals.

5,14. Ratification. The Commission may, and where required by this Agreement shall, refer matters to the governing bodies of the Members for ratification. Within 60 days, the governing bodies of the Members shall take action upon any matter referred for ratification.

5.15.Statutory Powers. The Commission may exercise all other powers necessary and incidental to the implementation of the purposes and powers set forth herein and as outlined and authorized by Minn, Stat. §§ I03B.201, et seq.

SECTION SIX
FINANCIAL MATTERS

6.1. Depositories/Disbursements. The Commission may collect and receive money and services subject to the provisions of this Agreement from the parties and from any other sources approved by the Commission and it may incur expenses and make expenditures and disbursements necessary and incidental to the effectuation of the purposes of this Agreement. The Board shall designate a national, state, or private bank or banks as a depository of Commission funds. Funds may be expended by the Commission in accordance with procedures established herein. Orders, checks and drafts shall be signed by two officers,

6.2. General Administration. Each voting Member agrees to contribute each year to a general fund to be used for general administration purposes including, but not limited to, salaries, rent, supplies, development on an overall plan, insurance, bonds, and to purchase and maintain devices to measure hydrological and water quality data. The funds may also be used for normal maintenance of facilities and capital improvements. The annual contribution by each voting Member shall be based on its share of the taxable market value of all real property within the Watershed to the total area in the Watershed.

6.3.Budget Approval and Appeal Process. On or before June 15 of each year, the Board shall adopt an operating budget for the following calendar year for the purpose of providing funds to operate the Commission's

business in accordance with its annual work plan. The operating budget shall never be greater than the equivalent of 0.02418% of total market value on all real property within the Watershed. Budget approval shall require a majority vote of all Commissioners eligible to vote. The Commission shall certify the budget on or before July 1 to the clerk of each Member governmental unit together with a statement of the proportion of the budget to be provided by each Member. The schedule of payments by the Members shall be determined by the Board in such a manner as to provide for an orderly collection of the funds needed.

The governing body of each Member agrees to review the budget, and the Board shall upon notice from any Member received prior to August 15, hear objections to the budget, and may, upon notice to all Members and after a hearing, modify or amend the budget (except the fee due cannot be increased), and then give notice to the Members of any and all modifications or amendments. Each Member agrees to provide the funds required by the budget and said determination shall be conclusive if no Member enters objections in writing on or before August 15. If objections are submitted to the Board, each Member agrees to provide the funds approved by the Board, after the Board has conducted the aforementioned hearing. Modifications or amendments to the original budget require a favorable vote by a majority of all Commissioners eligible to vote.

6.4. Supplemental Budget. Upon notice and hearing, the Board by a majority vote of all Commissioners eligible to vote may adopt a supplemental budget requiring additional payments by the Members within 60 days of its adoption. The operating budget, including any supplemental budget, shall never be greater than the equivalent of 0.02418% of total market value on all real property within the Watershed.

SECTION SEVEN
CAPITAL IMPROVEMENT PROGRAM

7.1. Assessments. If a capital improvement ordered by the Commission may result in payment from any Member, or if a capital improvement ordered by the Commission may result in a levy by a Member against privately or publicly owned land within the Watershed, said capital improvement shall follow the statutory procedure outlined in Minn. Stat. Ch. 429, except as herein modified.

7.2. Preliminary Reports/Public Hearings. For those improvements initiated by the Commission or so designated in the Commission's watershed management plan to be constructed by the Board, the Board shall secure from its engineers or some other competent person a preliminary report advising it whether the proposed improvement is feasible and as to whether it shall best be made as proposed or in connection with some other improvement and the estimated cost of the improvement as recommended,

The Board shall then hold a public hearing on the proposed improvement after mailed notice to the clerk of each Member governmental unit within the Watershed. The Commission shall not be required to mail or publish notice except by said notice to the clerk. Said notice shall be mailed not less than 45 days before the hearing, shall state the time and place of the hearing, the general nature of the improvement, the estimated total cost and the estimated cost to each Member governmental unit. The Board may adjourn said hearing to obtain further information, may continue said hearing pending action of the Member governmental units or may take such other action as it deems necessary to carry out the purpose of this Commission.

A resolution setting forth the order for a capital improvement project shall require a favorable vote by at least two-thirds of all Commissioners eligible to vote. In all cases other than to order a capital improvement project, a majority vote of all Commissioners eligible to vote shall be sufficient to adopt an action. The order shall describe the improvement, shall allocate in percentages the cost between the Member governmental units, shall designate the engineers to prepare plans and specifications, and shall designate the Member who will contract for the improvement.

After the Board has ordered the improvement or if the hearing is continued while the Member governmental units act on said proposal, it shall forward said preliminary report to all Member governmental units with an estimated time schedule for the construction of said improvement. The Board shall allow an adequate amount of time, and in no event less than 45 days, for each Member governmental unit to conduct hearings, in accordance with the provisions of the aforestated Chapter 429 or the charter requirements of any Member city, or to ascertain the method of financing which said Member governmental unit will utilize to pay its proportionate share of the costs of the improvement, Each Member governmental unit shall ascertain within a period of 90 days the method it shall use to pay its proportionate share of the costs.

If the Commission proposes to use Hennepin County's bonding authority as set forth in Minn. Stat. § I03B.251, or if the Commission proposes to certify all or any part of a capital improvement to Hennepin County for payment, then and in that event all proceedings shall be carried out in accordance with the provisions set forth in said Section 103B.251.

The Board shall not order and no engineer shall prepare plans and specifications before the Board has adopted a resolution ordering the improvement. The Board may direct one of its Members to prepare plans and specifications and order the advertising for bids upon receipt of notice from each Member governmental unit who will be assessed that it has completed its hearing or determined its method of payment or upon expiration of 90 days after the mailing of the preliminary report to the Members.

7.3. Appeals/Arbitration. Any Member governmental unit being aggrieved by the Board's determination as to the cost allocation of said capital improvement shall have 30 days after the Commission resolution ordering the improvement to appeal said determination. Said appeal shall be in writing and shall be addressed to the Board asking for arbitration. The determination of the Member's appeal shall be referred to a Board of Arbitration. The Board of Arbitration shall consist of three persons; one to be appointed by the Board of Commissioners, one to be appointed by the appealing Member governmental unit, and the third to be appointed by the two so selected. In the event the two persons so selected do no appoint the third person within 15 days after their appointment, then the Chief Judge of the Hennepin County District Court shall have jurisdiction to appoint, upon application of either or both of the two earlier selected, the third person to the Board of Arbitration. The third person selected shall not be a resident of any Member governmental unit and if appointed by the Chief Judge said person shall be a person knowledgeable in the subject matter. The arbitrators' expenses and fees, together with the other expenses, not including attorney fees, incurred in the conduct of the arbitration shall be divided equally between the Commission and the appealing Member. Arbitration shall be conducted in accordance with the Uniform Arbitration Act, Minn. Stat. Ch. 572.

7.4. Contracts for Capital Improvements. All contracts which are to be let as a result of the Board ordering a capital improvement, and for which two or more Member governmental units shall be responsible for the costs, shall be let in accordance with the provisions of Minn. Stat. § 429.041. The bidding and contracting of said work shall be let by any one of the Member governmental units, as ordered by the Board, after compliance with the statutory requirements. Contracts and bidding procedures shall comply with the legal requirements applicable to statutory cities.

The Commission shall not have the authority to contract in its own name for any improvement work for which a special assessment will be levied against any private or public property under the provisions of Chapter 429 or under the provisions of any Member city charter. These contracts shall be awarded by action of the governing body of a Member and shall be in the name of a Member governmental unit. This section does not preclude the Commission from proceeding under Minn. Stat. § 103B.251.

7.5.Contracts with Other Governmental Bodies. The Commission may exercise the powers set forth in Section 7.4 but said contracts for a capital improvement shall require a majority vote of all Commissioners eligible to vote,

7.6. Supervision. All improvement contracts shall be supervised by the entity awarding the contract. The Commission staff shall also be authorized to observe and review the work in progress and the Members agree to cooperate with the Commission staff in accomplishing its purposes. Representatives of the WMO shall have the right to enter upon the place or places where the improvement work is in progress for the purpose of making reasonable tests

and inspections. The Commission staff shall report and advise and recommend to the Board on the progress of the work.

7.7. Land Acquisition. The Commission shall not have the power of eminent domain. The Member governmental units agree that any and all easements or interests in land which are necessary will be negotiated or condemned in accordance with Minn. Stat. Ch. 117 by the unit wherein said lands are located, and each Member agrees to acquire the necessary easements or right-of-way or partial or complete interest in land upon order of the Board of Commissioners to accomplish the purposes of the improvement. All reasonable costs of said acquisition shall be considered as a cost of the improvement. If a Member government unit determines it is in the best interests of that Member to acquire additional lands, in conjunction with the taking of lands for storm and surface drainage or storage, or some other purpose, the costs of said acquisition will not be included in the improvement costs of the ordered project. The Board in determining the amount of the improvement costs to be assessed to each Member governmental unit may take into consideration the land use for which the additional lands are being acquired and may credit the acquiring municipality for said land acquisition to the extent that it benefits the other Members to this Agreement. Any credits may be applied to the cost allocation of the improvement project under consideration or the Board if feasible and necessary may defer said credits to a future project.

If any Member unit refuses to negotiate or condemn lands as ordered by the Board, any other Member may negotiate or condemn outside its corporate limits in accordance with Minn. Stat. Ch. 117. All Members agree that they will not condemn or negotiate for land acquisition to pond or drain storm and surface waters within another Member's corporate boundaries within the Watershed except upon order of the Board of Commissioners.

7.8.Capital Improvement Fund.

A. The Commission shall establish an improvement fund for each capital improvement project. Each Member agrees to contribute to said fund its proportionate share of the engineering, construction, legal and administrative costs as determined by the amount to be assessed against each Member as a cost of the improvement. The Board shall submit in writing a statement to each Member, setting forth in detail the expenses incurred by the Commission for each project,

Each Member agrees to pay its proportionate share of the cost of the improvement in accordance with the determination of the Board under Section 7.2. The Board, in its discretion, may require Members to make advance payments based upon estimated costs, subject to adjustment to reflect actual costs, or may bill the Members as costs are actually incurred. Members agree to pay billings within 30 days of receipt. The Board or the Member awarding the

contract shall advise other contributing Members of the tentative time schedule of the work and the estimated times when the contribution shall be necessary.

B. Notwithstanding the provisions of Section 7,8.A,, the Commission may fund all or part of the cost of a capital improvement contained in the capital improvement program of the plan in accordance with Minn. Stat. § 103B.251, The Commission and Hennepin County may establish a maintenance fund to be used for normal and routine maintenance of an improvement constructed in whole or in part with money provided by Hennepin County pursuant to Minn. Stat. § 103B.251. The levy and collection of an ad valorem tax levy for an improvement, payment of bonds, or maintenance shall be by Hennepin County based upon a tax levy resolution adopted by a majority vote of all eligible Members of the Board and remitted to the County on or before the date prescribed by law each year. If it is determined to levy for maintenance, the Commission shall be required to follow the hearing process established by Minn. Stat. Ch. 103D. Mailed notice shall also be sent to the clerk of each Member governmental unit at least 30 days before the hearing.

7.9. Capital Improvement Cost Allocation.

A. All costs of improvements designated in the Board's adopted watershed management plan for construction by the Board, which the Board determines will benefit only one Member, shall be paid for entirely by that Member.

B. All costs of improvements designated in the Board's adopted watershed management plan for construction by the Board, which the Board determines benefit more than one Member, shall he apportioned by the Board by the following bases:

(1) A negotiated amount to be arrived at by the Members who have lands in the subdistrict responsible for the capital improvement.

OR

(2) Based on each Member's share of the taxable market value of all real property within the Watershed to the total area within the Watershed.

OR

(3) Capital costs allocated under option (2) above may be varied by the Commission by a favorable vote by at least two-thirds of all Commissioners eligible to vote if (a) any Member community receives a direct benefit from the capital improvement which benefit can be defined as a lateral as well as a trunk benefit, or (b) the capital improvement provides a direct benefit to one or more Members which benefit is so disproportionate as to require in a sense of fairness a modification in the formula,

C. If the project is constructed and financed pursuant to Minn, Stat, § 103B.251, the Members understand and agree that said costs will be levied on all taxable property in the watershed as set forth in the statute.

D. Credits to any Member for lands acquired by said Member to pond or store storm and surface

water shall be allowed against costs as set forth in Section 7.7.

SECTION EIGHT
WITHDRAWAL FROM AGREEMENT

Withdrawal of any Member may be accomplished by filing written notice with the Commission and the other Members 60 days before the effective date of withdrawal. No Member may withdraw from this Agreement until the withdrawing Member has met its full financial obligations for the year of withdrawal and prior years,

SECTION NINE
DISSOLUTION OF COMMISSION

9.1. This Agreement may be terminated upon the unanimous consent of the parties. If the Agreement is to be terminated, a notice of the intent to dissolve the Commission shall be sent to Hennepin County and BWSR, at least 90 days before the date of dissolution,

9.2. In addition to the manner provided in Section 9.1 for termination, any Member may petition the Commission's Board to dissolve the Commission. Upon 90 days notice in writing to the clerk of each member governmental unit and to Hennepin County and BWSR, the Board shall hold a hearing and upon a majority vote of all Commissioners eligible to vote, the Board may by Resolution recommend that the Commission be dissolved, Said Resolution shall be submitted to each Member governmental unit and if ratified by three-fourths of the governing bodies of all eligible Members within 60 days, said Board shall dissolve the Commission allowing a reasonable time to complete work in progress and to dispose of personal property owned by the Commission.

9.3. Winding Up. Upon dissolution, all personal property of the Commission shall be sold and the proceeds thereof, together with monies on hand after payment of all obligations, shall be distributed to the Members, Such distribution of Commission assets shall be made in approximate proportion to the total contributions to the Commission for such costs made by each Member. All payments due and owing for operating costs under Section 6.2, or other unfilled financial obligations, shall continue to be the lawful obligation of the Members. In no event may this Agreement be terminated until all of the planning and plan implementation provisions of the Act, which are required of a watershed management organization, have been completed.

SECTION TEN
MISCELLANEOUS PROVISIONS

10.1. Eminent Domain. The Commission shall not have the power of eminent domain and shall not own any interest in real property. All interests in lands shall be held in the name of the Member wherein said lands are located.

10.2. Special Assessments. The Commission shall not have the power to levy a special assessment upon any privately or publicly owned land. All such assessments shall be levied by the Member wherein said lands are located. The Commission shall have the power to require any Member to contribute the costs allocated or assessed according to the other provisions of this agreement.

10.3. Member's Construction Projects that Will Affect Elm Creek. Each Member agrees that it will not directly or indirectly collect or divert any additional surface water to or from Elm Creek or its tributaries without approval from the Commission. Such approval may be granted by the Commission for a Member to proceed with the construction or reconstruction of improvements within the individual corporate Member's boundaries and at said Member's sole cost upon a finding (a) that there is an adequate outlet, (b) that said construction is in conformance with the overall plan, and (c) that the construction will not adversely affect other Members.

10.4. Member Vote Suspension for Failure to Contribute. Any Member who is more than 60 days in default in contributing its proportionate share to the general fund shall have the vote of its Board representative suspended pending the payment of its proportionate share. Any Member who is more than 60 days in default in contributing its proportionate share of the cost of any improvement to the contracting Member shall upon request of the contracting Member have the vote of its Board representative suspended, pending the payment of its proportionate share. Any Member whose Board representative vote is under suspension shall not be considered as an eligible Member as such membership affects the number of votes required to proceed on any matter under consideration by the Board.

10.5. Amendment. The Commission may recommend changes and amendments to this Agreement to the Members. Amendments shall be acted upon by the Members within 90 days of referral. Amendments shall be evidenced by appropriate resolutions of the Members filed with the Commission and shall, if no effective date is contained in the amendment, become effective as of the date all such filings have been completed.

10.6.Termination of Prior Agreement. By executing this document, the parties hereby agree to terminate the prior joint powers agreement, adopted May 12, 1993.

10.7. Counterparts. This Agreement and any amendment may be executed in several counterparts and all so executed shall constitute one Agreement or amendment, binding on all of the parties hereto notwithstanding that all of the parties are not signatory to the original or the same counterpart.

10.8.Effective Date. This Agreement shall be in full force and effect when all governmental units delineated in Section 2 have executed this Agreement. All Members need not sign the same copy.

10.9.Duration. This agreement shall have an unlimited duration.

10.10.Statutory References. All statutory references include all future amendments.

CITY OF CHAMPLIN

By: _____
Its Mayor

Dated: 11/10/2003

Attest: _____
Its City Clerk

CITY OF CORCORAN

By: _____
Its Mayor

Dated: November 13, 2003

Attest: _____
Its City Clerk

CITY OF DAYTON

By: _____
Its Mayor

Dated: 4-14-04

Attest: _____
Its City Clerk

CITY OF MAPLE GROVE

By: _____
Its Mayor

Dated: Dec. 15th, 2003

Attest: _____
Its City Clerk

CITY OF MEDINA

By: _____
Its Mayor

Dated: 11-18-2003

Attest: _____
Its City Clerk

CITY OF PLYMOUTH

By:_____
Its Mayor

11-25-03
Dated:

Attest:_____
Its City Clerk_____

CITY OF ROGERS

By:_____
Its Mayor

5-25-04
Dated:

Attest:_____
Its City Clerk

TOWN OF HASSAN

By:_____
Chair of Town Board

Dated: Dec. 7, 2003

Attest:_____
Its Town Clerk

Appendix B
Water Quality Trends

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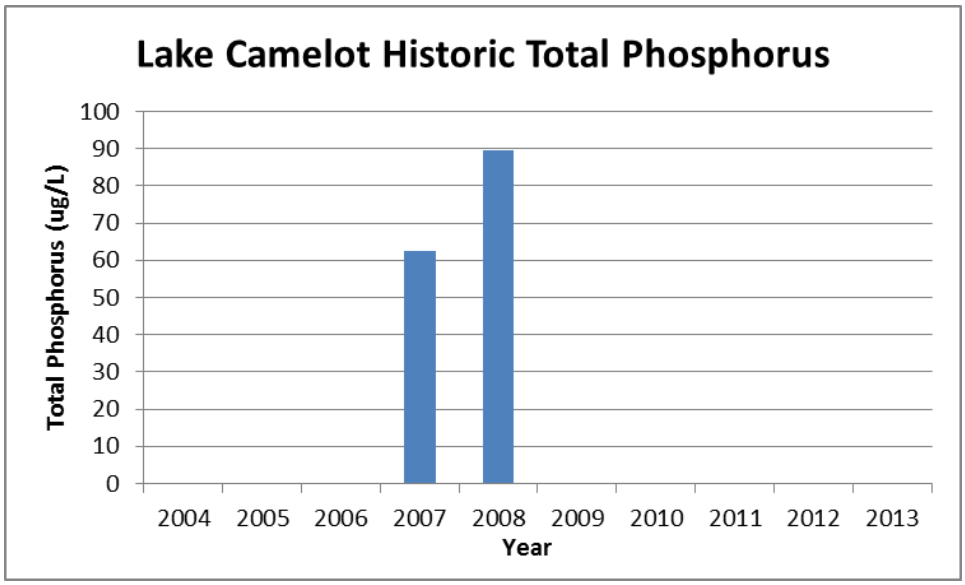
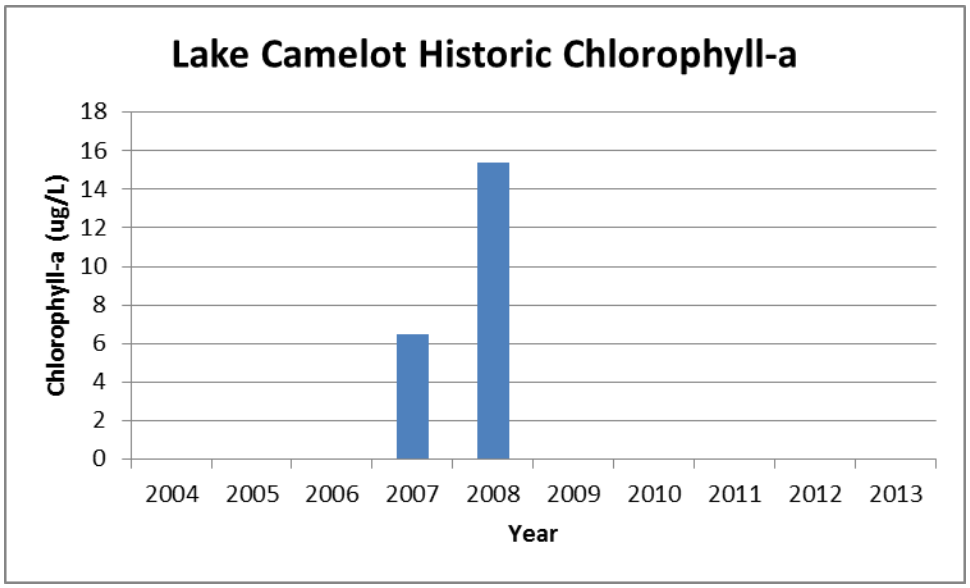
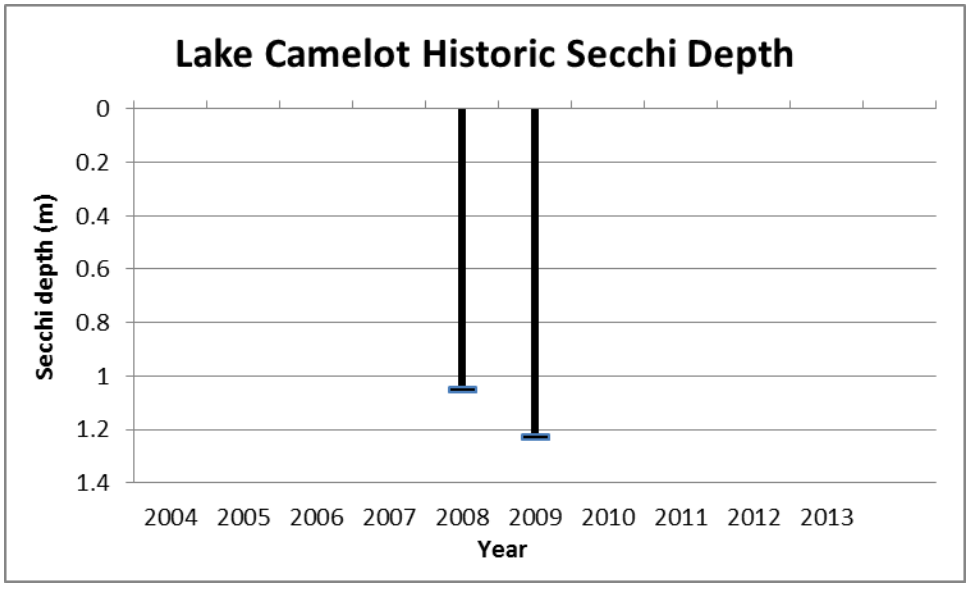
Lakes

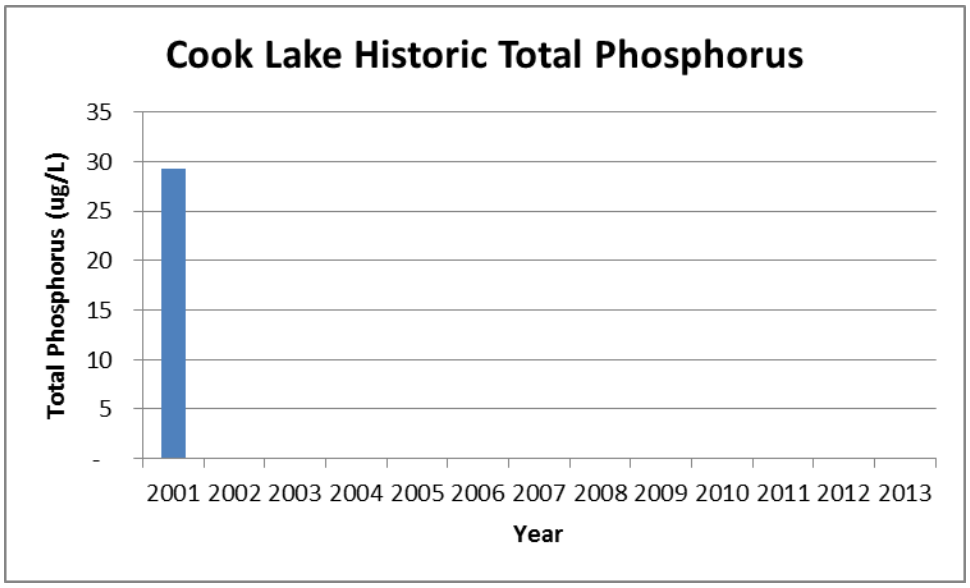
For many of the lakes in the Elm Creek watershed, there is a limited amount of monitoring data, and annual variability masks water quality trends. Five lakes have eight to ten years of chemistry data during the period 2004-2013: Diamond, Fish, French, Henry and Weaver. Rice Lake has a lengthy dataset of Secchi depth readings but only about five years of chemistry data.

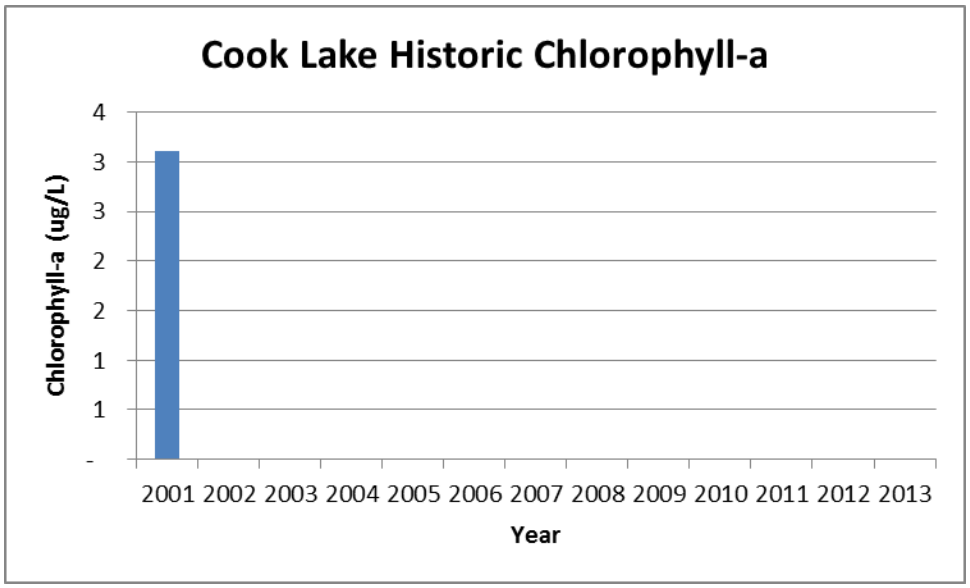
The only lake showing a clear trend is Weaver Lake, which has improved considerably following curly-leaf pondweed treatment and alum applications. The summer average total phosphorus and chlorophyll-a concentrations dropped significantly, and clarity has improved.

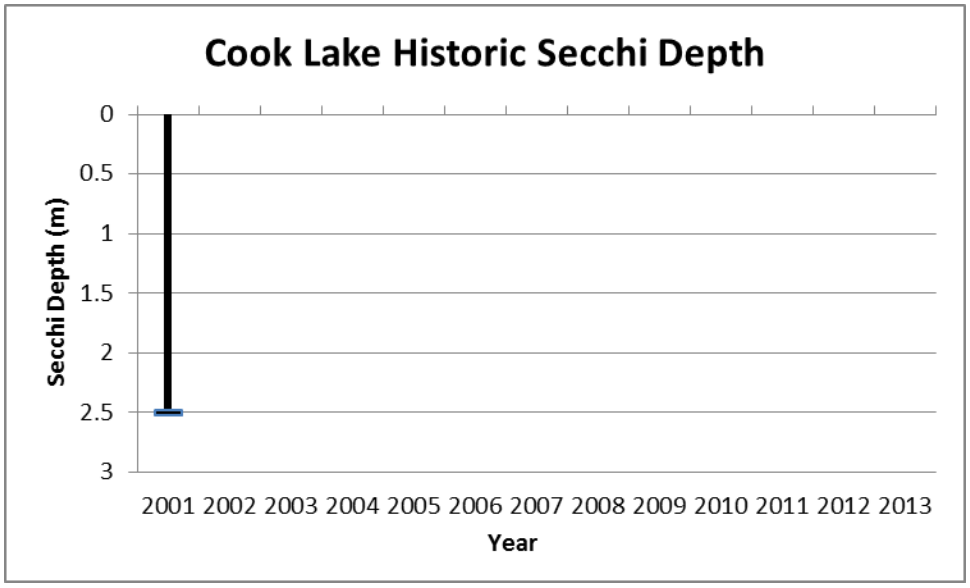

Lake Camelot Historic Total Phosphorus
Total Phosphorus (ug/L)
100
90
80
70
60
50
40
30
20
10
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

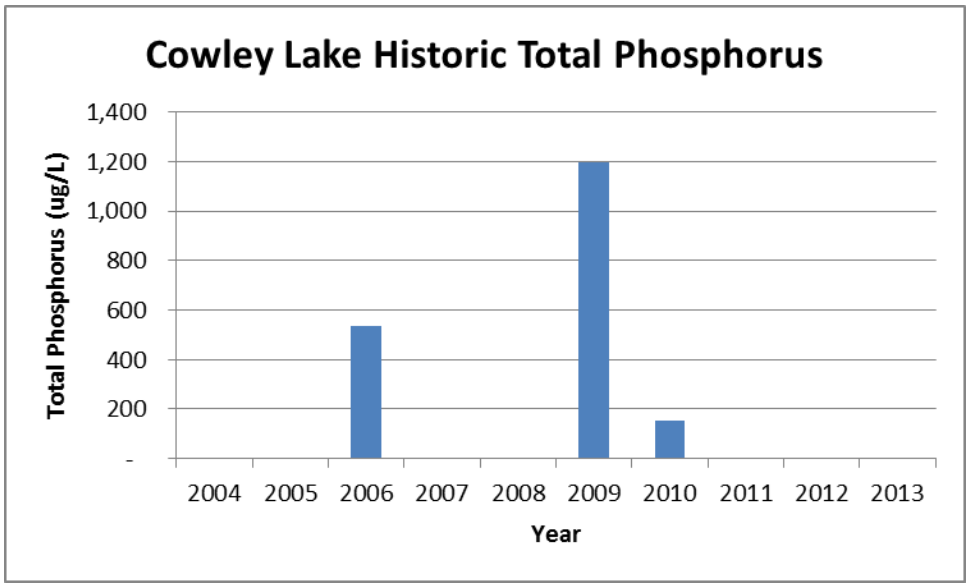

Lake Camelot Historic Chlorophyll-a
Chlorophyll-a (ug/L)
18
16
14
12
10
8
6
4
2
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

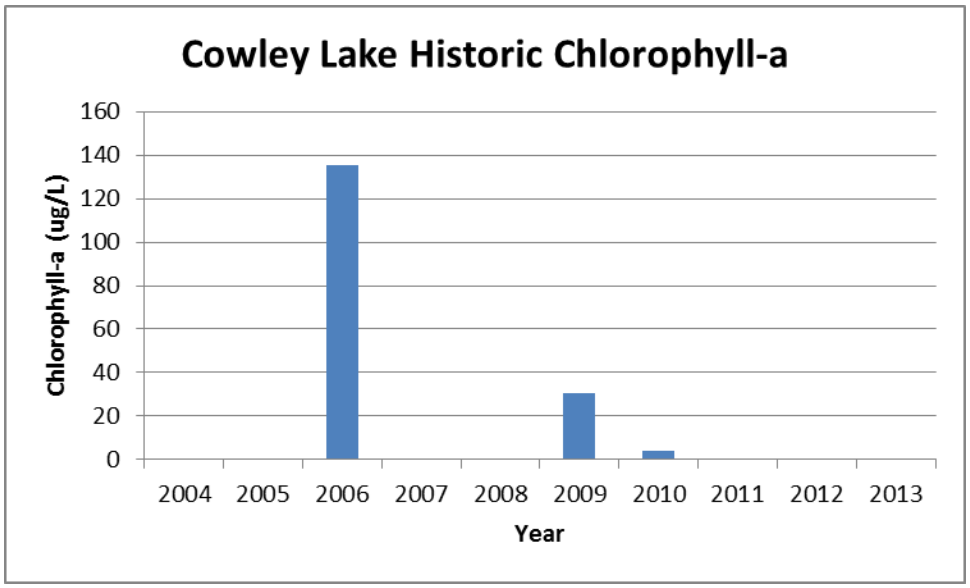

Lake Camelot Historic Secchi Depth
Secchi depth (m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

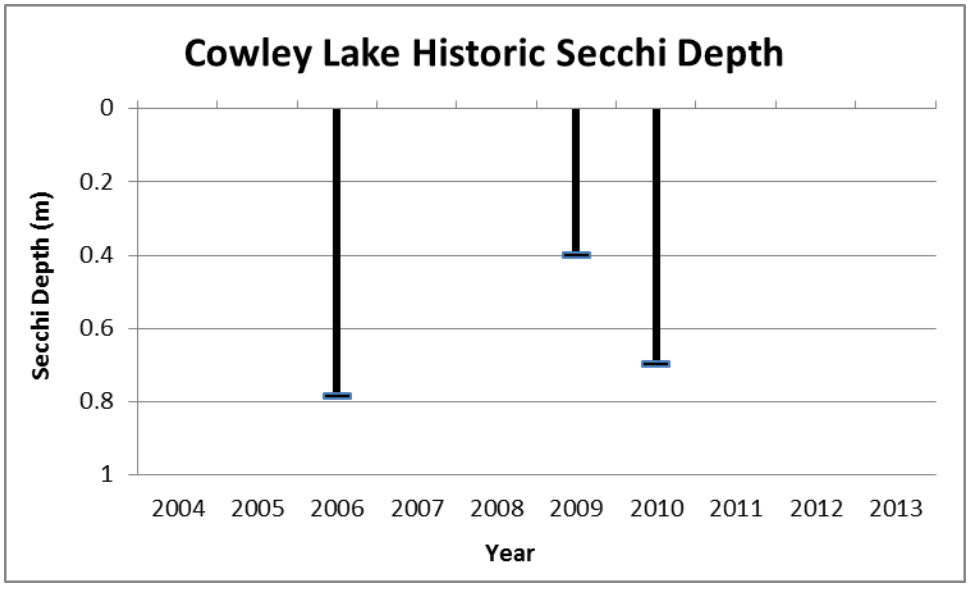

Cook Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
35
30
25
20
15
10
5
-
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

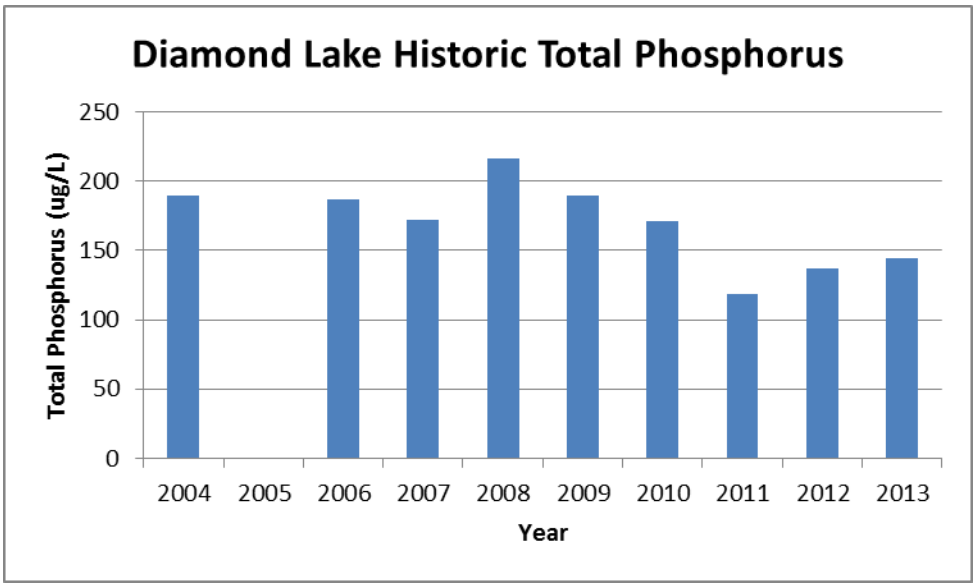

Cook Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
4
3
3
2
2
1
1
-
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

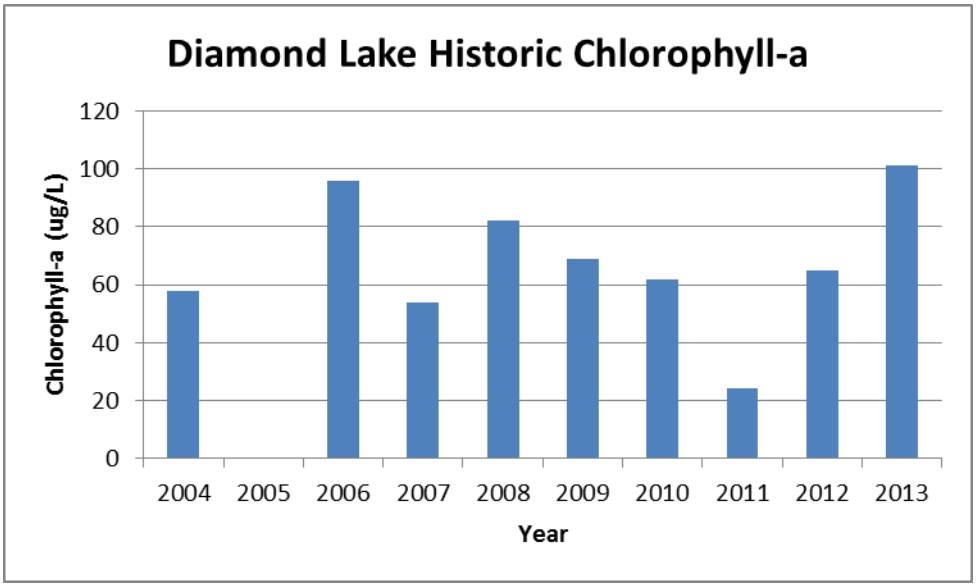

Cook Lake Historic Secchi Depth
Secchi Depth (m)
0
0.5
1
1.5
2
2.5
3
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

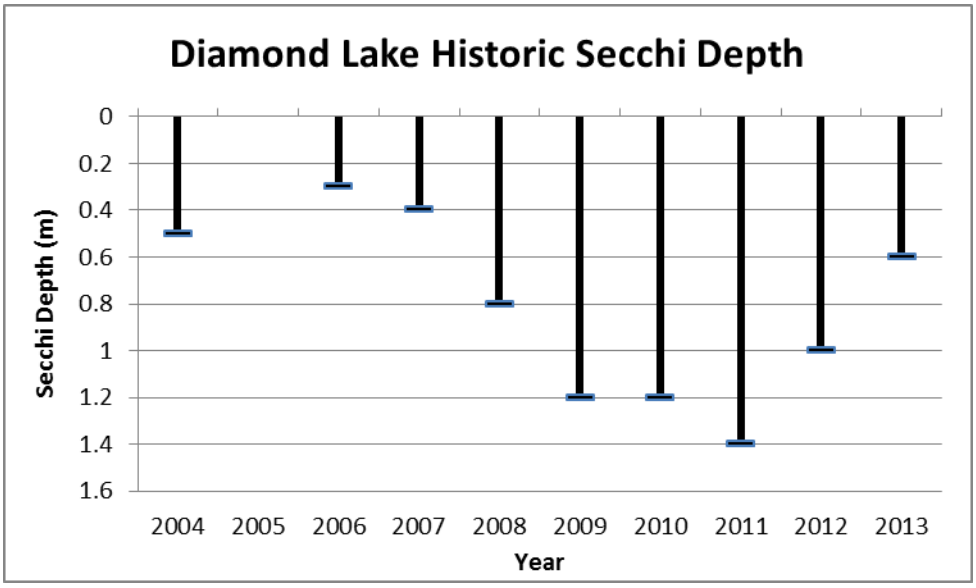

Cowley Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
1,400
1,200
1,000
800
600
400
200
-
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

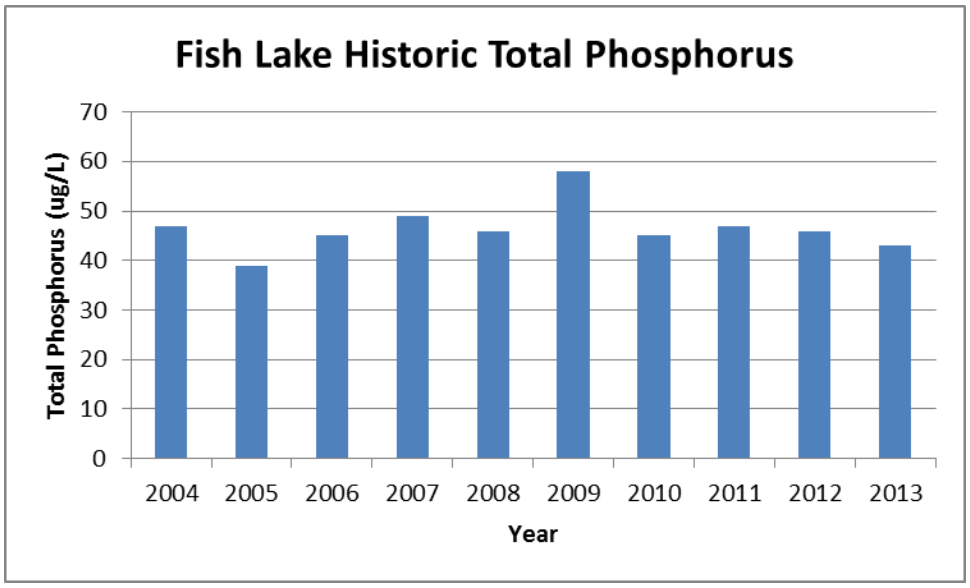

Cowley Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
160
140
120
100
80
60
40
20
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

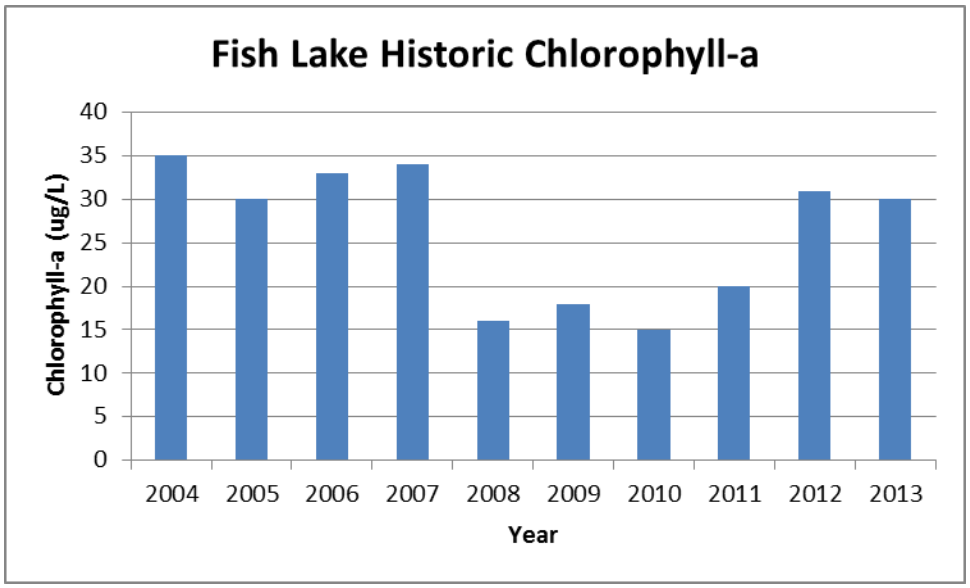

Cowley Lake Historic Secchi Depth
Secchi Depth (m)
0
0.2
0.4
0.6
0.8
1
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

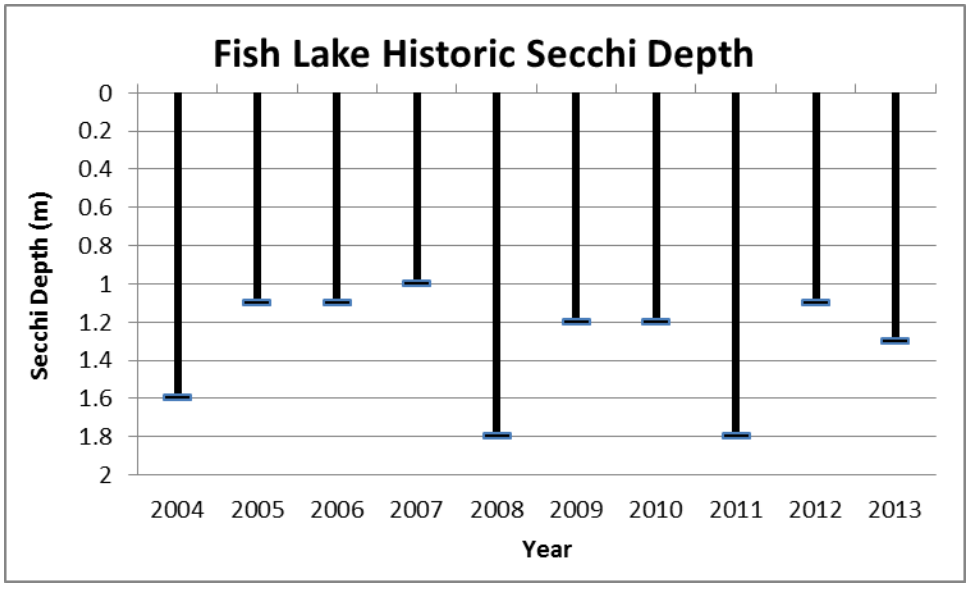

Diamond Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
250
200
150
100
50
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

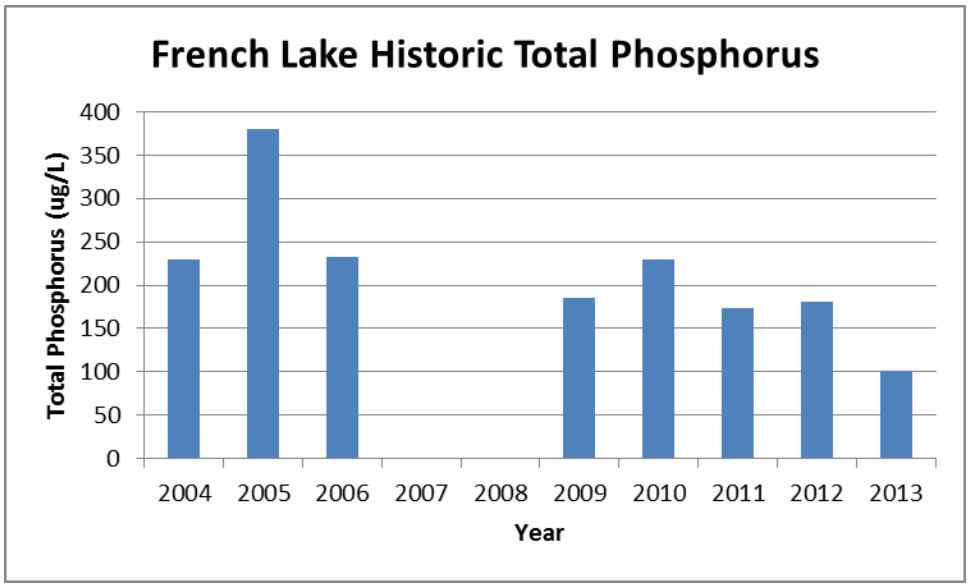

Diamond Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
120
100
80
60
40
20
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

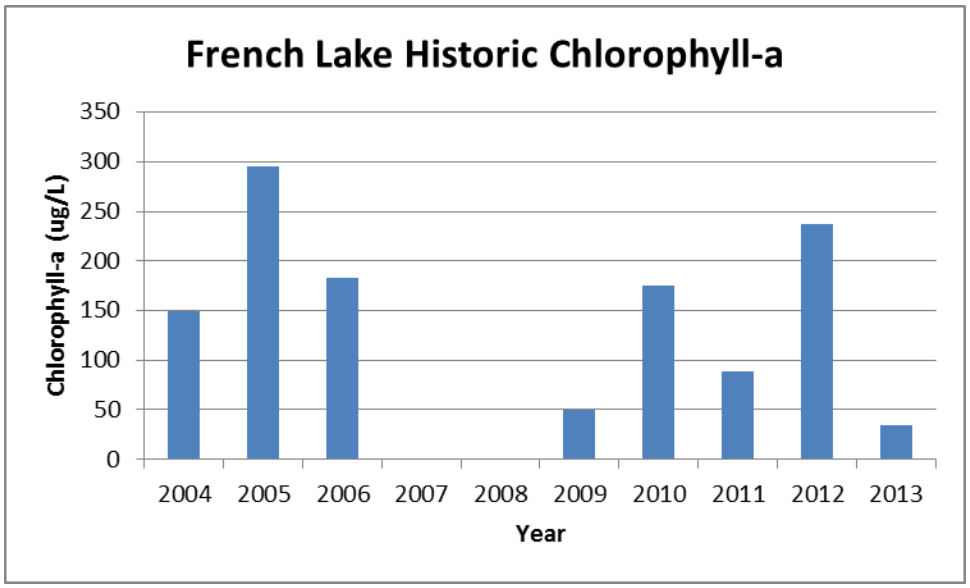

Diamond Lake Historic Secchi Depth
Secchi Depth (m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

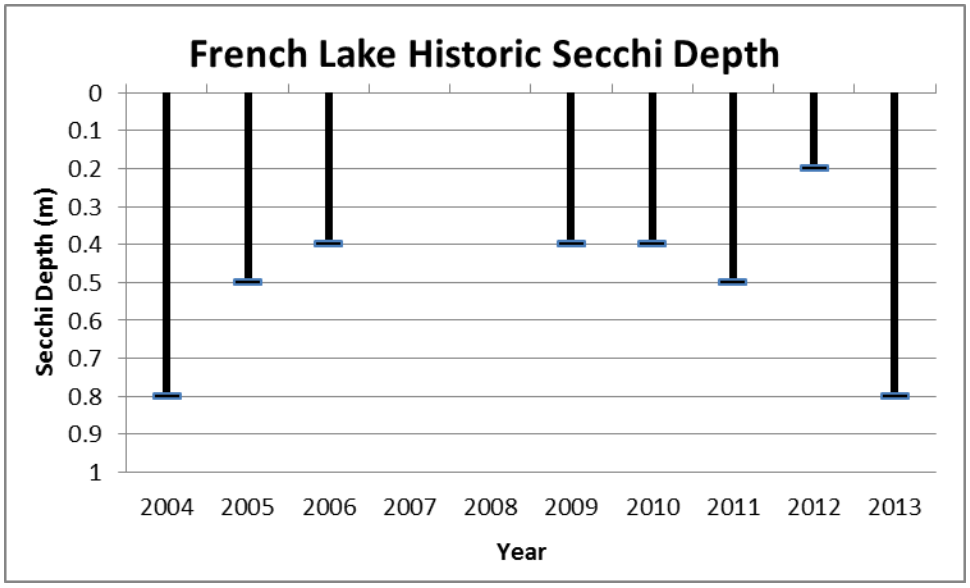

Fish Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
70
60
50
40
30
20
10
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

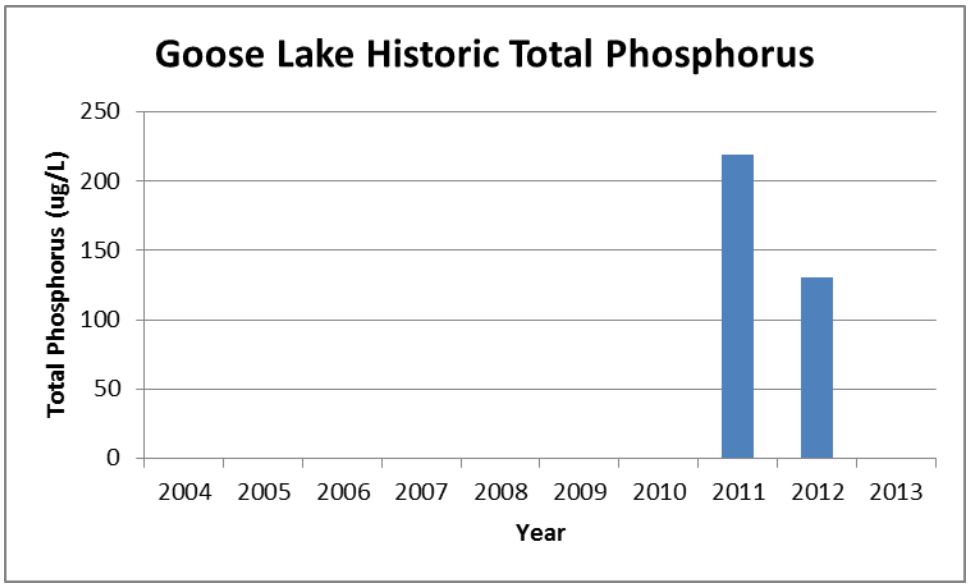

Fish Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
40
35
30
25
20
15
10
5
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

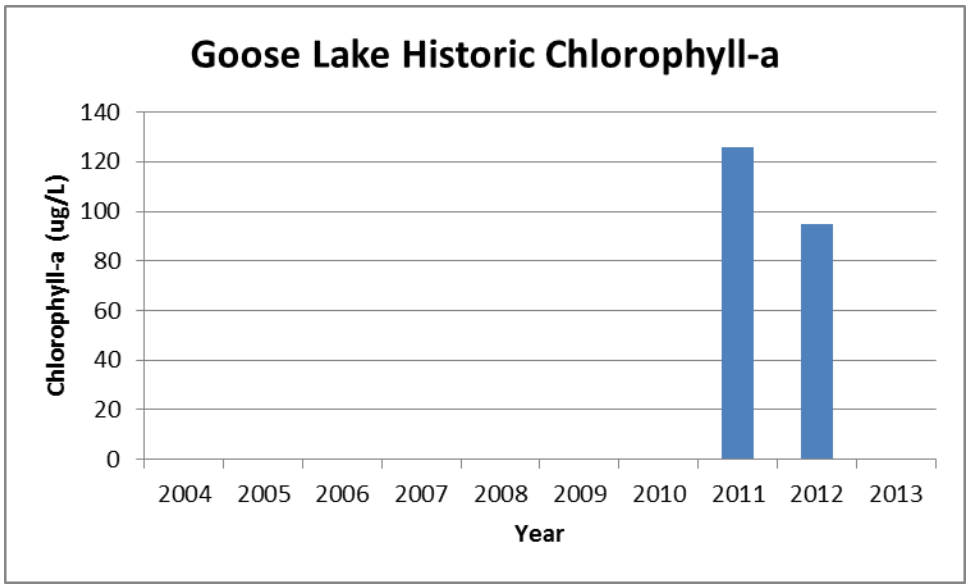

Fish Lake Historic Secchi Depth
Secchi Depth (m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

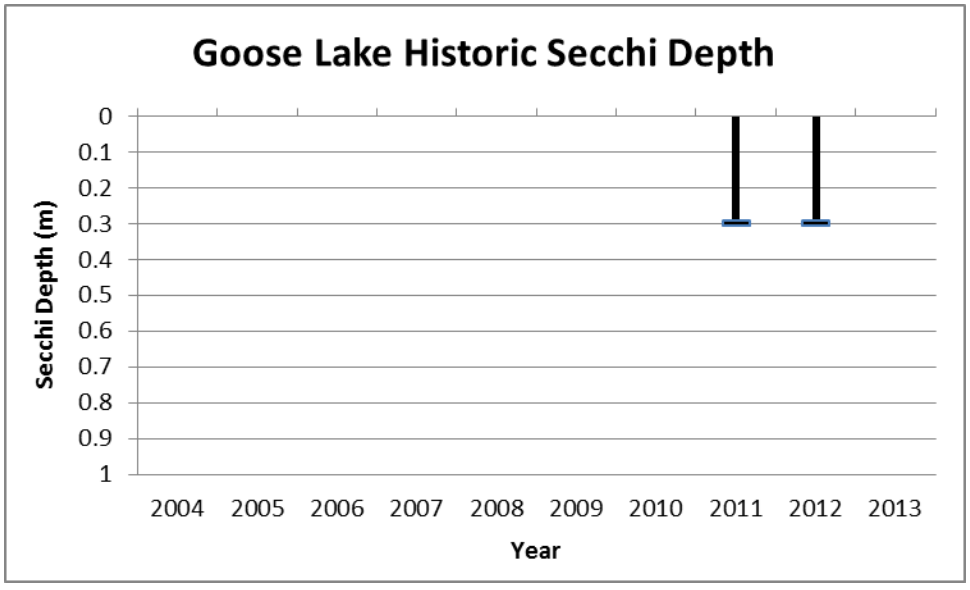

French Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
400
350
300
250
200
150
100
50
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

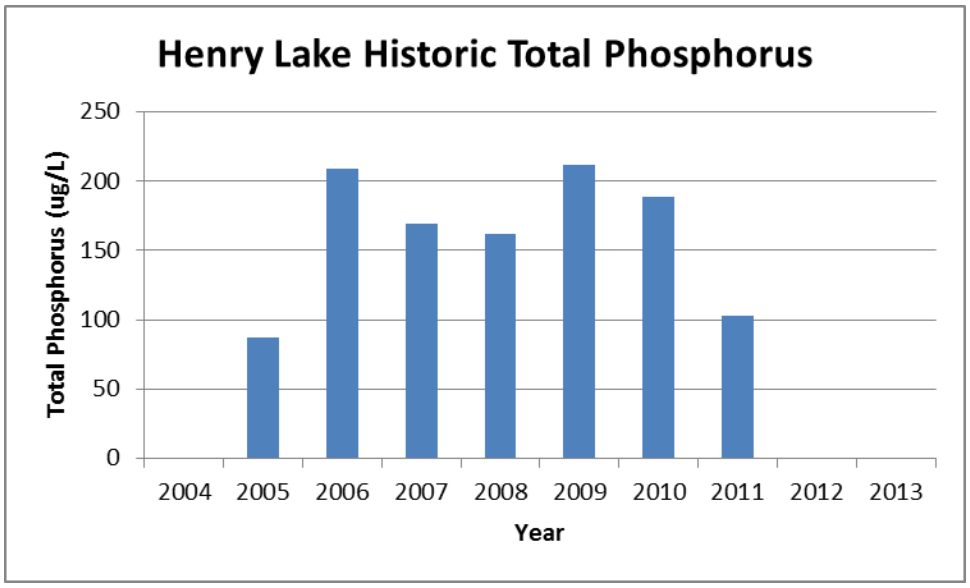

French Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
350
300
250
200
150
100
50
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

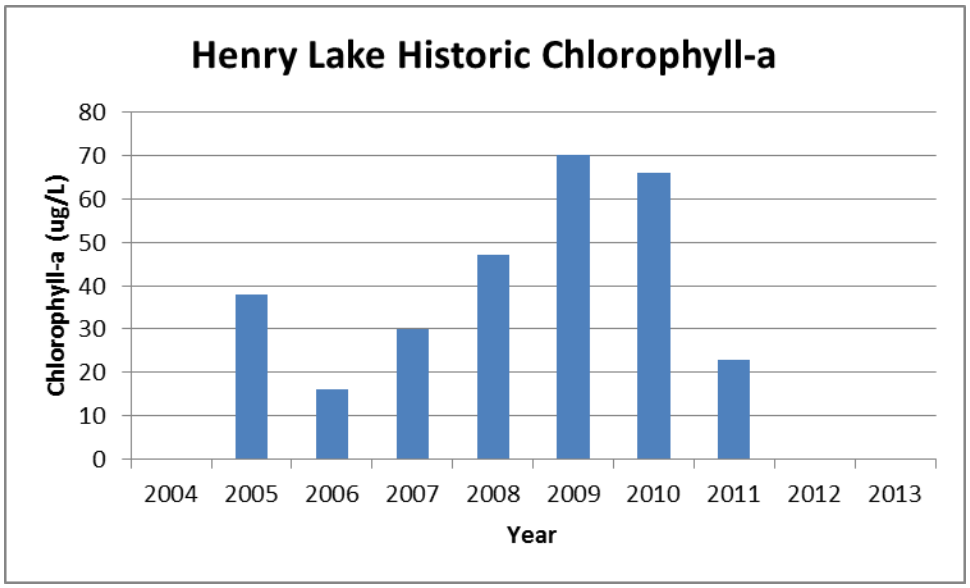

French Lake Historic Secchi Depth
Secchi Depth (m)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

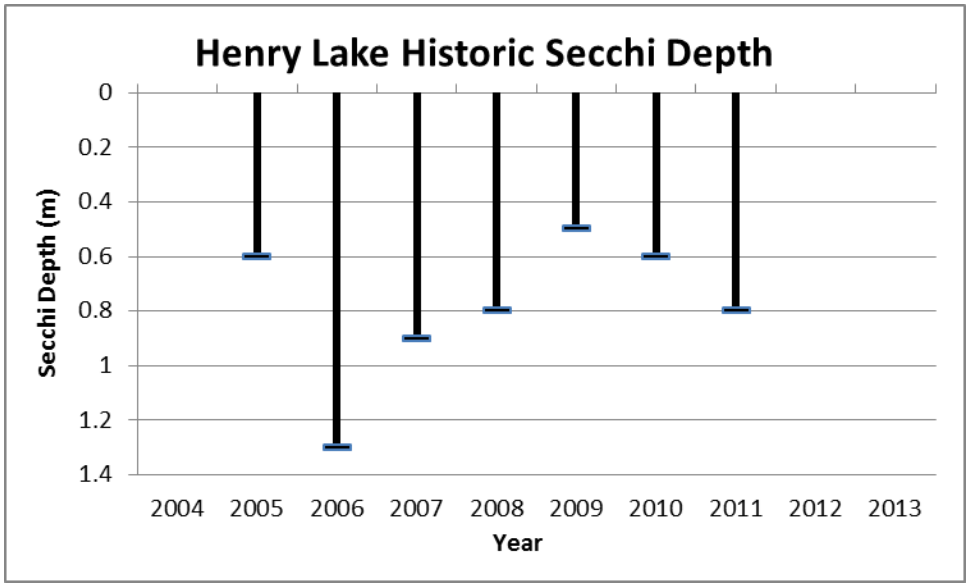

Goose Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
250
200
150
100
50
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

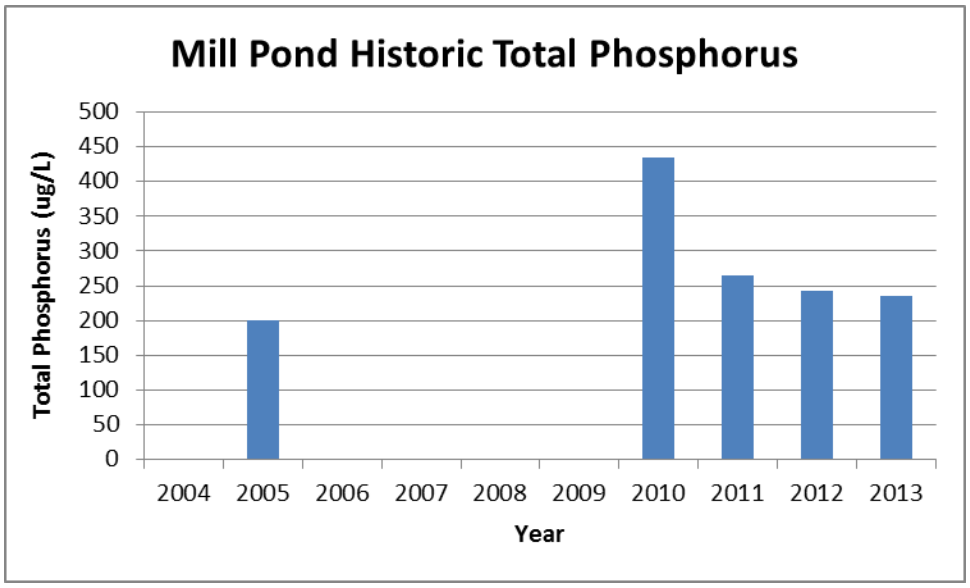

Goose Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
140
120
100
80
60
40
20
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

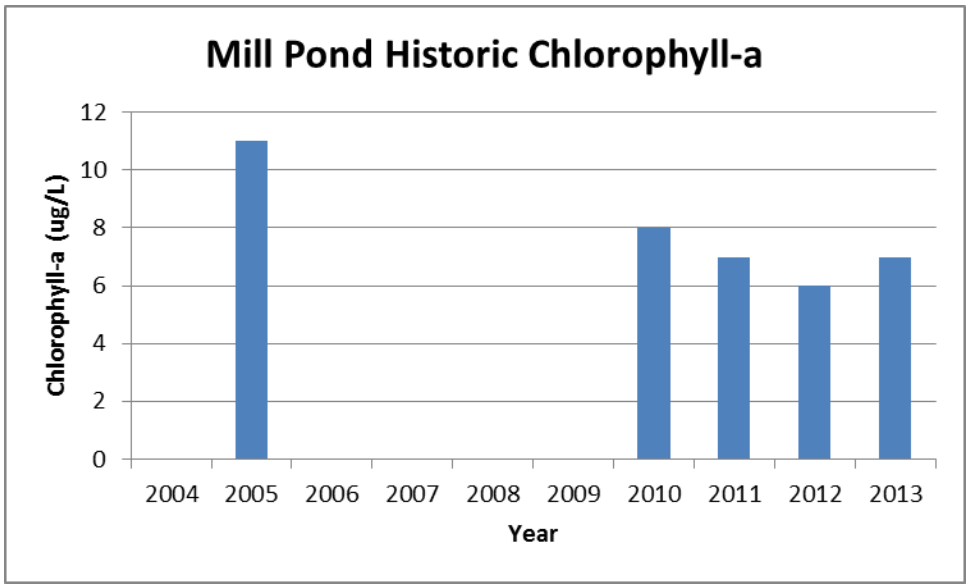

Goose Lake Historic Secchi Depth
Secchi Depth (m)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Year

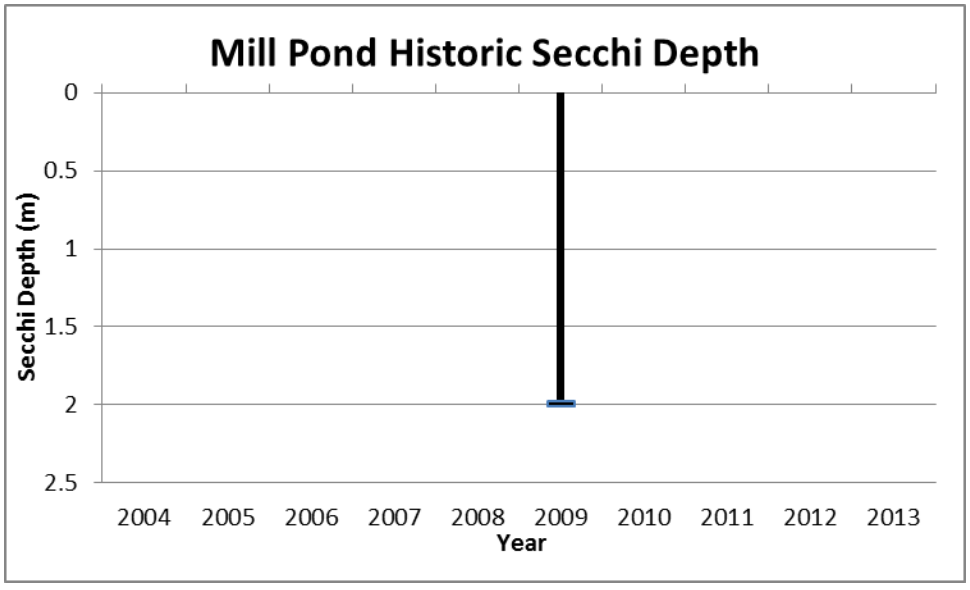

Henry Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
250
200
150
100
50
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

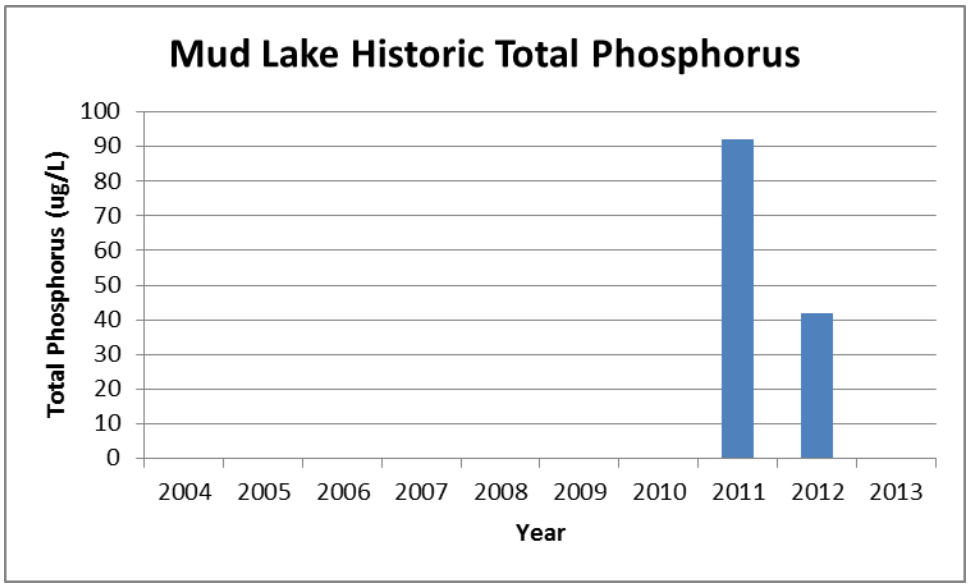

Henry Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
80
70
60
50
40
30
20
10
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

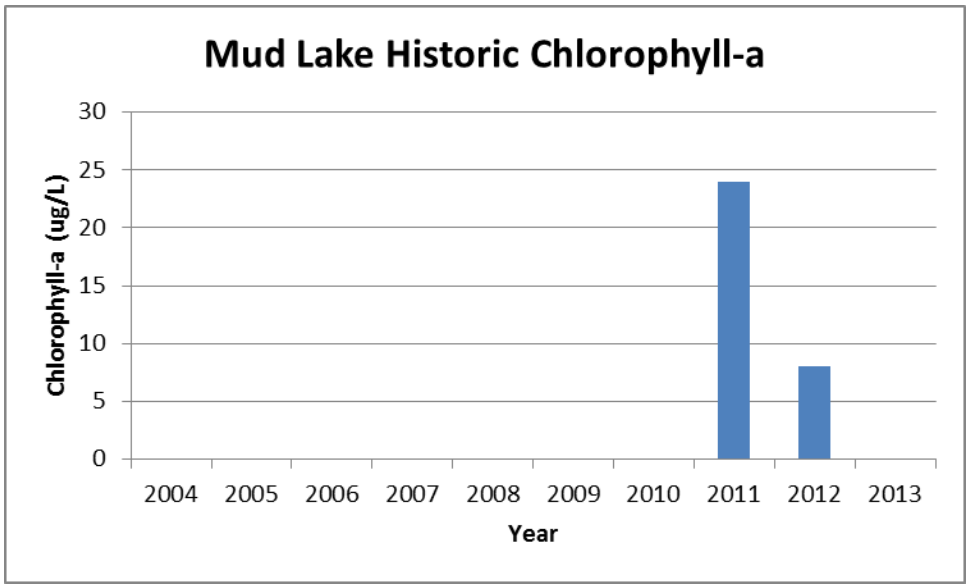

Henry Lake Historic Secchi Depth
Secchi Depth (m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

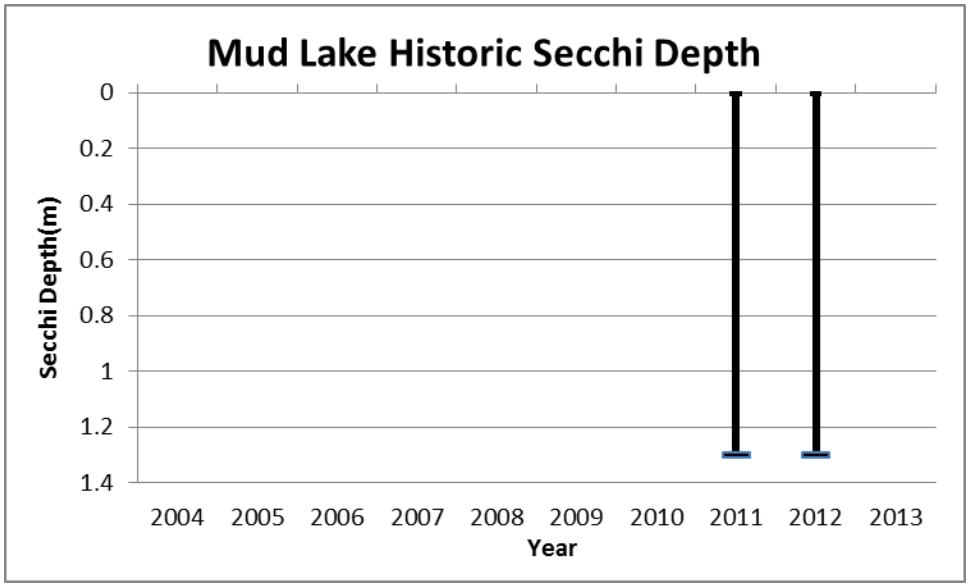

Mill Pond Historic Total Phosphorus
Total Phosphorus (ug/L)
500
450
400
350
300
250
200
150
100
50
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

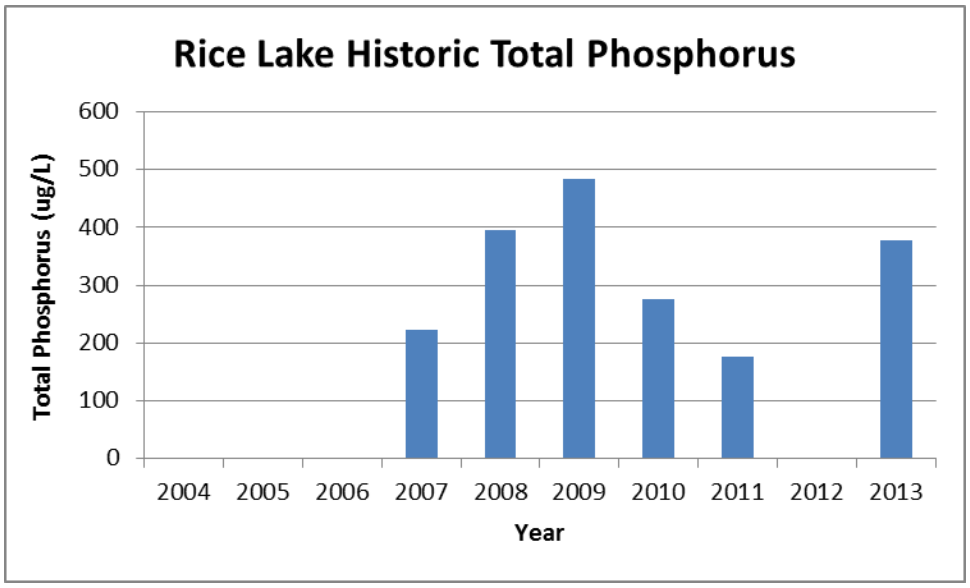

Mill Pond Historic Chlorophyll-a
Chlorophyll-a (ug/L)
12
10
8
6
4
2
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

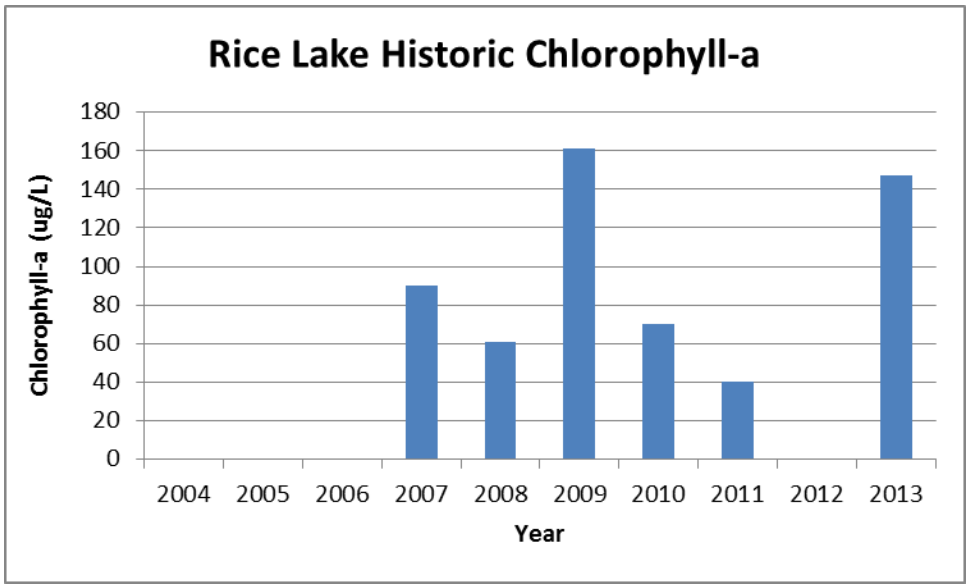

Mill Pond Historic Secchi Depth
Secchi Depth (m)
0
0.5
1
1.5
2
2.5
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

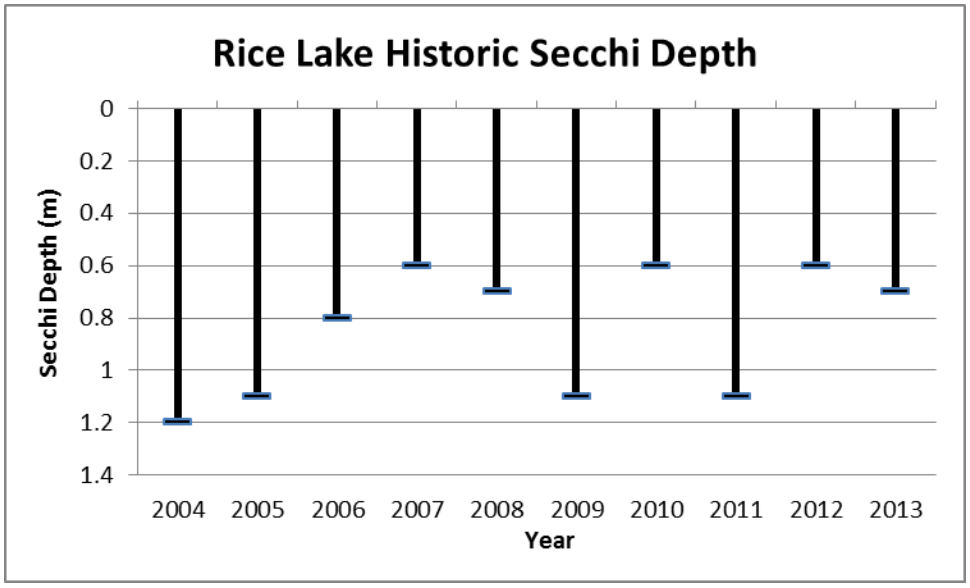

Mud Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
100
90
80
70
60
50
40
30
20
10
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

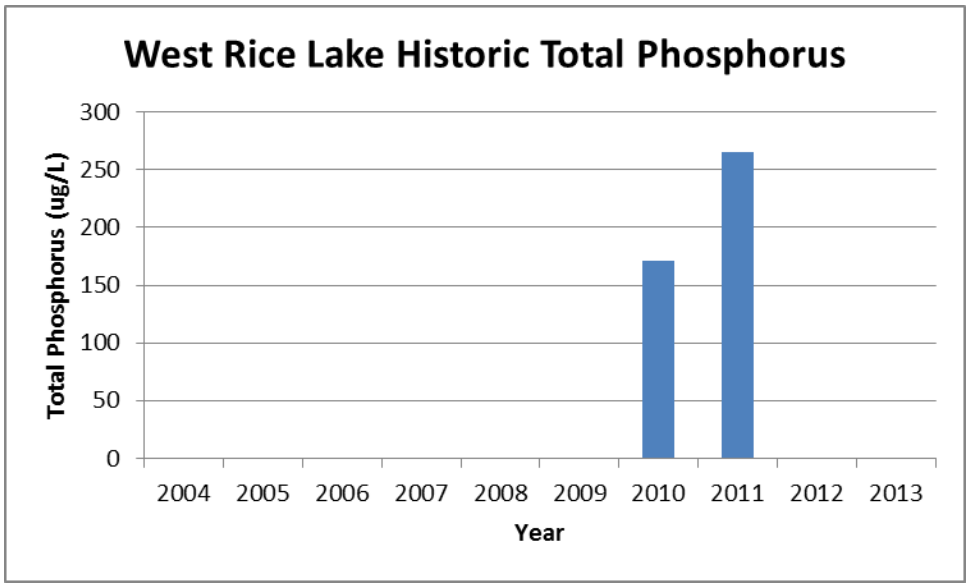

Mud Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
30
25
20
15
10
5
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

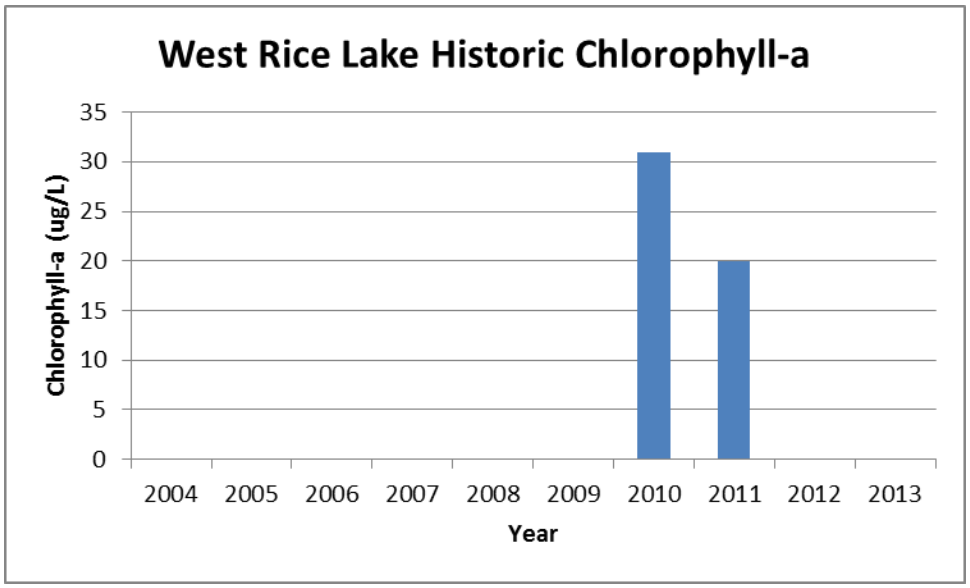

Mud Lake Historic Secchi Depth
Secchi Depth(m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

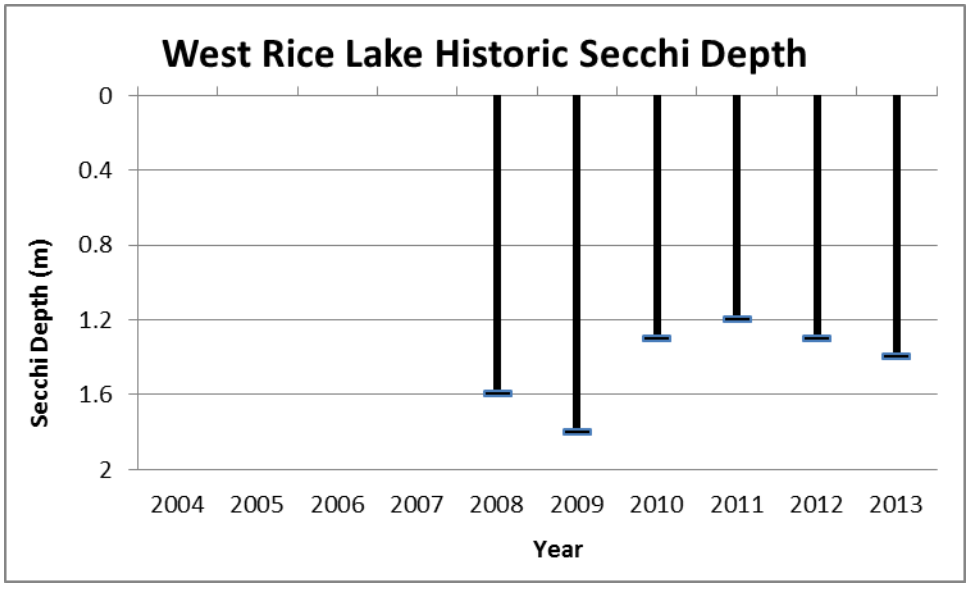

Rice Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
600
500
400
300
200
100
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

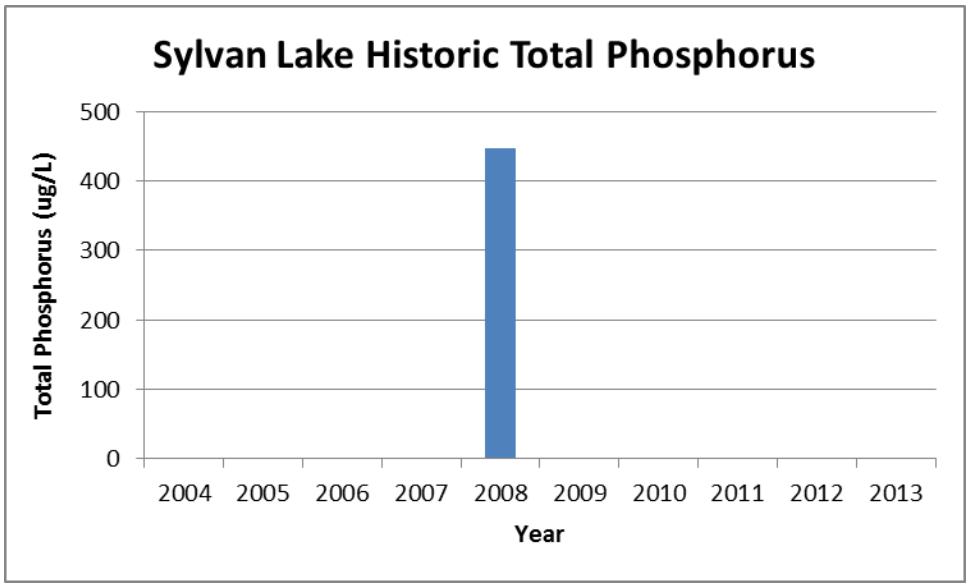

Rice Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
180
160
140
120
100
80
60
40
20
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

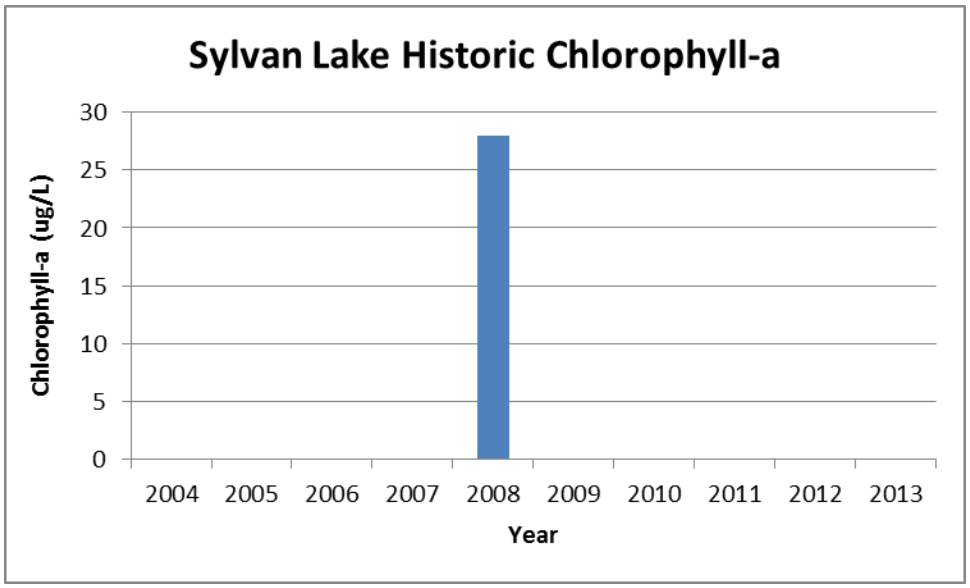

Rice Lake Historic Secchi Depth
Secchi Depth (m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

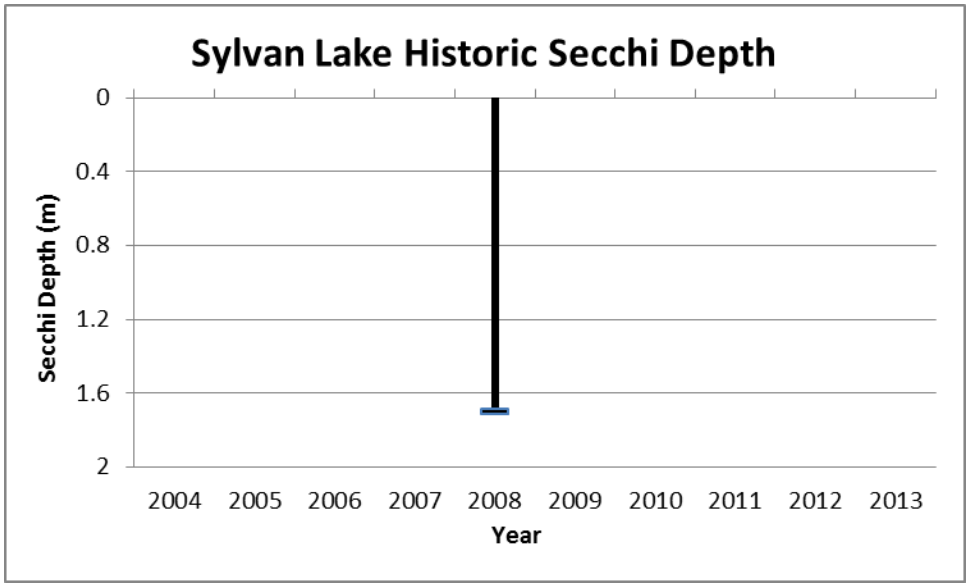

West Rice Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
300
250
200
150
100
50
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

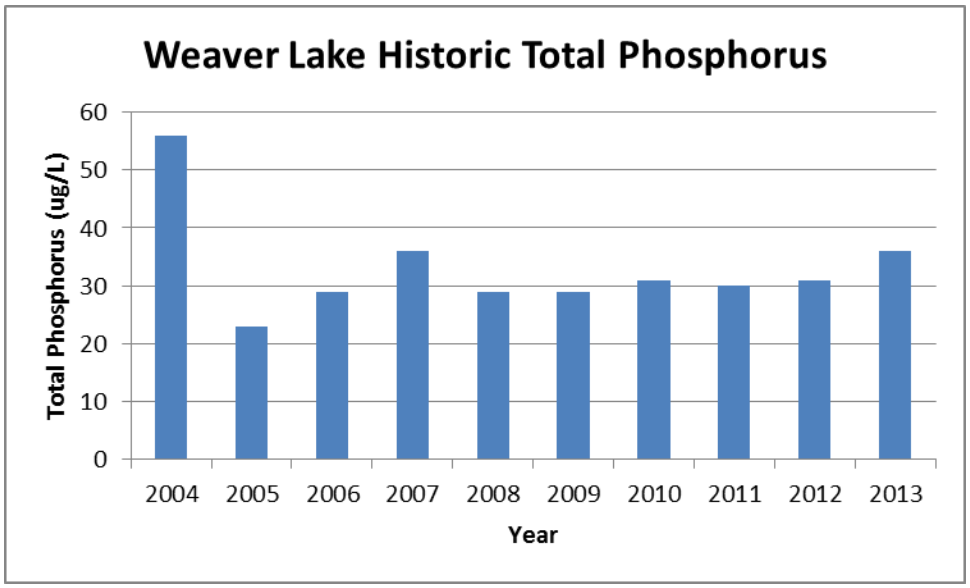

West Rice Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
35
30
25
20
15
10
5
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

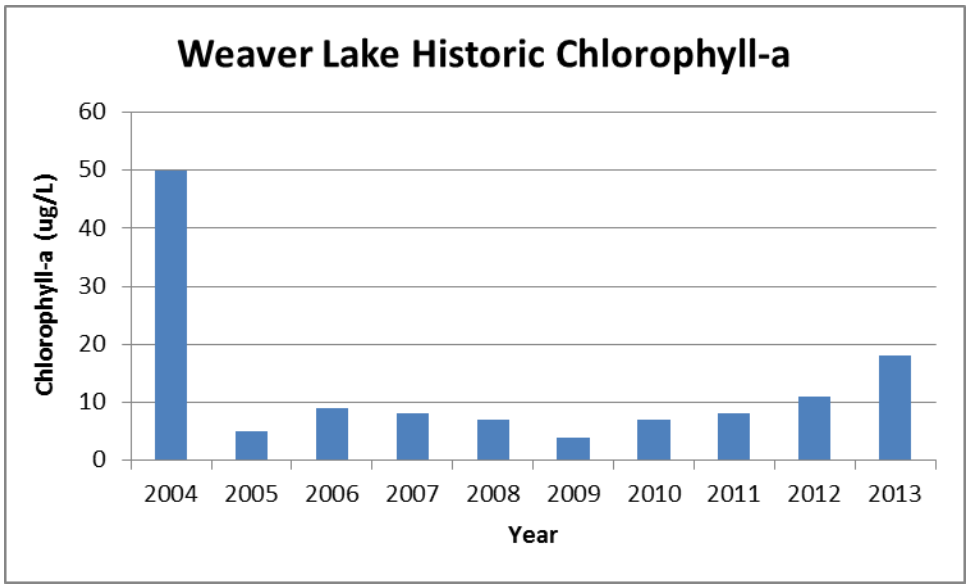

West Rice Lake Historic Secchi Depth
Secchi Depth (m)
0
0.4
0.8
1.2
1.6
2
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

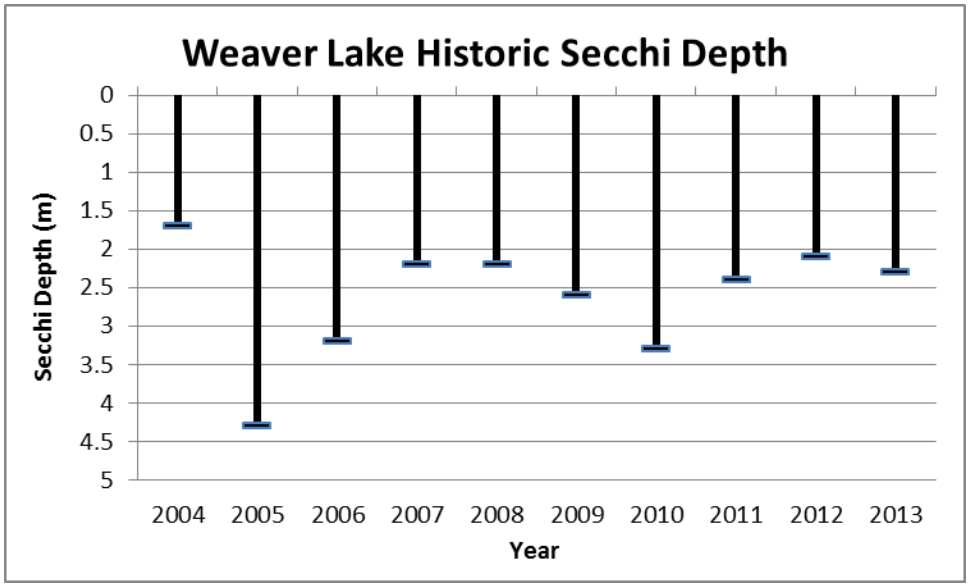

Sylvan Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
500
400
300
200
100
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year


Sylvan Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
30
25
20
15
10
5
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year


Sylvan Lake Historic Secchi Depth
Secchi Depth (m)
0
0.4
0.8
1.2
1.6
2
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year


Weaver Lake Historic Total Phosphorus
Total Phosphorus (ug/L)
60
50
40
30
20
10
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

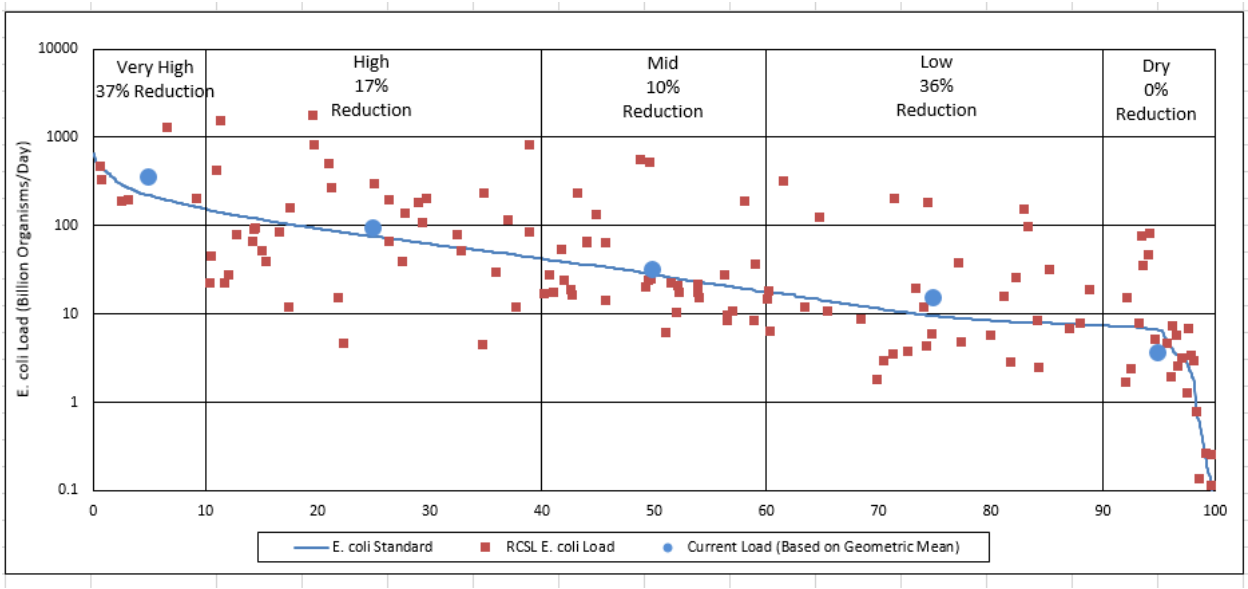

Weaver Lake Historic Chlorophyll-a
Chlorophyll-a (ug/L)
60
50
40
30
20
10
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year


Weaver Lake Historic Secchi Depth
Secchi Depth (m)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year

Streams

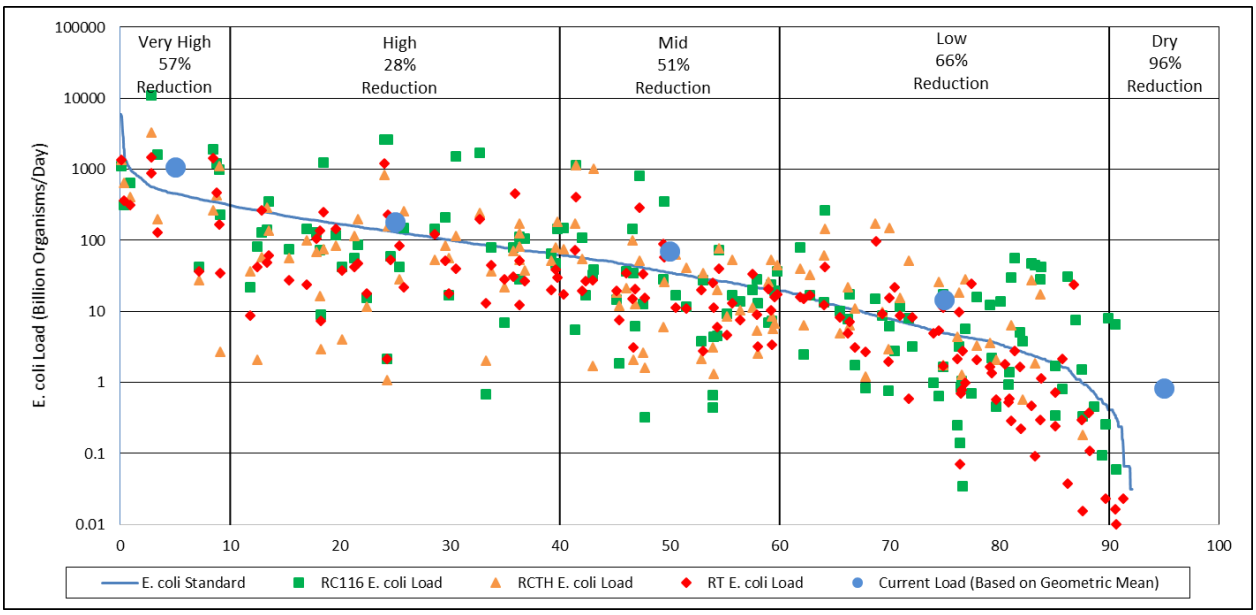
There is a lengthy flow and water quality period of record for the USGS monitoring station on Elm Creek in Elm Creek Park Reserve, and additional data gathered as part of the WRAPS study and for other assessments. This data was compiled in the WRAPS by Three Rivers Park District and other consultants performing monitoring and modeling for that project.

Rush Creek-South Fork (AUID – 732) *E. coli* Load Duration Curve and Required Load Reductions by Flow Regime.



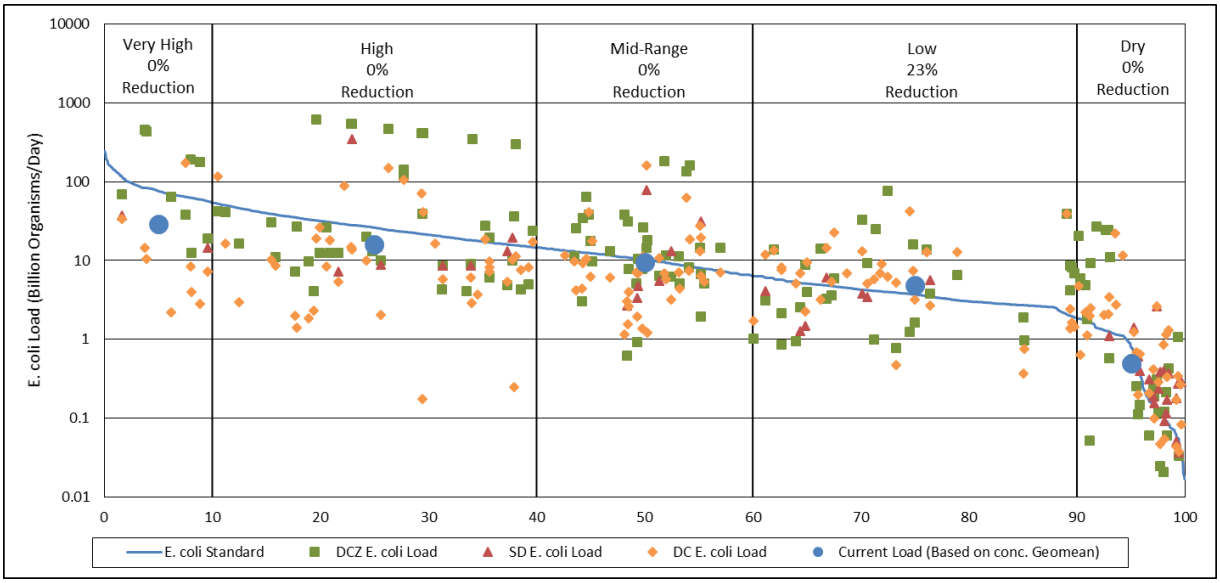
Note: The blue line represents the maximum allowable daily *E. coli* load

Rush Creek Mainstem (AUID -528) *E. coli* Load Duration Curve and Required Load Reductions by Flow Regime.



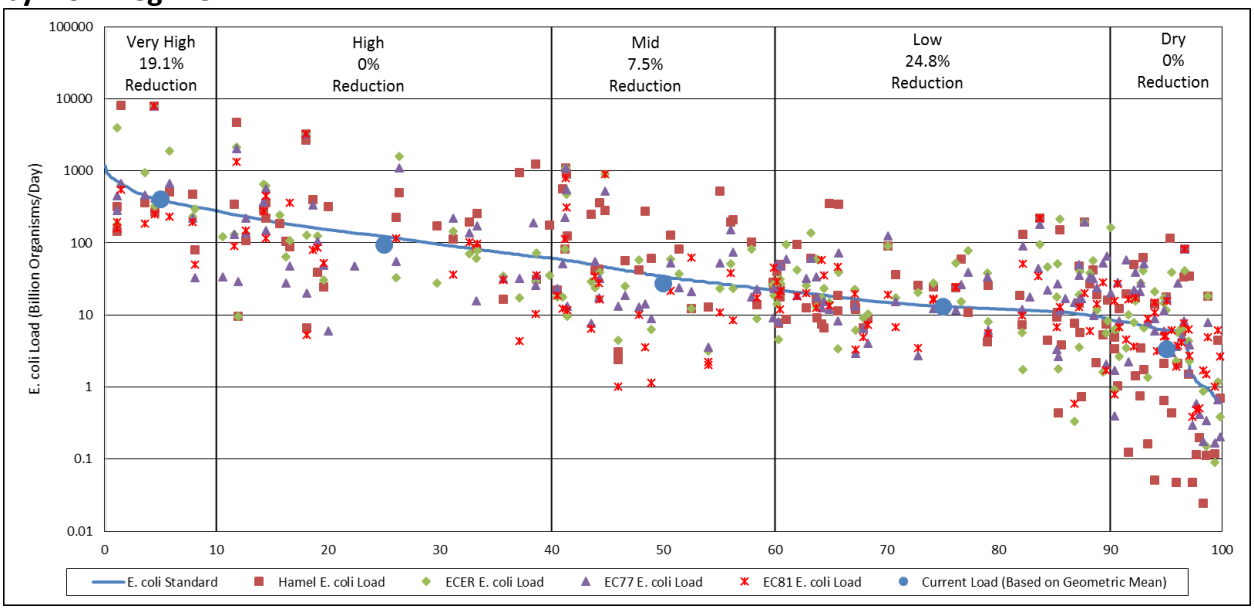
Note: The blue line represents the maximum allowable daily *E. coli* load

Diamond Creek (AUID -525) *E. coli* Load Duration Curve and Required Load Reductions by Flow Regime



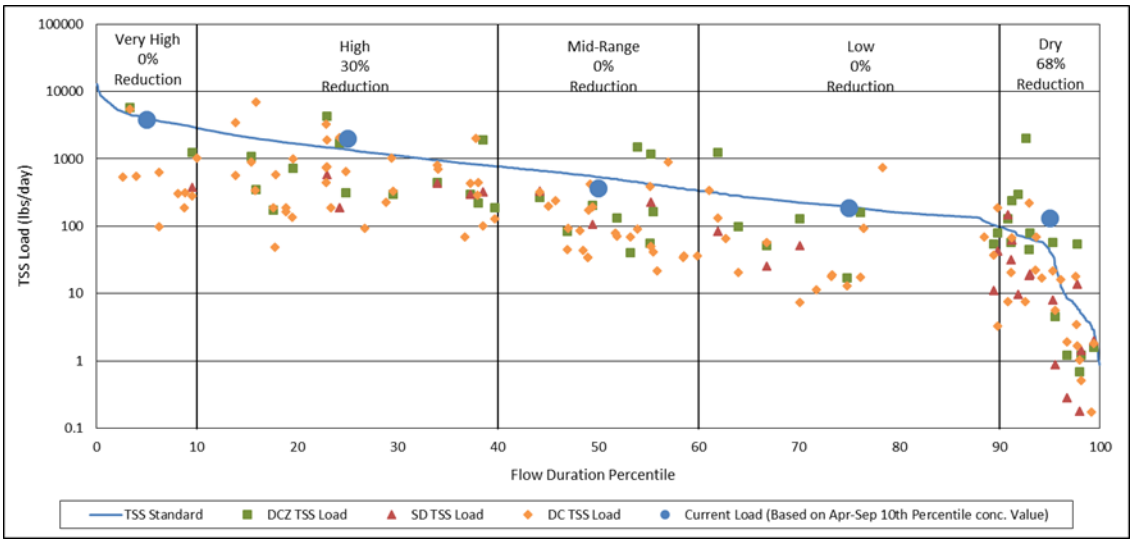
Note: The blue line represents the maximum allowable daily *E. coli* load

Figure 4.6 - Elm Creek (AUID -508) *E. coli* Load Duration Curve and Required Load Reductions by Flow Regime



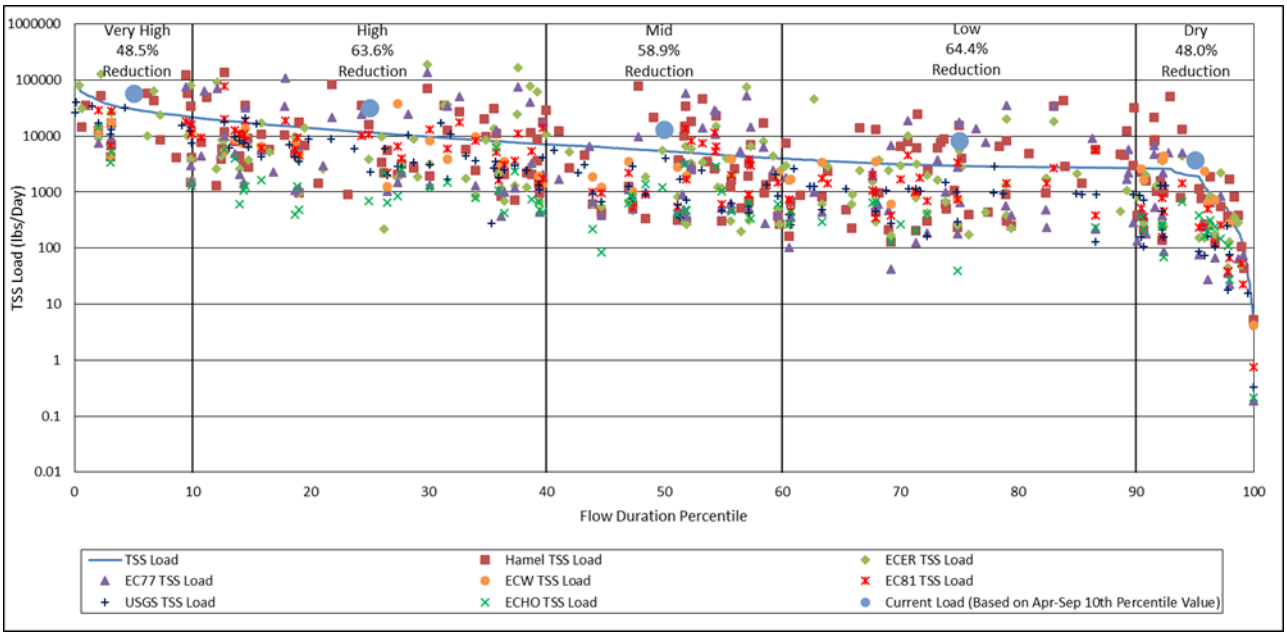
Note: The blue line represents the maximum allowable daily *E. coli* load

Diamond Creek (AUID -525) TSS Load Duration Curve and Required Load Reductions by Flow Regime



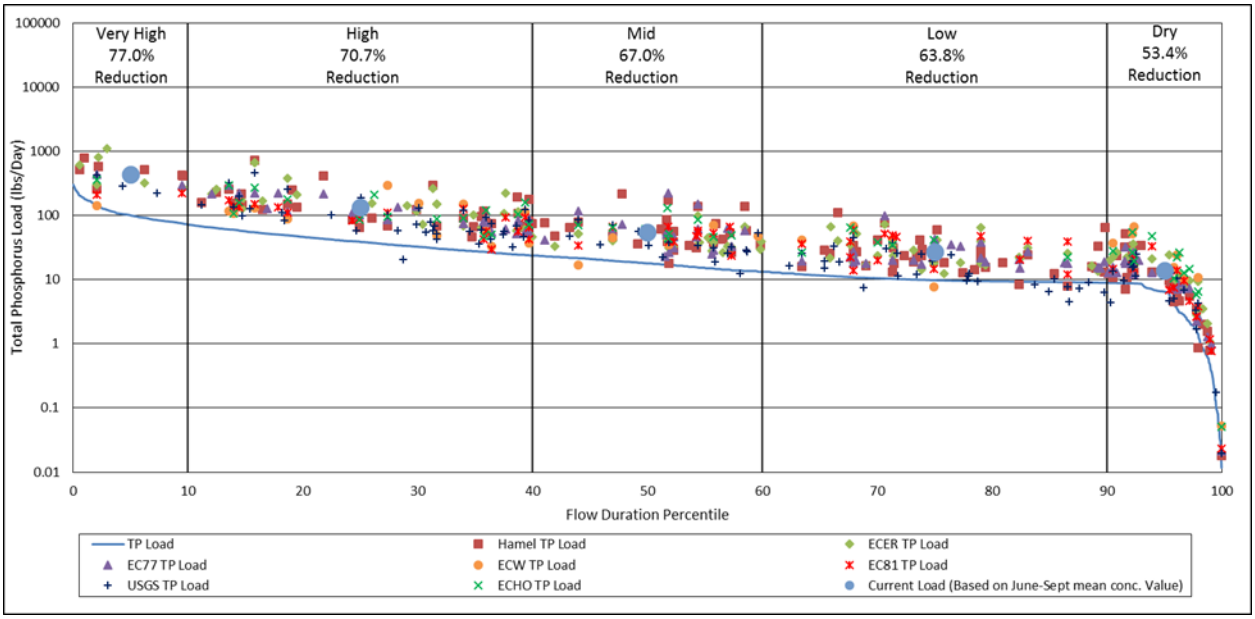
Note: The blue line represents the maximum allowable daily TSS load

Elm Creek (AUID -508) TSS Load Duration Curve and Required Load Reductions by Flow Regime



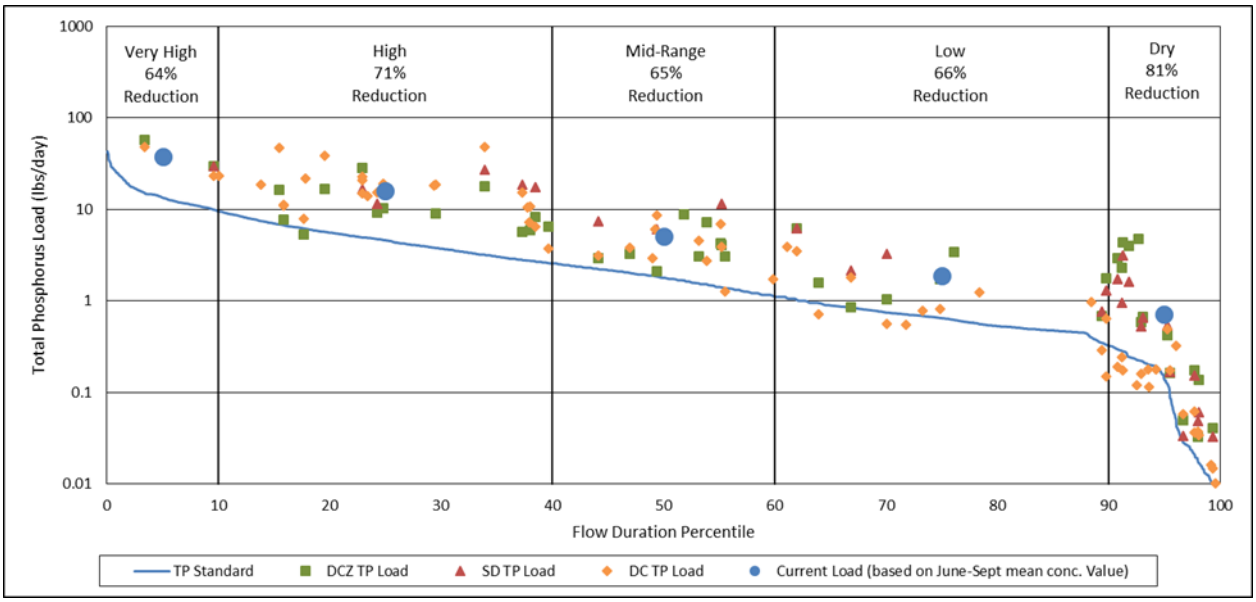
Note: The blue line represents the maximum allowable daily TSS load

Elm Creek (AUID -508) TP Load Duration Curve and Required Load Reductions by Flow Regime



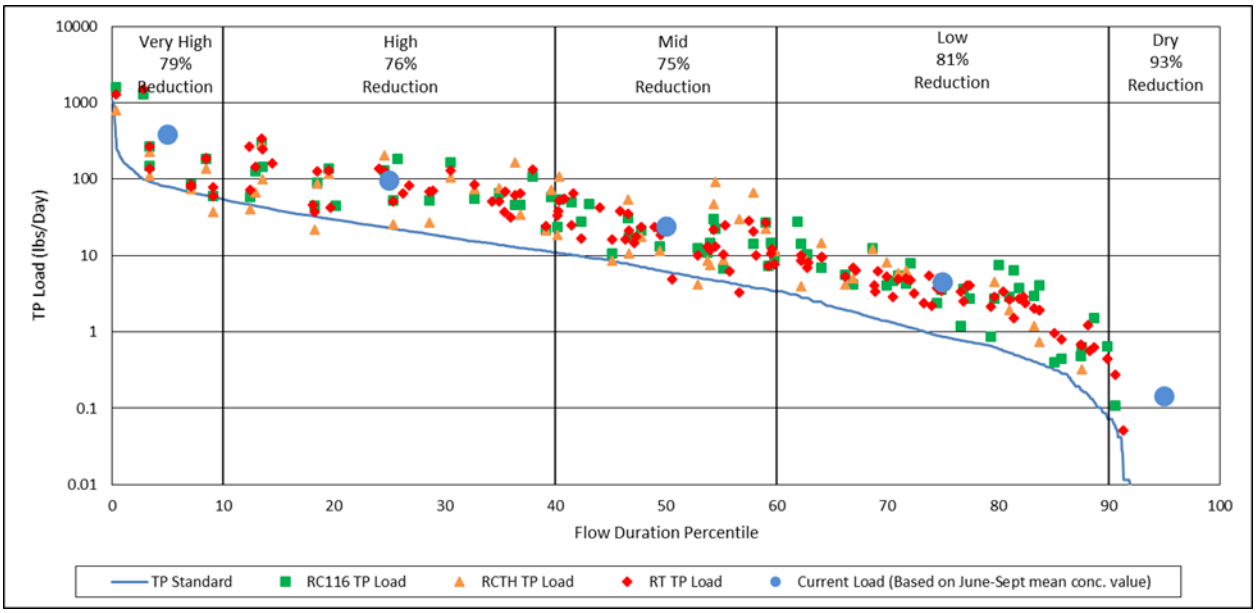
Note: The blue line represents the maximum allowable daily TP load

Diamond Creek (AUID -525) TP Load Duration Curve and Required Load Reductions by Flow Regime



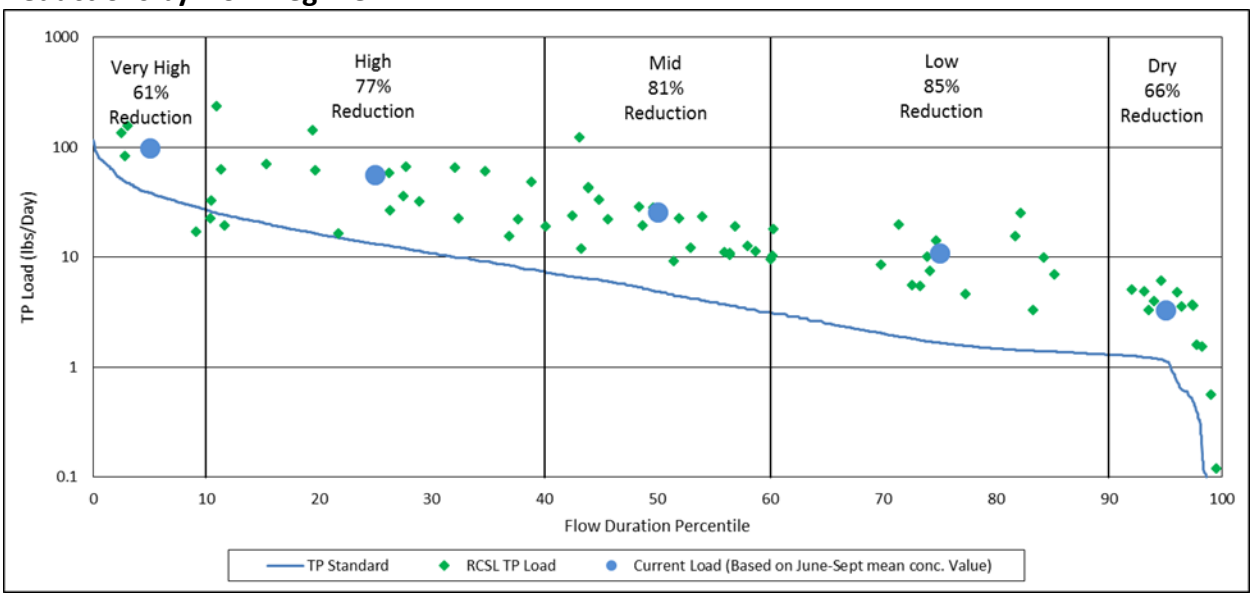
Note: The blue line represents the maximum allowable daily TP load

Rush Creek Mainstem (AUID -528) TP Load Duration Curve and Required Load Reductions by Flow Regime



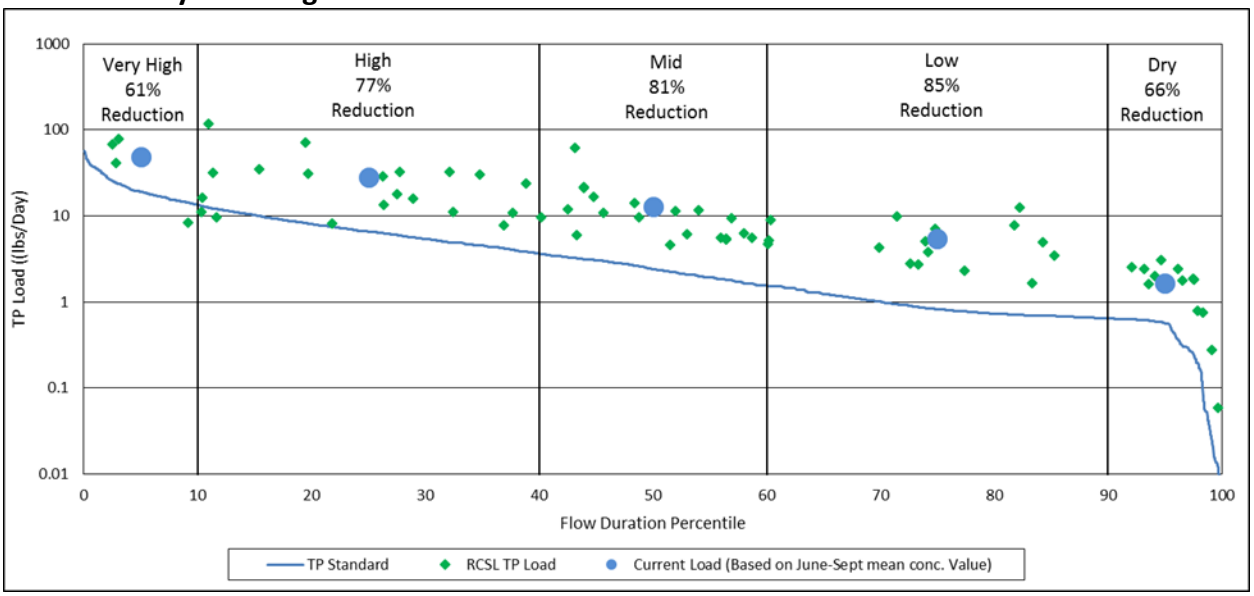
Note: The blue line represents the maximum allowable daily TP load

South Fork, Rush Creek (Lower) (AUID -732) TP Load Duration Curve and Required Load Reductions by Flow Regime



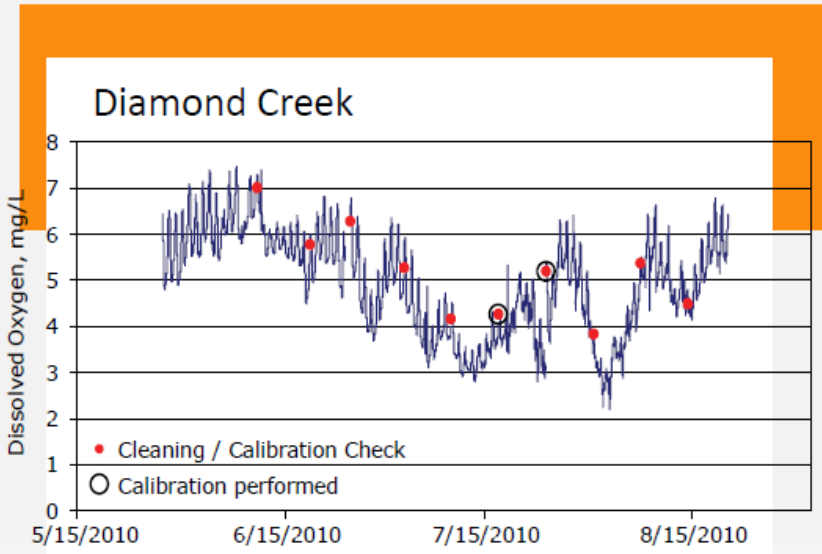
Note: The blue line represents the maximum allowable daily TP load

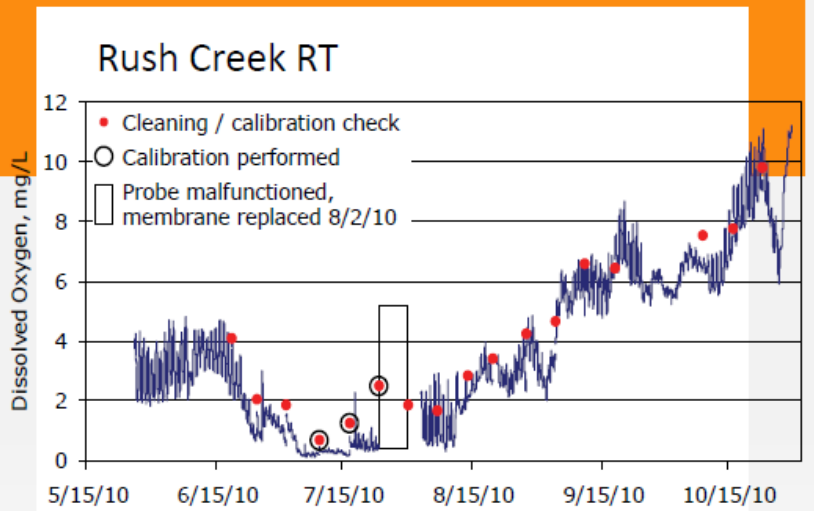
South Fork, Rush Creek (Upper) (AUID -760) TP Load Duration Curve and Required Load Reductions by Flow Regime

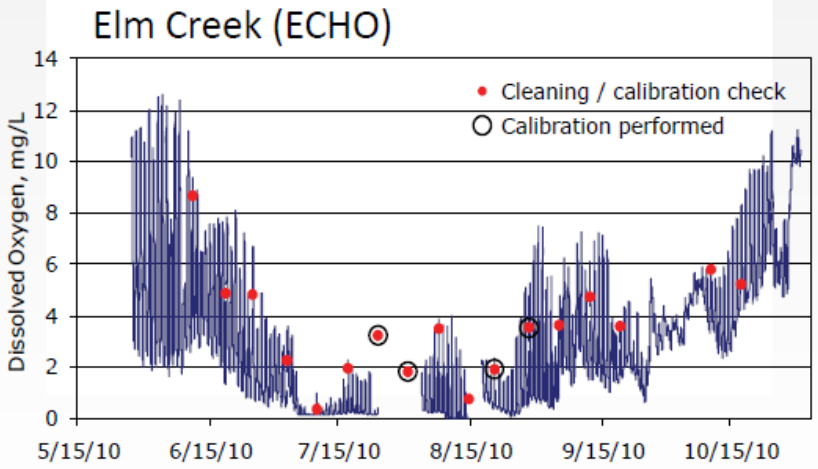


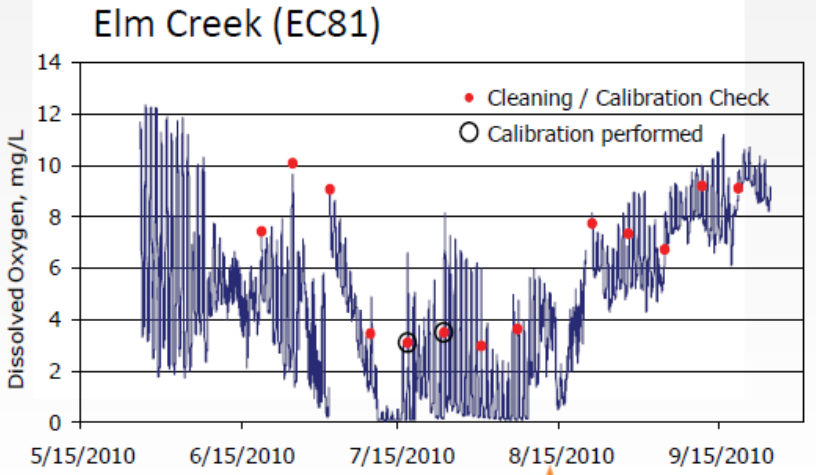
Note: The blue line represents the maximum allowable daily TP load

Dissolved Oxygen









NORTHLAND COLLEGE

SIGURD OLSON ENVIRONMENTAL INSTITUTE

Summarizing the Data

Site Name	Impairment	Data Years	Laboratory Parameters																						Field Parameters									
			TN		NH4		NO3		TP		SRP		TS		TSS		VSS		Chl		BOD		E. Coli		DO		Temp		Cond		pH		t-Tube	
			mg/L	n	mg/L	n	mg/L	n	mg/L	n	mg/L	n	mg/L	n	mg/L	n	mg/L	n	mg/L	n	mg/L	n	100ml	n	mg/L	n	Deg C	n	us/cm	n		n	cm	n
Lower Elm Creek																																		
ECRL	DO; E. Coli;	1	3.86	11					0.456	11	0.247	11			21.45	11			118.7	22	6.5	11	138	29										
ECW		1	1.77	16					0.211	16	0.095	16			13.72	16	8.4	15	86.7	16	5.0	12	73	30										
EC81		3	1.99	76					0.282	79	0.139	69			18.90	76	6.7	33	110.0	43	3.8	28	202	59										
USGS		23	1.74	267	0.20	681	1.56	205	0.170	831	0.230	73	341.00	65	20.00	419			52.2	204					8.4	243	10.3	265	568.0	326	7.7	322		
USGS (TRPD)		2	1.06	41					0.165	41	0.107	41			3.43	41	< 4	19	51.6	41	1.6	27	121	59			10.2	20					60.0	20
ECHO		2	1.71	60					0.345	60	0.210	56			6.48	60	< 4	28	75.2	42	3.0	29	97	59			10.6	20					42.7	20
MPO		2																					67	50										
Upper Elm Creek																																		
Hamel	DO; E. Coli; Chloride (?)	7	1.75	182	0.10	32	0.70	14	0.243	182	0.091	129	205.00	4	36.73	158	3.4	40	182.9	76	2.1	29	399	97	6.7	24	14.0	23	1421.3	22	7.3	24	85.5	21
ECER		7	1.62	159	0.07	31	1.21	13	0.306	160	0.130	117	505.33	3	39.25	137	7.8	33	69.3	69	2.7	28	369	91	7.5	20	13.7	20	565.4	20	7.4	20	93.2	18
EC77		4	1.43	129					0.222	131	0.106	85			41.39	132	7.1	35	89.2	71	2.5	28	297	99	8.6	22	14.7	22	572.9	21	7.3	21	96.1	24
MC1A and MC1B *		2	2.73	17					0.383	20	0.183	12			16.42	16																		
MC2		2	1.51	29					0.167	32	0.068	23			26.99	29																		
EC1		3	1.23	45					0.209	48	0.143	40			12.33	46																		
Rush Creek																																		
RT	DO; E. coli; Biota	4	1.79	97					0.391	99	0.243	62			24.92	99	< 4	27	69.7	70	2.7	29	137	99	6.8	25	14.8	25	465.8	22	7.4	24	77.0	36
RCSL / RC101*		4	2.09	76					0.571	76	0.400	49			83.66	75	< 4	17	148.8	60	2.3	24	449	97	4.3	23	14.4	22	1105.1	21	7.2	22	70.0	21
RC116		4	3.15	61					0.490	61	0.274	35			33.76	60	< 4	17	60.2	62	4.7	24	398	98	5.7	23	16.0	22	572.7	23	7.3	21	67.1	19
RCTH		4	2.39	46					0.518	46	0.213	32			21.09	43	< 4	17	75.2	47	2.5	22	427	70	5.7	11	14.5	9	649.0	8	7.4	9	77.3	12
RC		2	1.69	12					0.362	12	0.301	10			3.64	15																		
Diamond Creek																																		
DC	E. coli	4	1.35	96					0.209	100	0.126	64			15.54	96	< 4	25	39.6	71	2.3	26	340	99	9.2	24	14.3	24	512.1	23	7.4	24	88.7	36
SD		3	3.07	38					0.310	38	0.144	14			9.60	38			59.4	40	2.6	12	504	66	5.8	22	14.3	22	472.8	20	7.4	20	80.1	27
DCZ		4	4.24	60					0.440	60	0.115	35			57.06	60	6.7	19	75.9	62	3.2	23	604	94	5.9	23	13.9	22	461.6	21	7.4	22	23.5	29
Fish Lake																																		
FL2	Nutrients	1							0.232	16	0.122	16																						
FL4		1							0.589	11	0.233	11																						
FL5		1							0.502	8	0.283	8																						
FL6*		2	1.32	7					0.158	27	0.395	21			6.30	4																		
FL7		1							0.422	16	0.175	16																						

Summary Table 2. in 2011 Data Summary

Appendix C
Rules and Standards

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Elm Creek
Watershed Management Commission

Rules and Standards

Adopted: October 8, 2014

Effective: January 1, 2015

Revised: October 14, 2015

ELM CREEK
WATERSHED MANAGEMENT COMMISSION
RULES AND STANDARDS

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RULE B. PROCEDURAL REQUIREMENTS 7

RULE C. GENERAL STANDARDS 9

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RULE E. EROSION AND SEDIMENT CONTROL 17

RULE F. FLOODPLAIN ALTERATION 18

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Appendix A – Wet Pond Design Standards

POLICY STATEMENT

The Elm Creek Watershed Management Commission is a Joint Powers Association of the State under the Minnesota Watershed Act, and a watershed management organization as defined in the Metropolitan Surface Water Management Act. These acts provide the Commission with power to accomplish its statutory purpose: the conservation, protection, and management of water resources in the boundaries of the watershed through sound scientific principles. The Commission has adopted a water resources management plan pursuant to the Acts. These Rules implement the plan's principles and objectives.

Land alteration and utilization can affect the rate and volume and degrade the quality of surface water runoff. Sedimentation from ongoing erosion and construction activities can reduce hydraulic capacity of waterbodies and degrade water quality. Water quality problems already exist in many waterbodies in the watershed. Most of these waterbodies have been designated by the State of Minnesota as Impaired Waters, and do not meet state water quality standards.

Activities that increase the rate or volume of stormwater runoff will aggravate existing flooding problems and contribute to new ones. Activities that degrade runoff quality will cause quality problems in receiving water. Activities that fill floodplain or wetland areas will reduce flood storage and hydraulic capacity of waterbodies, and will degrade water quality by eliminating the filtering capacity of such areas.

These Rules and Standards protect the public health, welfare, and natural resources of the watershed by regulating the alteration of land and waters in the watershed to 1) reduce the severity and frequency of high water, 2) preserve floodplain and wetland storage capacity, 3) improve the chemical and physical quality of surface waters, 4) reduce sedimentation, 5) preserve the hydraulic and navigational capacities of waterbodies, 6) promote and preserve natural infiltration areas, and 7) preserve natural shoreline features. In addition to protecting natural resources, these Rules and Standards are intended to minimize future public expenditures on problems caused by land and water alterations.

RELATIONSHIP WITH MUNICIPALITIES AND COUNTY

The Commission recognizes that the control and determination of appropriate land use is the responsibility of the municipalities. The Commission will review projects involving land-disturbing activities in accordance with these Rules and Standards. The Commission intends to be active in the regulatory process to ensure that water resources are managed in accordance with its goals and policies.

The Commission desires to provide technical advice to the municipalities in the preparation of local stormwater management plans and the review of projects that may affect water resources prior to investment of significant public or private funds.

RULE A. DEFINITIONS

For the purposes of these Rules, unless the context otherwise requires, the following words and terms shall have the meanings set forth below. References in these Rules to specific sections of the Minnesota Statutes or Rules include amendments, revisions or recodifications of such sections. The words "shall" and "must" are mandatory; the word "may" is permissive.

100 Year Event. The rainfall depth with a 1 percent chance of occurring in a given year.

Abstraction. Removal of stormwater from runoff, by such methods as infiltration, evaporation, transpiration by vegetation, and capture and reuse, such as capturing runoff for use as irrigation water.

Agricultural Activity. The use of land for the production of agronomic, horticultural or silvicultural crops, including dairy animals, food animals, nursery stock, sod, fruits, vegetables, flowers, cover crops, grains, Christmas trees, and for grazing.

Alteration or Alter. When used in connection with public waters or wetlands, any activity that will change or diminish the course, current, or cross-section of public waters or wetlands.

Applicant. Any person or political subdivision that submits an application to the Commission for a project review under these Rules.

Best Management Practices (BMPs). Techniques proven to be effective in controlling runoff, erosion and sedimentation including those documented in the Minnesota Construction Site Erosion and Sediment Control Planning Handbook (BWSR 1988), Protecting Water Quality in Urban Areas (MPCA 2000), and the Minnesota Stormwater Manual (MPCA 2005) as revised.

Biofiltration. Using living material to capture and/or biologically degrade or process pollutants prior to discharging stormwater, such as directing runoff through a vegetated buffer or to a rain garden or vegetated basin with an underdrain.

Bioretention. A terrestrial-based (upland, as opposed to wetland) water quality and water quantity control process. Bioretention employs a simplistic, site-integrated design that provides opportunity for runoff infiltration, filtration, storage and water uptake by vegetation.

Buffer Strip. An area of natural, unmaintained, vegetated ground cover abutting or surrounding a watercourse or wetland.

BWSR. The Minnesota Board of Water and Soil Resources.

Commission. The Elm Creek Watershed Management Commission.

Commissioners. The Board of Commissioners of the Elm Creek Watershed Management Commission.

Compensatory Storage. Excavated volume of material below the floodplain elevation required to offset floodplain fill.

County. Hennepin County, Minnesota.

Dead Storage. The permanent pool volume of a water basin or the volume below the runout elevation of a water basin.

Detention Basin. Any natural or manmade depression for the temporary storage of runoff.

Development. Any proposal to subdivide land, any land-disturbing activity or creation of impervious surface.

Directly Connected Impervious Surface. Any hard surface (rooftop, driveway, sidewalk, roadway, etc.) from which runoff is not subject to loss beyond initial abstraction before being routed to the downstream collection and conveyance system.

Disturbance. See Land Disturbing Activity.

Drain or Drainage. Any method for removing or diverting water from waterbodies, including excavation of an open ditch, installation of subsurface drainage tile, filling, diking, or pumping.

Erosion. The wearing away of the ground surface as a result of wind, flowing water, ice movement, or land disturbing activities.

Erosion and Sediment Control Plan. A plan of BMPs or equivalent measures designed to control runoff and erosion and to retain or control sediment on land during the period of land disturbing activities in accordance with the standards set forth in these Rules.

Excavation. The artificial removal of soil or other earth material.

Fill. The deposit of soil or other material by artificial means.

Filtration. A process by which stormwater runoff is captured, temporarily stored, and routed through a filter bed to improve water quality and slow down stormwater runoff.

Floodplain. The area adjacent to a waterbody that is inundated during a 1% chance (100-year) flood as defined by the FEMA Flood Insurance Study for the member city or the Commission's flood study.

Impaired Water. A waterbody that does not meet state water quality standards and that has been included on the MPCA Section 303(d) list of Impaired Waters of the state.

Impervious Surface. A surface compacted or covered with material so as to be highly resistant to infiltration by runoff. Impervious surface shall include roads, driveways and parking areas,

whether or not paved, sidewalks greater than 3 feet wide, patios, tennis and basketball courts, swimming pools, covered decks and other structures. Open decks with joints at least ¼ inch wide, areas beneath overhangs less than 2 feet wide, and sidewalks 3 feet or less wide shall not constitute impervious surfaces under these Rules.

Infiltration. The passage of water into the ground through the soil.

Infiltration Area. Natural or constructed depression located in permeable soils that capture, store and infiltrate the volume of stormwater runoff associated with a particular design event.

Interested Party. A person or political subdivision with an interest in the pending subject matter.

Land Disturbing Activity. Any change of the land surface to include removing vegetative cover, excavation, fill, grading, and the construction of any structure that may cause or contribute to erosion or the movement of sediment into waterbodies. The use of land for agricultural activities, or improvements such as mill and overlay or concrete rehabilitation projects that do not disturb the underlying soil shall not constitute a land disturbing activity under these Rules.

Landlocked Basin. A basin that is 1 acre or more in size and does not have a natural outlet at or below the 1% chance (100-year) flood elevation as determined by the 1% chance (100-year), 10-day runoff event.

Low Floor. The finished surface of the lowest floor of a structure.

Member City. Any city wholly or partly within the Commission's boundary that has executed the Joint Powers Agreement.

MnDOT. The Minnesota Department of Transportation.

MPCA. The Minnesota Pollution Control Agency.

Municipality. Any city wholly or partly within the Commission's boundary.

NPDES. National Pollutant Discharge Elimination System.

NURP. The Nationwide Urban Runoff Program developed by the Environmental Protection Agency to study stormwater runoff from urban development.

Ordinary High Water Level (OHW). The elevation delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. For watercourses, the OHW level is the elevation of the top of the bank of the channel. An OHW established for a waterbody by the Minnesota Department of Natural Resources will constitute the OHW under this definition.

Owner. The owner of a parcel of land or the purchaser under a contract for deed.

Parcel. A parcel of land designated by plat, metes, and bounds, registered land survey, auditor's subdivision, or other accepted means and separated from other parcels or portions by its designation.

Person. Any individual, trustee, partnership, unincorporated association, limited liability company or corporation.

Political Subdivision. A municipality, county or other political division, agency or subdivision of the state.

Project. A space, parcel, or parcels of real property owned by one or more than one person which is being or is capable of being developed or redeveloped as a single project.

Public Health and General Welfare. Defined in Minnesota Statutes, Section 103D.011, Subdivisions 23 and 24.

Public Waters. Any waters as defined in Minnesota Statutes, Section 103G.005, Subdivision 15.

Public Waters Wetland. Any wetland as defined in Minnesota Statutes, Section 103G.005, Subdivision 15a.

Redevelopment. Any proposal to re-subdivide land, or any land-disturbing activity or addition of impervious surface to a developed site.

Runoff. Rainfall, snowmelt or irrigation water flowing over the ground surface.

Sediment. Soil or other surficial material transported by surface water as a product of erosion.

Sedimentation. The process or action of depositing sediment.

Shoreland Protection Zone. Land located within a floodplain or within 1,000 feet of the OHW of a public water or public waters wetland or 300 feet of a public waters watercourse.

Site. A space, parcel, or parcels of real property owned by one or more than one person which is being or is capable of being developed or redeveloped as a single project.

Standard. A required level of quantity, quality, or value.

Stormwater Management Plan. A plan for the permanent management and control of runoff prepared and implemented in accordance with the standards set forth in these Rules.

Structure. Anything manufactured, constructed or erected which is normally attached to or positioned on land, including portable structures, earthen structures, walls, roads, water and storage systems, drainage facilities and parking lots.

Subdivision or Subdivide. The separation of a parcel of land into two or more parcels.

TMDL. A Total Maximum Daily Load is the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. "TMDL" can also refer to a study that calculates that load, or to the allocation of that allowable load to its various sources. An Implementation Plan may be part of the TMDL study or it may be a separate document that sets forth the steps that will be taken to achieve the TMDL.

Volume Management. The retention and abstraction of a certain volume of stormwater runoff onsite through techniques such as infiltration, evapotranspiration, and capture and reuse.

Water Basin. An enclosed natural depression with definable banks capable of containing water that may be partly filled with public waters.

Waterbody. All water basins, watercourses and wetlands as defined in these Rules.

Watercourse. Any natural or improved stream, river, creek, ditch, channel, culvert, drain, gully, swale, or wash in which waters flow continuously or intermittently in a definite direction.

Water Resources Management Plan. The watershed management plan for the Commission adopted and implemented in accordance with Minnesota Statutes, Section 103B.231.

Watershed. Region draining to a specific watercourse or water basin.

Wetland. Land transitional between terrestrial and aquatic systems as defined in Minnesota Statutes, Section 103G.005, Subdivision 19.

Wetland Conservation Act (WCA). Minnesota Wetland Conservation Act of 1991 as amended.

RULE B. PROCEDURAL REQUIREMENTS

1. **APPLICATION REQUIRED**. Any person or political subdivision undertaking an activity for which a project review is required by these Rules shall first submit to the Commission a project review application, design data, plans, specifications, fees, and such other information and exhibits as may be required by these Rules. Applications shall be signed by the owner, or the owner's authorized agent, except for activities of a political subdivision which may be signed by either the owner or the general contractor. All project review applications must be authorized by the municipality where the proposed project is located.

2. **FORMS**. Project review applications shall be submitted on forms provided by the Commission. Forms are available at the Commission office or Web site.

3. **ACTION BY COMMISSION**. The Commission shall act within 60 days after receipt of a complete application, including all required information, exhibits and fees. If a state or federal law or court order requires a process to occur before the Commission acts on an application, or if an application requires prior approval of a state or federal agency, the deadline for the Commission to act is extended to 60 days after completion of the required process or the required prior approval is granted. The Commission may extend the initial 60-day period by providing written notice of the extension to the applicant. The extension may not exceed 60 days unless approved by the applicant.

4. **SUBMITTAL**. A complete project review application with all required information and exhibits shall be filed with the Commission at least 14 calendar days prior to the scheduled meeting date of the Commission. Late or incomplete submittals will be scheduled to a subsequent meeting date.

5. **CONDITIONS**. A project review may be approved subject to reasonable conditions to assure compliance with these Rules. The conditions may include a requirement that the applicant and owner enter into an agreement with the member city in a form acceptable to the Commission to a) specify responsibility for the construction and future maintenance of approved structures or facilities, b) document other continuing obligations of the applicant or owner, c) grant reasonable access to the proper authorities for inspection, monitoring and enforcement purposes, d) affirm that the Commission or other political subdivisions can require or perform necessary repairs or reconstruction of such structures or facilities, e) require indemnification of the Commission for claims arising from issuance of the approved project review or construction and use of the approved structures or facilities, and f) reimburse the reasonable costs incurred to enforce the agreement. Project reviews and agreements may be filed for record to provide notice of the conditions and continuing obligations.

6. **ISSUANCE OF PROJECT REVIEWS**. The Commission will issue a project review approval only after the applicant has satisfied all requirements of these Rules and paid all required fees.

7. **VALIDITY**. Issuance of a project review approval based on plans, specifications, or other data shall not prevent the Commission from thereafter requiring the correction of errors in the approved plans, specifications and data, or from preventing any activity being carried on thereunder in violation of these Rules.

8. **MODIFICATIONS**. The applicant shall not modify the approved activity or plans and specifications on file with the Commission without the prior approval of the Commission.

9. **INSPECTION AND MONITORING**. With permission of the property owner and under the authority of the member city, the Commission may perform such field inspections and monitoring of the approved activity as the Commission deems necessary to determine compliance with the conditions of the project review and these Rules. Any portion of the activity not in compliance shall be promptly corrected. In applying for a project review, the applicant consents to entry upon the land for field inspections and monitoring, or for performing any work necessary to bring the activity into compliance.

10. **SUSPENSION OR REVOCATION**. The Commission may suspend or revoke a project review approved under these Rules whenever the project review approval is issued in error or on the basis of incorrect information supplied, or in violation of any provision of these Rules, or if the preliminary and final project approvals received from the municipality or county are not consistent with the conditions of the approved project review.

11. **EXPIRATION OF COMMISSION APPROVALS.** An approved project review shall expire and become null and void if the approved activity is not commenced within one year from date of approval, or if the approved activity is suspended or abandoned for a period of one year from the date the activity originally commenced. With the approval of the affected member city, applicants may apply for an extension of that period if the city review process is extended beyond the usual review period. Before an activity delayed for one year or more can recommence, the project approval must be renewed. Any applicant may apply for an extension of time to commence the approved activity under an unexpired project review approval.

    An application for renewal or extension must be in writing, and state the reasons for the renewal or extension. Any plan changes and required fees must be included with the application. There must be no unpaid fees or other outstanding violations of the approval being renewed or extended. An application for extension must be received by the Commission at least 30 days prior to the approval's expiration. The Commission shall consider the application for renewal or extension on the basis of the Rules in effect on the date the application is being considered. The Commission may extend the time for commencing the approved activity for a period not exceeding one year upon finding that circumstances beyond the control of the applicant have prevented action from being taken.

12. SEVERABILITY. If any provision of these Rules is adjudged unconstitutional or invalid by a court of competent jurisdiction, the remainder of these Rules shall not be affected thereby.

RULE C. GENERAL STANDARDS

1. POLICY. It is the policy of the Commission to protect the water resources of the watershed by requiring that all activities within the watershed comply with minimum standards for the protection of water quality and the environment.

2. REGULATION.

a) All land disturbing activities, whether requiring a project review under these Rules or otherwise, shall be undertaken in conformance with BMPs.

b) Project reviews are required of any land disturbing activity meeting the review thresholds set forth in Rule D Section 2.

c) In areas that drain to Impaired Waters, TMDL Implementation Plans may include site-specific requirements for any land-disturbing activities that are in addition to these rules and standards.

d) No person shall conduct land-disturbing activities without protecting adjacent property and waterbodies from erosion, sedimentation, flooding, or other damage.

e) Development shall be planned and conducted to minimize the extent of disturbed area, runoff velocities, and erosion potential, and to reduce and delay runoff volumes. Disturbed areas shall be stabilized and protected as soon as possible and facilities or methods used to retain sediment on-site.

f) Existing natural watercourses and vegetated soil surfaces shall be used to convey, store, filter, and retain runoff before discharge into public waters or a stormwater conveyance system.

g) Runoff from roof gutter systems shall discharge onto lawns or other pervious surfaces to promote infiltration where possible.

h) Use of fertilizers and pesticides in the shoreland protection zone shall be so done as to minimize runoff into public waters by the use of earth material, vegetation, or both. No phosphorus fertilizer shall be used unless a soil nutrient analysis shows a need for phosphorus or in the establishment of new turf.

i) When development density, topographic features, and soil and vegetation conditions are not sufficient to adequately handle runoff using natural features and vegetation, various types of constructed facilities such as diversions, settling basins, skimming devices, dikes, waterways, and ponds may be used. The Commission encourages designs using surface drainage, vegetation and infiltration rather than buried pipes and man-made materials and facilities.

j) Whenever the Commission determines that any land disturbing activity has become a hazard to any person or endangers the property of another, adversely affects water quality or any waterbody, increases flooding, or otherwise violates these Rules, the Commission shall notify the member city where the problem occurs and the member city shall require the owner of the land upon which the land disturbing activity is located, or other person or agent in control of such land, to repair or eliminate such condition within the time period specified therein. The owner of the land upon which a land disturbing activity is located shall be responsible for the cleanup and any damages from sediment that has eroded from such land. The Commission may require the owner to submit a project review application under these Rules before undertaking any repairs or restoration.

RULE D. STORMWATER MANAGEMENT

1. POLICY. It is the policy of the Commission to control excessive rates and volumes of runoff by:

a) Requiring that peak runoff rates not exceed existing conditions or the capacity of downstream conveyance facilities or contribute to flooding or streambank erosion.

b) Managing subwatershed discharge rates and flood storage volumes to be consistent with the goals of the Commission's water resources management plan and the local water resources management plans.

c) Controlling runoff rates by the use of on-site or if feasible regional detention or infiltration facilities.

d) Reviewing stormwater management structures based on the 1% (100-year) critical storm event for the drainage area.

e) Routing runoff to water treatment ponds or other acceptable facilities before discharging into waterbodies.

f) Promoting the use of natural resources for storing runoff and improving water quality and other amenities where appropriate.

g) Promoting natural infiltration of runoff.

2. REGULATION. No person or political subdivision shall commence a land disturbing activity or the development or redevelopment of land for the following types of projects without first submitting to and obtaining approval of a project review from the Commission or the city in which the project is located that incorporates a stormwater management plan for the activity, development or redevelopment:

a) Plans of any land development or site development that disturbs more than 1 acre of land.

b) Linear projects that create one acre or more of new impervious surface must meet all Commission requirements for the net new impervious surface. Sidewalks and trails that

do not exceed twelve feet (12’0”) in width, are not constructed with other improvements, and have a minimum of five feet (5’0”) of vegetated buffer on both sides are exempt from Commission requirements

c) Plans of any land development or individual site development adjacent to or containing a lake, wetland, or a natural or altered watercourse as listed in the Hennepin County wetland inventory or the final inventory of Protected Waters and Wetlands for Hennepin County, as prepared by the DNR.

d) Any culvert installation or replacement, bridge construction, stream cross-section alteration, or activity requiring a DNR Waters Permit on Elm, Rush, North Fork Rush, or Diamond Creeks or their tributaries.

e) Plans for any land development or site development within the 1% chance (100-year) floodplain as defined by the Flood Insurance Study for the member city or the Commission’s flood study.

f) Plans of any land development or site development regardless of size, if such review is requested by a member city.

g) Land disturbing activity that drains to more than one watershed, for that portion of the site draining into the Elm Creek Watershed.

3. CRITERIA. Stormwater management plans shall comply with the following criteria regarding runoff rate restrictions, volume control requirements, and water quality requirements.

a) A hydrograph method based on sound hydrologic theory will be used to analyze runoff for the design or analysis of flows, volumes, water quality, and water levels.

b) *Runoff rates* for the proposed activity shall not exceed existing runoff rates for the 2-year, 10-year, and 100-year critical storm events and rainfall distribution for the project location as set forth in NOAA Atlas 14 Volume 8, published June 2013, or its successor, using the online NOAA Precipitation Frequency Data Server or a similar data source. Applicant must document the location and event depths used. If an approved local water management plan requires more restrictive rate control, then the more restrictive rate shall govern. Runoff rates may be restricted to less than the existing rates when necessary for the public health and general welfare of the watershed.

   i) If detention basins are used to control rate of runoff they shall be designed to provide:

      (1) An outlet structure to control the 2-year, 10-year, and 100-year critical storm events to predevelopment runoff rates. Said outlet structure will be required to control critical storm events to less than predevelopment runoff rates if downstream facilities have insufficient capacity to handle the increased flow.

      (2) Alternative to (1), runoff may be directed to a downstream facility within the same hydrologic subwatershed that has sufficient capacity to provide the required rate control. This means that no rate control may be required for an

individual development provided there is a regional facility designed and constructed to accommodate the flow from this property.

(3) An identified overflow spillway sufficiently stabilized to convey a 1% (100-year) critical storm event.

(4) A normal water elevation above the OHW of adjacent waterbodies.

(5) Access for future maintenance.

(6) An outlet skimmer to prevent migration of floatables and oils for at least the two year storm event.

(7) The low floor elevation shall be at minimum two feet above the critical event 100-year elevation and at minimum one foot above the emergency overflow elevation of nearby waterbodies and stormwater ponds.

ii) Regional detention basins may be used to manage peak flow rates and meet water quality objectives when feasible.

iii) Analysis of flood levels, storage volumes and flow rates for waterbodies and detention basins shall be based on the range of rainfall and snow melt duration producing the critical flood levels and discharges, whichever is most critical.

iv) Landlocked water basins may be provided with outlets that:

(1) Retain a hydrologic regime complying with floodplain and wetland alterations.

(2) Provide sufficient storage below the outlet run-out elevation to retain back-to-back 100-year, 24-hour rainfalls and runoff above the highest anticipated groundwater elevation and prevent damage to property adjacent to the basin.

(3) Do not create adverse downstream flooding or water quality conditions.

c) Stormwater runoff volume must be *infiltrated/abstracted* onsite in the amount equivalent to one point one inch (1.1”) of runoff generated from new impervious surface.

i) Applicant must minimize the creation of new impervious surface, reduce existing impervious surfaces where possible, and minimize the amount of directly connected impervious surface.

ii) When using infiltration for volume reduction, runoff must be infiltrated within 48 hours. Infiltration volumes and facility sizes shall be calculated based on the measured infiltration rate determined by a double-ring infiltrometer test(s) conducted to the requirements of ASTM Standard D3385 at the proposed bottom elevation of the infiltration area. Other testing methods may be used with the approval of the Commission’s Engineer. The measured infiltration rate shall be divided by the appropriate correction factor selected from the Minnesota Stormwater Manual. This site investigation must be conducted by a licensed soil scientist or engineer.

iii) A post-construction percolation test must be performed on each infiltration practice and must demonstrate that the constructed infiltration rate meets or exceeds the design infiltration rate prior to project acceptance by the city.

iv) Infiltration areas will be limited to the horizontal areas subject to prolonged wetting.

v) Areas of permanent pools tend to lose infiltration capacity over time and will not be accepted as an infiltration practice.

vi) Stormwater runoff must be pretreated to remove solids before discharging to infiltration areas to maintain the long term viability of the infiltration areas.

vii) Design and placement of infiltration BMPs shall be done in accordance with the Minnesota Department of Health guidance "Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas," as amended.

viii) Constructed bioretention and infiltration practices such as rain gardens, infiltration trenches, and infiltration benches shall not be used in:

(1) Fueling and vehicle maintenance areas;

(2) Areas with less than 3 feet separation from the bottom of the infiltration system to the elevation of seasonal high groundwater;

(3) Areas with runoff from industrial, commercial and institutional parking lots and roads and residential arterial roads with less than 5 feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater;

(4) Areas within 400 feet of a community water well, within 100 feet of a private well, or within a delineated 1-year time of travel zone in a wellhead protection area;

(5) Sites documented to contain contaminated soils or groundwater.

ix) Credit towards compliance with the abstraction requirement in (c) may be achieved by:

(1) Meeting post construction soil quality and amendment depth requirements. Areas that will be subjected to clearing, grading, or compaction that will not be covered by impervious surface, incorporated into a drainage facility, or engineered as structural fill or slope may be included in the credit calculation if they meet post construction soil quality and amendment depth requirements. Soil amendment areas become part of the site's storm drainage system, and must be protected by a utility and drainage easement and be included in the site's utility maintenance agreement. The applicant may compute a credit of 0.5 inches over the soil amendment area and apply that toward the abstraction volume requirement.

(a) A minimum 8-inch depth of compost amended soil or imported topsoil shall be placed in all areas of the project site being considered for the abstraction

credit. Before the soil is placed, the subsoil must be scarified (loosened) at least 4 inches deep, with some incorporation of the amended soil into the existing subsoil to avoid stratified layers.

(b) Soil amendment may be achieved by either mixing 2 inches of approved compost into the 8 inches of soil depth, or by mixing a custom-calculated amount of compost to achieve 8 inches of uncompacted soil depth with a minimum organic content of five percent.

(c) The amended areas must pass a 12-inch probe test during the site final inspection, in accordance with the Commission's testing procedure. Once amended, soil areas must be protected from recompaction.

(2) Preserving undisturbed forest or grassland conservation areas. Conservation areas must remain undisturbed during construction and must be protected by a permanent conservation easement prescribing allowable uses and activities on the parcel and preventing future development. A long-term vegetation management plan describing methods of maintaining the conservation area in a natural vegetative condition must be submitted with the stormwater management plan. The applicant may compute a credit of 0.5 inches over the conservation area and apply that toward the abstraction volume requirement.

(3) Providing wetland buffers in excess of minimum requirements. Areas eligible for credit must meet all wetland buffer requirements, must be monumented and shown on the construction plans. The applicant may compute a credit of 0.5 inches over the excess buffer area and apply that toward the abstraction volume requirement.

(4) Disconnecting impervious surface by redirecting runoff across a pervious surface or into an engineered bioinfiltration facility. Impervious disconnection must be designed to prevent any reconnection of runoff with the storm drain system. The applicant may subtract the disconnected impervious surface area from the total impervious surface area used to compute the required abstraction volume.

x) Alternative to (c), runoff may be directed to a downstream facility within the same hydrologic subwatershed that has sufficient capacity to provide the required volume management. This means that no volume management may be required for an individual development provided there is a regional facility designed and constructed to accommodate the volume from this property.

d) Where infiltration is not advisable or infeasible due to site conditions, *biofiltration* must be provided for that part of the abstraction volume that is not abstracted by other BMPs. Where biofiltration is infeasible, at a minimum filtration through a medium that incorporates organic material, iron fillings, or other material to reduce soluble phosphorus must be provided.

e) There shall be *no net increase in total phosphorus (TP) or total suspended solids (TSS)* from pre-development land cover to post-development land cove. Pre-development land cover is defined as the predominant land cover over the previous 10 years. The TP

and TSS export coefficients to be used to calculate predevelopment and post-development land use loadings are set forth in Commission project review guidance.

i) Full infiltration of one point one (1.1) inches of runoff from all impervious surface will satisfy (e).

ii) If it is not feasible to achieve the full 1.1 inch infiltration requirement, a combination of BMPs may be used to achieve the no-net-increase requirement.

iii) If permanent sedimentation and water quality ponds are used they shall be designed to the Wet Pond Design Standards set forth on Appendix A to these Rules and provide:

(1) Water quality features consistent with NURP criteria and best management practices.

(2) A permanent wet pool with dead storage of at least the runoff from a 2.5-inch storm event.

iv) Alternative to (e), runoff may be directed to a downstream facility within the same hydrologic subwatershed that has sufficient capacity to provide the required treatment. This means that no treatment may be required for an individual development provided there is a regional facility designed and constructed to accommodate the flow from this property.

4. WAIVERS.

a) The Commission may waive the on-site runoff rate, volume and water quality control design criteria as noted above, if a municipality has an off-site stormwater facility that provides equivalent control and treatment of runoff that conforms to Commission standards.

b) The design criteria for infiltration may be waived for sites with total impervious surface of less than one acre if infiltration BMPs have been incorporated to the maximum extent possible.

5. EXHIBITS. The following exhibits shall accompany the project review application (one set full size, one set reduced to a maximum size of 11" x 17", and one electronic set in pdf format). All plans must be signed by a licensed professional engineer registered in Minnesota.

a) Property lines and delineation of lands under ownership of the applicant.

b) Delineation of the subwatershed contributing runoff from off-site, proposed and existing subwatersheds on-site, emergency overflows and watercourses.

c) Proposed and existing stormwater facilities location, alignment and elevation.

d) Delineation of existing on-site wetland, marsh, shoreland and floodplain areas.

e) Where infiltration or filtration is used as a stormwater management practice, identification, description, results of double-ring infiltrometer tests, and permeability and approximate delineation of site soils and seasonal high groundwater elevation in both existing and proposed as-developed condition.

f) Existing and proposed ordinary high and 1% chance (100-year) water elevations on-site.

g) Existing and proposed site contour elevations at 2-foot intervals, referenced to NAVD (1988 datum). If NAVD 1988 is not used, applicant must specify the datum used and the appropriate conversion factor.

h) Construction plans and specifications of all proposed stormwater management facilities, including design details for outlet controls.

i) Runoff volume and rate analysis for the 2-year, 10-year, and 100-year critical storm events, existing and proposed.

j) Pre-construction and post-construction annual runoff volume (ac-ft), annual total phosphorus (lbs/yr), and annual total suspended solids (lb/yr).

k) All hydrologic, water quality and hydraulic computations made in designing the proposed stormwater management facilities.

l) A narrative describing the pre-and post-construction drainage conditions and the post-construction BMPs incorporated in the plans.

m) Applications requesting a soil management credit must include a Soil Management Plan (SMP) that shall include an 11" x 17" or larger site map indicating areas where soils will be amended, and calculations for soil volumes to be stockpiled and amounts and specifications of amendment or topsoil to be imported to achieve specified minimum organic matter content.

n) Delineation of any ponding, flowage or drainage easements, or other property interests, to be dedicated for stormwater management purposes.

6. **MAINTENANCE**. All stormwater management structures and facilities shall be maintained in perpetuity to assure that the structures and facilities function as originally designed. The owner of any water quality treatment device if not a governmental unit shall provide to the member city, in a form acceptable to the Commission, a recordable agreement detailing an operations and maintenance plan that assures that the structure(s) will be operated and maintained as designed.

7. **EASEMENTS**. The member city shall obtain from the applicant, in form acceptable to the Commission, recordable temporary and perpetual easements for ponding, flowage and drainage purposes over hydrologic features such as waterbodies, wetlands, buffers, floodplain, and stormwater basins and other permanent BMPs. The easements shall include the right of reasonable access for inspection, monitoring, maintenance and enforcement purposes.

8. **COVENANTS**. The Commission may require as a condition of project review approval that the member city shall require that the land be subjected to restrictive covenants or a conservation easement, in form acceptable to the Commission, to prevent the future expansion of impervious surface and the loss of infiltration capacity.

RULE E. EROSION AND SEDIMENT CONTROL

1. **POLICY**. It is the policy of the Commission to control runoff and erosion and to retain or control sediment on land during land disturbing activities by requiring the preparation and implementation of erosion and sediment control plans.

2. **REGULATION**. No person or political subdivision shall commence a land disturbing activity or the development or redevelopment of land for which a project review is required under Rule D without first submitting to and obtaining approval of a project review from the Commission that incorporates an erosion and sediment control plan for the activity, development or redevelopment.

3. **CRITERIA**. Erosion and sediment control plans shall comply with the following criteria:

a) Erosion and sediment control measures shall be consistent with best management practices as demonstrated in the most current version of the MPCA manual "Protecting Water Quality in Urban Areas," and shall be sufficient to retain sediment on-site.

b) Erosion and sediment controls shall meet the standards for the General Permit Authorization to Discharge Storm Water Associated with Construction Activity Under the National Pollutant Discharge Elimination System/State Disposal System Permit Program Permit MN R100001 (NPDES General Construction Permit) issued by the Minnesota Pollution Control Agency, except where more specific requirements are required.

c) All erosion and sediment controls shall be installed before commencing the land disturbing activity, and shall not be removed until completion.

d) The activity shall be phased when possible to minimize disturbed areas subject to erosion at any one time.

4. **EXHIBITS**. The following exhibits shall accompany the project review application (one set full size, one set reduced to a maximum size of 11" x 17", and one electronic set in pdf format). Erosion and sediment control plans must be prepared by a qualified professional.

a) An existing and proposed topographic map showing contours on and adjacent to the land, property lines, all hydrologic features, the proposed land disturbing activities, and the locations of all runoff, erosion and sediment controls and soil stabilization measures.

b) Plans and specifications for all proposed runoff, erosion and sediment controls, and temporary and permanent soil stabilization measures.

c) Detailed schedules for implementation of the land disturbing activity, the erosion and sediment controls, and soil stabilization measures.

d) Detailed description of the methods to be employed for monitoring, maintaining and removing the erosion and sediment controls, and soil stabilization measures.

e) Soil borings if requested by the Commission.

5. MAINTENANCE. The project review applicant shall be responsible for proper operation and maintenance of all erosion and sediment controls and soil stabilization measures, in conformance with best management practices and the NPDES permit. The project review applicant shall, at a minimum, inspect and maintain all erosion and sediment controls and soil stabilization measures daily during construction, weekly thereafter, and after every rainfall event exceeding 0.5 inches, until vegetative cover is established.

RULE F. FLOODPLAIN ALTERATION

1. POLICY. It is the policy of the Commission to prevent and control flooding damage by:

a) Preserving existing water storage capacity below the 100-year critical flood elevation on all waterbodies in the watershed to minimize the frequency and severity of high water.

b) Minimizing development in the floodplain that will unduly restrict flood flows or aggravate known high water problems.

c) Requiring compensatory storage for floodplain fill.

2. REGULATION. No person or political subdivision shall alter or fill land below the 100-year critical flood elevation of any public waters watercourse, public waters wetland, or other wetland without first obtaining an approved project review from the Commission.

3. CRITERIA.

a) Floodplain alteration or filling shall not cause a net decrease in flood storage capacity below the projected 1% (100-year) critical flood elevation or alter the timing of flooding unless it is shown that the proposed alteration or filling, together with the alteration or filling of all other land on the affected reach of the waterbody to the same degree of encroachment as proposed by the applicant, will not cause high water or aggravate flooding on other land and will not unduly restrict flood flows.

b) All new structures shall be constructed with the low floor at the elevation required in the municipality's ordinance, however, in no case shall the low floor be less than two feet above the regulatory elevation.

4. **EXHIBITS**. The following exhibits shall accompany the project review` application (one set full size, one set reduced to a maximum size of 11" x 17", and one electronic set in pdf format):

a) Site plan showing boundary lines, delineation and existing elevation contours of the work area, ordinary high water level, and 1% (100-year) critical flood elevation. All elevations shall be referenced to the NAVD 1988 datum. If NAVD 1988 is not used, applicant must specify the datum used and the appropriate conversion factor.

b) Grading plan showing any proposed elevation changes.

c) Preliminary plat of any proposed subdivision.

d) Determination by a registered professional engineer of the 100-year critical flood elevation before and after the proposed activity.

e) Computation of the change in flood storage capacity as a result of the proposed alteration or fill.

f) Erosion and sediment control plan which complies with these Rules.

g) Soil boring logs and report if available.

5. **EXCEPTIONS**. If a municipality has adopted a floodplain ordinance that prescribes an allowable degree of floodplain encroachment, the applicable ordinance shall govern the allowable degree of encroachment and no project review will be required under this Floodplain Alteration Rule.

RULE G. WETLAND ALTERATION

1. **POLICY**. It is the policy of the Commission to preserve and protect wetlands for their water quality, stormwater storage, habitat, aesthetic, and other attributes by:

a) Achieving no net loss in the quantity, quality and biological diversity of wetlands in the watershed.

b) Increasing the quantity, quality and biological diversity of wetlands in the watershed by restoring or enhancing diminished or drained wetlands.

c) Enforcing mitigation of direct or indirect impacts from activities that destroy or diminish the quantity, quality and biological diversity of watershed wetlands.

d) Replacing affected wetlands where sequencing demonstrates that avoidance is not feasible.

2. **REGULATION**. No person or political subdivision shall drain, fill, excavate or otherwise alter a wetland without first obtaining the approval of a wetland replacement plan from the local government unit with jurisdiction over the activity. Mitigation of wetland impacts will be considered in the following sequence: 1) mitigated by enhancing the impacted wetland; 2) mitigated within the subcatchment of the impacted wetland; 3)

mitigated in the drainage area of the impacted wetland; 4) mitigated in the watershed of the impacted wetland; 5) mitigated through purchase of wetland bank credits.

3. CRITERIA.

a) Any drainage, filling, excavation or other alteration of a wetland shall be conducted in compliance with Minnesota Statutes, section 103G.245, the Wetland Conservation Act, and regulations adopted thereunder.

b) A wetland may be used for stormwater storage and treatment only if pre-treatment is provided and the use will not adversely affect the function and public value of the wetland as determined by the local government unit.

c) Other activities which would change the character of a wetland shall not diminish the quantity, quality or biological diversity of the wetland.

4. LOCAL GOVERNMENT UNIT. The Commission will serve as the local government unit (LGU) for administration of the Wetland Conservation Act (WCA) for those cities that have designated the Commission to serve in that capacity. If a member city has not designated the Commission as the LGU for the administration of the WCA, they shall be responsible for administering the WCA. MnDOT serves as the LGU on its right of way.

RULE H. BRIDGE AND CULVERT CROSSINGS

1. POLICY. It is the policy of the Commission to maintain channel profile stability and conveyance capacity by regulating crossings of watercourses for driveways, roads and utilities.

2. REGULATION. No person or political subdivision shall construct or improve a road, driveway or utility crossing across any public waters watercourse or county ditch without first submitting to the Commission and receiving approval of a project review.

3. CRITERIA. Crossings shall:

a) Retain adequate hydraulic capacity to pass the 100-year flow and maintain the 100-year flow profile, if available.

b) Mimic the existing base flow (1-year, 2-year) conditions.

c) Not adversely affect water quality.

d) Represent the "minimal impact" solution to a specific need with respect to all reasonable alternatives.

e) Allow for future erosion, scour, and sedimentation maintenance considerations.

f) If the project proposes changing the FEMA FIS profile, a FEMA map revision must be obtained.

g) If the project requires a DNR Work in Public Waters permit, the conditions of that permit must be satisfied.

4. EXHIBITS. The following exhibits shall accompany the project review application (one set full size, one set reduced to a maximum size of 11" x 17", and one electronic set in pdf format):

a) Construction plans and specifications.

b) Analysis prepared by a registered professional engineer showing the effect of the project on hydraulic capacity and water quality.

c) An erosion and sediment control plan that complies with these Rules.

5. MAINTENANCE.

a) The maintenance, reconstruction and stabilization of any public crossing shall be the responsibility of the political subdivision with jurisdiction over the crossing.

b) The maintenance, reconstruction and stabilization of any private crossing shall be the responsibility of the owner of the crossing.

c) If a crossing over any public waters watercourse is determined by the Commission to be causing significant erosion, the Commission may notify the member city where said crossing is located and the member city may order the owner of the crossing to make necessary repairs or modifications to the crossing and outlet channel.

RULE I. BUFFER STRIPS

1. POLICY. It is the policy of the Commission to maintain the water quality and ecological functions provided by watercourses, lakes and wetlands by requiring the development of vegetated buffers around watercourses, lakes and wetlands where development and redevelopment occurs, and to encourage the installation of vegetated buffers around all watercourses and wetlands. Vegetative buffers reduce the impact of surrounding development and land use on watercourse, lake and wetland functions by stabilizing soil to prevent erosion, filtering sediment from runoff, and moderating water level fluctuations during storms. Buffers provide essential habitat for wildlife. Requiring buffers recognizes that watercourse, lake and wetland quality and function are related to the surrounding upland.

2. REGULATION. No person or political subdivision shall commence a land disturbing activity or the development or redevelopment of land for which a project review is required under Rule D on land that contains or is adjacent to a watercourse, lake or wetland without first submitting to and obtaining approval of a project review from the Commission that incorporates a vegetated buffer strip between the development or redevelopment and the watercourse or wetland.

3. GENERAL PROVISIONS.

a) This Rule shall apply to all lands containing or abutting watercourses, lakes or wetlands that are subject to a project review under these Rules. Watercourses, lakes and wetlands shall be subject to the requirements established herein, and other applicable federal, state and local ordinances and regulations. If a municipality has a buffer strip requirement that has been reviewed and approved by the Commission, the municipal regulation shall have precedence over the Commission's Rules.

b) An applicant shall determine whether any watercourse, lake or wetland exists, and shall delineate the boundary for any wetland on the land. An applicant shall not be required to delineate wetlands on adjacent property, but must review available information to estimate the wetland boundary.

c) Documentation identifying the presence of any watercourse, lake or wetland on the applicant's land, including wetland delineation and buffer strip vegetation evaluation, must be provided to the Commission with a project review application.

d) Wetland and buffer strip identifications and delineations shall be prepared in accordance with state and federal regulations.

4. CRITERIA. The following standards apply to all lands that contain or abut a watercourse, lake or wetland:

a) BMPs shall be followed to avoid erosion and sedimentation during land disturbing activities.

b) When a buffer strip is required the applicant shall, as a condition to issuance of an approved project review:

i) Submit to the member city, in a form acceptable to the Commission, a recordable conservation easement for protection of approved buffer strips. The easement shall describe the boundaries of the watercourse or wetland and buffer strips, identify the monuments and monument locations, and prohibit any of the alterations set forth in Paragraph 5(e) below and the removal of the buffer strip monuments within the buffer strip or the watercourse or wetland.

ii) Submit to the member city, in a form acceptable to the Commission, an executed buffer maintenance plan and agreement for the first two growing seasons following establishment, and providing an escrow or an alternate surety to assure successful vegetation establishment.

iii) Install the wetland monumentation required by Paragraph 7 below.

c) All open areas within the buffer strip shall be seeded or planted in accordance with Paragraph 8 below. All seeding or planting shall be completed prior to removal of any erosion and sediment control measures. If construction is completed after the end of

the growing season, erosion and sediment control measures shall be left in place and all disturbed areas shall be mulched for protection over the winter season.

5. BUFFER STRIPS.

a) A buffer strip shall be maintained around the perimeter of all watercourses, lakes or wetlands. The buffer strip provisions of this Rule shall not apply to any parcel of record as of the date of this Rule until such parcel is developed or redeveloped or unless required by a previous project review. The Commission does, however, strongly encourage the installation of buffer strips on all parcels in the watershed.

b) Buffer strips on Elm Creek, Rush Creek, North Fork Rush Creek, and Diamond Creek shall be an average of 50 feet wide and a minimum of 25 feet wide, measured from the top of bank. Buffer strips on other watercourses, lakes, and wetlands shall be an average 25 feet wide and a minimum of 10 feet wide. It is recommended that all structures have a minimum 15 foot setback from the buffer strip.

c) Buffer strips shall apply whether or not the watercourse or wetland is on the same parcel as a proposed development.

d) Buffer areas disturbed by grading operations must be finish graded to a slope of 6:1 or less or an increase in width of five (5) feet for each one (1) foot decrease in horizontal width (i.e., a 25 required foot buffer width at a 5:1 slope must be 30 feet wide, 4:1 must be 35 feet wide, and 3:1 must be 40 feet wide.)

e) Buffer strip vegetation shall be established and maintained in accordance with Paragraph 8 below. Buffer strips shall be identified within each parcel by permanent monumentation in accordance with Paragraph 7 below.

f) Subject to Paragraph 5(g) below, alterations including building, storage, paving, mowing, plowing, introduction of noxious vegetation, cutting, dredging, filling, mining, dumping, grazing livestock, agricultural production, yard waste disposal or fertilizer application, are prohibited within any buffer strip. Noxious vegetation shall be removed to meet state standards. Alterations would not include plantings that enhance the natural vegetation or selective clearing or pruning of trees or vegetation that are dead, diseased or pose similar hazards.

g) The following activities shall be permitted within any buffer strip, and shall not constitute prohibited alterations under Paragraph 5(f) above:

    i) Use and maintenance of an unimproved access strip through the buffer, not more than 20 feet in width, for recreational access to the watercourse, lake or wetland and the exercise of riparian rights.

    ii) Placement, maintenance, repair or replacement of utility and drainage systems that exist on creation of the buffer strip or are required to comply with any subdivision approval or building permit obtained from the municipality or county, so long as any adverse impacts of utility or drainage systems on the function of the buffer strip have been avoided or minimized to the extent possible.

iii) Construction, maintenance, repair, reconstruction, or replacement of existing and future public roads crossing the buffer strip, so long as any adverse impacts of the road on the function of the buffer strip have been avoided or minimized to the extent possible.

6. ALTERNATE WETLAND PROTECTION METHODS.

a) Should application of the buffer standards in Paragraph 5 above render a parcel of record as of the date of this Rule unbuildable based on current city ordinances, the Watershed engineer may allow alternative methods to protect the wetland. Such methods must include a buffer strip no less than ten feet wide, supplemented by redirection of drainage to a wider area of buffer, or to a Best Management Practice such as a rain garden or vegetated swale.

b) The use of alternative wetland protection methods will be evaluated as part of the review of a stormwater management plan under these Rules. Alternative wetland protection methods must be in keeping with the spirit and intent of this Rule.

7. MONUMENTATION. A monument shall be required at each parcel line where it crosses a buffer strip and shall have a maximum spacing of 200 feet along the edge of the buffer strip. Additional monuments shall be placed as necessary to accurately define the edge of the buffer strip. A monument shall consist of a post and a buffer strip sign meeting Commission standards. The signs shall include warnings about mowing, disturbing or developing the buffer strip.

8. VEGETATION.

a) Where acceptable natural vegetation exists in buffer strip areas, the retention of such vegetation in an undisturbed state is required unless an applicant receives approval to replace such vegetation. A buffer strip has acceptable natural vegetation if it:

i) Has a continuous, dense layer of native vegetation that has been uncultivated or unbroken for at least 5 consecutive years; or

ii) Has an overstory of native trees and/or shrubs that has been uncultivated or unbroken for at least 5 consecutive years; or

iii) Contains a mixture of the plant communities described in Subparagraphs 8(a)(i) and (ii) above that has been uncultivated or unbroken for at least 5 years.

b) Notwithstanding the performance standards set forth in Paragraph 8(a), the Commission may determine existing buffer strip vegetation to be unacceptable if:

i) It contains undesirable plant species including but not limited to common buckthorn, reed canary grass, or species on the Minnesota State Noxious Weeds List; or

ii) It has topography that tends to channelize the flow of runoff; or

iii) For some other reason it is unlikely to retain nutrients and sediment.

iv) Where buffer strips are not vegetated or have been cultivated or otherwise disturbed within 5 years of the project review application, such areas shall be replanted and maintained with native vegetation. The buffer strip plantings must be identified on the project review application. Acceptable buffer strip design and planting methods are detailed in the reference document "Restoring and Managing Native Wetland and Upland Vegetation" (Jacobson 2006, prepared for BWSR and MnDOT).

c) Buffer strip vegetation shall be established and maintained in accordance with the requirements found in this Paragraph. During the first two full growing seasons, the owner must replant any buffer strip vegetation that does not survive. The owner shall be responsible for reseeding and/or replanting if the buffer strip changes at any time through human intervention or activities. At a minimum the buffer strip must be maintained as a "no mow" area.

9. ENCROACHMENT.

a) Buffer strips must be kept free of all materials, equipment and structures, including fences and play equipment. Buffer strips must not be grazed, cropped, logged or mown except as approved by the Commission. The topography of the buffer strips shall not be altered by any means, including paving, plowing, cutting, dredging, filling, mining, or dumping.

b) Variances.

i) Only variances meeting the standards and criteria set forth in Rule K shall be granted.

ii) Variances shall not be granted that would circumvent the intent and purposes of this Rule.

RULE J. FEES

1. POLICY. The Commission finds that it is in the public interest to require applicants to pay the cost of administering and reviewing project review applications, and inspecting approved activities to assure compliance with these Rules, rather than using the Commission's annual administrative levy for such purposes. The Commission shall by resolution establish a schedule of fees that may be amended from time to time to reflect the cost of providing each service.

2. APPLICATION. Each application for the issuance, transfer or renewal of a project review recommendation under these Rules shall be accompanied by an application fee to defray the cost of processing the application.

3. REVIEW. A project review applicant under these Rules shall pay a fee for the cost of the review and analysis of the proposed activity, including services of engineering, legal, and

other consultants. The review fee shall be payable upon the submission of the project review application.

4. **WETLAND MITIGATION PLAN**. A project review applicant under these rules shall pay a fee for the cost of the review and analysis of a proposed activity involving a wetland mitigation plan in a municipality where the Commission is the LGU. The fee is to cover the costs of engineering, legal, and other consultants, and shall be payable upon the submission of the project review application. Should the cost of said wetland mitigation plan review exceed the review fee, the application shall deposit such additional sums as are needed to pay such costs. Failure to pay such costs is grounds to deny the application or suspend review.

5. **WETLAND MITIGATION PLAN MONITORING**. A project review applicant under these rules in a municipality where the Commission is the LGU shall deposit an escrow to cover the cost of Commission monitoring and annual monitoring plan review for the five-year period. If the escrow amount is insufficient to cover the costs the Commission may require additional funds from the applicant.

6. **WETLAND MITIGATION SECURITY DEPOSIT**. A project review applicant under these rules in a municipality where the Commission is the LGU shall provide a security to assure that the replacement plan is followed. The amount of the security shall be calculated on a case-by-case basis based on the estimated cost of construction, follow up and contingency. The security may also include an amount determined by the Commission to be sufficient to protect the public in the event the replacement plan does not succeed.

7. **DEPOSITS**. The Commission will maintain an accounting for all deposits made under this Rule. No interest will be paid to applicants for funds held in deposit.

RULE K. VARIANCES

1. **WHEN AUTHORIZED**. The Commission may grant variances from the literal provisions of these Rules. A variance shall only be granted when in harmony with the general purpose and intent of the Rules in cases where strict enforcement of the Rules will cause practical difficulties or particular hardship, and when the terms of the variance are consistent with the Commission's water resources management plan and Minnesota Statutes, chapter 103D.

2. **HARDSHIP**. "Hardship" as used in connection with the granting of a variance means the land in question cannot be put to a reasonable use if used under the conditions allowed by these Rules; the plight of the applicant is due to circumstances unique to the land and not created by the applicant; and the variance, if granted, will not adversely affect the essential character of the locality and other adjacent land. Economic considerations alone shall not constitute a hardship if a reasonable use for the land exists under the terms of these Rules. Conditions may be imposed in the granting of a variance to insure

compliance and to protect adjacent land and the public health and general welfare of the Commission.

3. **PROCEDURE**. An application for a variance shall describe the practical difficulty or particular hardship claimed as the basis for the variance. The application shall be accompanied with such surveys, plans, data and other information as may be required by the Commission to consider the application.

4. **VIOLATION**. A violation of any condition imposed in the granting of a variance shall be a violation of these Rules and shall automatically terminate the variance.

RULE L. ENFORCEMENT

1. **ADMINISTRATION**. These Rules shall be administered by the Commission. The Commission shall consider applications required under these Rules and determine whether such applications should be approved, approved with conditions, or denied. Such determination shall be communicated to the member city in which the project lies and to the applicant.

2. **IMPLEMENTATION BY MEMBER CITIES**. It shall be the duty of each city to enforce and implement such determinations by the Commission under the various permitting processes and regulations of the city. Each city shall make such amendments to its official controls, regulations, and permitting processes as are necessary to provide it with the authority to enforce and implement the determinations of the Commission.

3. **FAILURE BY CITY TO IMPLEMENT**. Upon a determination by the Commission that a city has not enforced or implemented a decision of the Commission in the administration of these Rules, the Commission shall notify the city of such determination and direct that appropriate action be taken by the city. If the city does not take such action, the Commission may take such legal steps as are available to it to effect such enforcement or implementation.

RULE M. AMENDMENT OF THESE RULES

1. **AMENDMENT.** These rules may be amended from time to time by the Commission. Proposed amendments shall be reviewed by the member cities prior to adoption unless the Commission determines that said amendment is of a minor or technical nature. Minor or technical amendments include recodifying or streamlining the rules, clarifying policies, or other actions that do not adversely affect a member city or impact the Commission's or member cities' ability to meet their water management plan goals.

2. **PROCEDURE.** Proposed major amendments to these rules shall be first considered by the Commission and then forwarded to the member cities for a 45-day comment period. Following that comment period, the Commission shall consider the proposed amendment and the comments received for approval. All amendments shall be made by resolution.

ELM CREEK WATERSHED MANAGEMENT COMMISSION
RULES APPENDIX A
WET POND DESIGN STANDARDS

Permanent Pool Depth	Average 4', maximum 10'
Permanent Pond Surface Area	Greater of 2% of watershed's impervious area and 1% of the watershed
Permanent Pool Length to Width Ratio	3:1 or greater with an irregularly shaped shoreline
Side Slopes	10:1 for 10-foot bench centered on the normal water elevation and between 3:1 and 20:1 elsewhere
Side Slope Stabilization	Native seed with mix 33-261 (MnDOT 310), 34-271 (BWSR W2) or equivalent between NWL and HWL, provide 10' buffer where possible with mix 35-221 (MnDOT 330 (dry)) or mix 35-241 (MnDOT 350 (mesic))
Floatable Removal	Skimming device discharging at no greater than 0.5 fps during the 2-year event or a submerged outlet with a minimum 0.5 feet from the normal water level to the crown of the outlet pipe
Sediment Accumulation Area	Provide maintenance pads to remove sediment deltas at inlets
Permanent Pool Volume	A 4-foot mean depth and equal to 2.5-inch rain over the watershed
Source	Protecting Water Quality in Urban Areas (MPCA 2000)

SUMMARY

Elm Creek Watershed Management Commission
Management Rules and Standards*

	Standard	Purpose	Applicability
Project Reviews Required	A Stormwater Management Plan consistent with all applicable management rules and standards* must be reviewed and approved prior to commencement of land disturbing activities.	To control excessive rates and volumes of runoff; manage subwatershed discharge rates and flood storage volumes; improve water quality; protect water resources; and promote natural infiltration of runoff.	All development or redevelopment projects of the following types: • Projects disturbing more than one acre of land • Projects within the 100-year floodplain • Projects adjacent to or within a lake, wetland, or watercourse • Any land disturbing activity requested by a member city to be reviewed regardless of project size • Linear projects creating more than one acre of new impervious surface
Rate Control	Peak runoff rates may not exceed existing rates for the 2-year, 10-year, and 100-year critical storm event; or the capacity of downstream conveyance facilities; or contribute to flooding	To control excessive rates and volumes of runoff; manage subwatershed discharge rates and flood storage volumes	All projects disturbing more than one acre of land. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.
Volume Manage-ment	1.1 inch of impervious surface runoff must be abstracted on site within 48 hours	To control excessive rates and volumes of runoff; manage discharge rates and flood storage volumes; protect stream channels from erosion; and promote natural infiltration of runoff.	All projects disturbing more than one acre of land. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.
Erosion and Sediment Control	Erosion control plan using Best Management Practices (BMPs) and consistent with the NPDES General Construction Permit is required	To control erosion and sediment so as to protect conveyance systems and water quality	All projects requiring a project review
Floodplain Alteration	Compensating storage is required to mitigate floodplain fill	To prevent and control flooding damage	All development or redevelopment projects within the 100-year floodplain regardless of project size
Water Quality	No net increase in total phosphorus and total suspended sediment annual load	To protect water quality	All projects disturbing more than one acre of land. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.
Buffer Strips	Vegetated buffer strips average 50 foot, minimum 25 foot wide adjacent to Elm, Diamond, Rush, and North Fork Rush Creeks; average 25 foot, minimum 10 foot wide adjacent to lakes, wetlands and other watercourses	To protect water quality; reduce erosion and sedimentation; reduce pollutants from runoff and debris; and provide habitat	All projects requiring a project review that contain or abut a wetland or watercourse
Wetland	Wetlands may not be drained, filled, excavated, or otherwise altered without an approved wetland replacement plan from the local government unit (LGU) with jurisdiction	To preserve and protect wetlands for their water quality, stormwater storage, habitat, aesthetic, and other attributes	All land disturbing activity impacting a wetland as defined by the Wetland Conservation Act (WCA)

*Important Note: Approved TMDL Implementation Plans may have additional site-specific requirements.

July 2015

Appendix D
Monitoring Program

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Elm Creek Watershed Management Commission
Third Generation Watershed Management Plan
Monitoring Program

Minnesota Rules 8410.0100 Subp. 5 states that:

> *A. Each plan must establish water quality and quantity monitoring programs that are 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 programs shall, at a minimum, include the location of sampling, the frequency of sampling, the proposed parameters to be measured, and the requirement of periodic analysis of the data.*

Concurrent with this Management Plan, the Commission partnered with the Minnesota Pollution Control Agency and Three Rivers Park District to undertake a Watershed Restoration and Protection Strategies (WRAPS) study. The Commission obtained valuable baseline data on its lakes and streams through the monitoring phase of the WRAPS. There are a few resources that have a significant amount of monitoring data and length of record, including the USGS site on Elm Creek and Weaver and Fish Lakes. There is limited data on the other streams in the watershed, and the other lakes range from having some years either through Three Rivers or CAMP to only one or two years of data.

Diamond Creek, Rush Creek, North Fork Rush Creek and Elm Creek are Impaired Waters, with some or all of the streams impaired for *E. coli*, low dissolved oxygen, and biotic integrity affecting both the fish and macroinvertebrate communities. In addition, monitoring indicates that Diamond Creek and Elm Creek do not meet Total Suspended Solids standards and that all four streams do not meet the TP standard. Cowley, Diamond, Fish, Henry, and Rice Lakes are impaired Waters for excess nutrients, and monitoring indicates that Sylvan and Goose Lakes are also impaired by excess nutrients. TMDLs and load reductions The WRAPS established Total Maximum Daily Load (TMDL) pollutant load reductions to achieve state water quality standards for those impairments, as well as protection activities for the water resources that currently meet state water quality standards. The Commission is responsible not only for an ongoing monitoring program that meets the requirements of Minnesota Rules cited above, but that also is sufficient to determine progress toward meeting the TMDLs.

Third Generation Monitoring Program Framework

The Third Generation Monitoring Program has two organizing principles:

1. Continue to obtain detailed flow and water quality data on Elm Creek and on sentinel lakes, and collect data on other lakes and streams on a rotating basis; and
2. Collect data sufficient to document water quality trends, both positive and negative, and assess progress toward meeting towards meeting TMDL and other goals.

Each year the Commission will evaluate this monitoring program and make modifications as necessary based on the most current data needs. The monitoring objectives guiding the Elm Creek watershed monitoring program and the assessment of data are:

- To quantify the current status of streams and lakes throughout the watershed in comparison to state water quality standards.
- To quantify changes over time, or trends, in stream and lake water quality in the watersheds.
- To enhance the value of previous monitoring data by extending the period of record.
- To track and quantify the effectiveness of implemented BMPs throughout the watersheds for the protection of water quality.
- To evaluate progress toward meeting TMDL load reduction and other goals.

Monitoring data will be used:

- To quantify any changes to receiving waters (lakes, streams, and wetlands) and their biota as land use conversion and development occurs.
- To convey information about the water resources in the watershed and their condition to multiple stakeholders, raising the visibility of the Commission.
- To target TMDL/WRAPS implementation and resource protection actions based on cost-effectiveness.
- To perform TMDL/WRAPS progress reviews.
- To accumulate enough information to support de-listing impaired waters that have improved to meet state water quality standards.
- To assist member cities who have Municipal Separate Storm Sewer Systems (MS4s) with their permit application and annual reporting requirements.
- To support applications for grant funding.
- To calibrate and validate hydrologic, hydraulic, and water quality models

Stream Monitoring

Table 1 sets forth the framework for stream monitoring in the Elm Creek watershed for 2015-2024. The Commission currently partners with the USGS to operate a flow and water quality monitoring station on Elm Creek in the Elm Creek Park Reserve. This station has a long-term period of record, and gauges about 81 percent of the watershed. The Commission will continue to partner with the USGS to obtain routine flow and water quality at this site. Monitored parameters may vary from year to year based on current data needs such as obtaining baseline data for upcoming new standards or collecting additional data to assist in evaluating progress towards TMDL goals.

The Commission will also monitor flow and water quality at two additional sites in the watershed (Figure 1) per year on a rotating basis, so that each site is monitored every two to three years. These sites are: two stations on Elm Creek upstream of the USGS site; Rush Creek; North Fork of Rush Creek; and Diamond Creek. In addition, the Commission may from time to time undertake special stream monitoring on other tributaries where necessary, for example to calibrate models or refine source assessments.

The Commission currently partners with Hennepin County Environmental Services to offer the RiverWatch volunteer macroinvertebrate monitoring program for high school students, and the Stream Health Evaluation Program, a similar program for adult volunteers. These are valuable education and outreach programs that provide useful information about stream health. However, the data collected through these programs is not comparable to the data used by the MPCA to evaluate stream biotic health using the state standard Macroinvertebrate Index of Biotic Integrity. This program reduces the number of volunteer sites monitored each year, and adds one or two sites per year where collections will be completed by professional staff using the MPCA macroinvertebrate protocol and assessment.

Additional stream monitoring that will be considered to document progress toward meeting the DO TMDLs is longitudinal and diurnal dissolved oxygen (DO) monitoring. Longitudinal monitoring assesses stream DO along the entire length of the stream in one morning. Monitoring starts near sunup at the headwaters, where a DO reading is taken. The technician then moves downstream a set distance and takes another reading, then repeats until the end of the stream is reached. This provides a snapshot of the entire stream at once early in the morning when stream DO is at its lowest. Diurnal monitoring occurs at a point in the stream where an instrument takes continuous DO measurements over a 72 hour period. This shows how DO fluctuates from low to high to low again on a daily cycle. The Commission may undertake such monitoring later in the 10-year planning period, to understand how management actions are impacting DO in the streams.

Finally, the Commission may periodically undertake desktop (GIS and aerial photos) and field studies of stream conditions, including buffer assessments, streambank conditions, etc. Hennepin County Environmental Services currently completes these assessments on ditches that are under its ditch authority.

The estimated cost of this monitoring program is shown on Table 2.

Lakes

There are numerous basins in the Elm Creek watershed, with 22 primary lakes (Figure 2). Fish Lake and Weaver Lake have an extensive monitoring record, including surface water and water column monitoring. Other lakes have been periodically monitored at least back to the mid-1980s. The Commission has also regularly participated in the Metropolitan Council's Citizen Assisted Lake Monitoring Program (CAMP) since 2005, although some lakes were occasionally monitored through that program as far back as 1994. Historical lake monitoring is shown in Tab le 3.

CAMP volunteers monitor surface water conditions and chemistry. They also judge the appearance of the lake, its odor, and its suitability for recreation. Cowley, Dubay, Henry, Rice, and Sylvan have been participating most frequently in this program.

Three Rivers Park District has collected data on Diamond and French Lakes and Champlin's Mill Pond. Aquatic vegetation surveys have been completed on several lakes as part of the WRAPS monitoring.

Table 1 sets forth the framework for lake monitoring in the Elm Creek watershed. This framework establishes four "Sentinel Lakes" that will be monitored every year by the Three Rivers Park District for the Commission: Diamond, Fish, Rice, and Weaver Lakes. These lakes represent both deep and shallow lakes, urban and semi-urban. Other lakes will be monitored on a rotating basis as shown on Table 3, either by Three Rivers Park District (Cook and Mill Pond) or through CAMP (Camelot, Cowley, Dubay, Henry, Jubert, Laura, and Sylvan). The Commission will also periodically update aquatic vegetation surveys in the lakes as shown on Table 4. The estimated cost of this monitoring program is shown on Table 2.

Other Monitoring

The Commission has for several years participated in the Wetland Health Evaluation Program (WHEP). Hennepin County Environmental Services trains and supervises adult volunteers to assess wetland vegetation and macroinvertebrates. The Commission will continue to participate in this program.

The Commission may from time to time undertake special monitoring where necessary, for example monitoring upstream and downstream of a wetland to calibrate models or refine source assessments, or to do performance monitoring of installed BMPs.

The Commission will annually collect from the member cities, Hennepin County, MnDOT and other MS4s information about the BMPs that were installed in the watershed in the previous year. This data will assist in tracking progress toward achieving TMDL and WRAPS load reduction and protection goals.

Table 1. Elm Creek Watershed monitoring framework.

Resource	Activity	Purpose	Requirement	Frequency	Comments/Standards
Streams	Continue to partner with USGS on flow/water quality at USGS site in Elm Creek Park Reserve	Current conditions and long-term trends; TMDL compliance; annual water yield trend; calibrate models	MR 8410.0100 Subp. 5 / TMDL compliance / voluntary	Annually	Modify or add parameters as necessary based on current data needs
	Flow and water quality monitoring on tributary sites, rotate among: Diamond Creek (DCZ), 2 sites on Elm Creek (ECW and EC77), Rush Creek (RCSL) and North Fork (RC116)	Current conditions and long-term trends; TMDL compliance; annual water yield trend; calibrate models		Rotate every 2-3 years	Modify or add parameters as necessary based on current data needs
	DO longitudinal and diurnal assessment on impaired streams	TMDL compliance	TMDL compliance/ voluntary	As set forth in the WRAP	DO standards, biotic response
	Macroinvertebrate community	TMDL compliance	TMDL compliance/ voluntary	Every 5 years	IBI Standards
	RiverWatch/SHEP volunteer stream monitoring	Current condition; trends; education & outreach	Voluntary	Annually	Educational Activity
	Fish community	TMDL compliance	TMDL compliance/ voluntary	Every 5 years	IBI Standards
	Land use/ stream condition/ buffer assessments	Long-term trends	Voluntary	As needed	TMDL compliance and BMP implementation
Lakes	Citizens Assisted Monitoring Program (CAMP)	Current condition; trends; education & outreach	MR 8410.0100 Subp. 5 / TMDL compliance / voluntary	6 lakes total, 2-3 lakes per year, bi-weekly	Lake water quality standards; education and outreach
	Sentinel Lakes annual monitoring	Current conditions and long-term trends		4 lakes, biweekly, annually	Lake water quality standards
	Monthly monitoring through Three Rivers Park District	Current conditions and long-term trends		2 lakes total, monthly, every three years	Lake water quality standards
	Vegetation surveys	Current conditions and long-term trends	TMDL compliance/ voluntary	Spring and fall every 5 years	Lake restoration
	DNR fish surveys	Current conditions and long-term trends	TMDL compliance/ voluntary	DNR schedule	Lake restoration
Wetlands	Wetland Health Evaluation Program	Current condition; trends; education & outreach	Voluntary	Annually	Baseline wetland health
Groundwater	Track well groundwater elevation data	Baseline for ground-water recharge/ discharge	Voluntary	As needed	Important of base flow becomes an issue
Other	Special source assessment and other monitoring	Collect one-time or periodic special monitoring, such as: inflow and outflow of target wetlands; small streams; BMP effectiveness; biology	TMDL compliance/ voluntary	As needed	Some special monitoring may require cost-share from a benefitting MS4
	Annually log BMPs undertaken in the subwatershed of each resources	Progress toward meeting load reductions	TMDL compliance/ voluntary	Annually	Member cities report annually

Table 2. Elm Creek watershed Third Generation monitoring program. (in constant, 2014 dollars)

Activity	Resources and Site(s)	Parameters	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
STREAM MONITORING													
Routine flow and water quality monitoring	2 sites on rotation: Rush Creek/North Fork; Diamond Creek, Elm Creek	Flow, temp, pH, TP,SRP, TN, DO, TSS, VSS, *E. coli,* chloride, specific conductance	$0	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000
Partnership with USGS in the Elm Creek Park Reserve	USGS Station No. 05287890 (Includes $190 for electric service)	Flow, temp, specific conductance, DO, COD, pH, ammonia, nitrate, TN, NO2+NO3, TP, DP, chloride	$21,190	$21,190	$21,190	$21,190	$21,190	$21,190	$21,190	$21,190	$21,190	$21,190	$21,190
Rain gauge network		Precipitation	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100
DO longitudinal survey	Every 2-3 years, from headwaters to month, DO impaired streams on a rotating basis	Dissolved oxygen	$0	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
DO 72-hour diurnal survey	As recommended in WRAP	Flow, temp, pH, continuous DO, conductivity, once at average flow	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Macroinvertebrate monitoring	Every 5 years on a rotating basis among Elm Creek and tribs, as recommended in WRAP	Macroinvertebrates, once in Aug-Sep	$0	$0	$0	$0	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
RiverWatch/SHEP volunteer stream monitoring	Elm Creek: Varies	Macroinvertebrates, spring and fall	$12,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000
Condition/buffer assessments	Select streams and tributaries around watershed	Buffer width and condition, streambank condition	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LAKE MONITORING													
Citizen Assisted Lake Monitoring Program (CAMP)	6 Lakes on scheduled rotation, 2-3 per year	Surface water TP, chl-a, temp, water condition observations, biweekly, Apr-Oct	$1,750	$1,750	$1,750	$1,200	$1,750	$1,200	$1,750	$1,200	$1,200	$1,750	$1,200
Sentinel Lakes Monitoring	Rice, Fish, Diamond, and Weaver, annually	DO and temperature profiles, TP, SRP, TN, chl-a, biweekly	$3,600		$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400
Other Lake Monitoring	2 Lakes on scheduled rotation, 1 per year	DO and temperature profiles, TP, SRP, TN chl-a, monthly		$2,400 $600	$600	$600	$600	$600	$600	$600	$600	$600	$600
Aquatic vegetation surveys	10 Lakes on scheduled rotation, 2 per year	Aquatic vegetation, spring and fall	$0	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
Fish surveys	As necessary	Special study or as part of a rough fish harvest feasibility study	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
OTHER MONITORING													
Wetland Health Evaluation Program	Select wetlands around watershed	Wetland biotic condition	$4,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
Source Assessment	As necessary	Special study	$0	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
Groundwater elevation	Select wells	Groundwater elevation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		TOTAL	**$42,640**	**$44,540**	**$44,540**	**$44,990**	**$44,540**	**$44,990**	**$44,540**	**$44,990**	**$44,990**	**$44,540**	**$44,990**

Table 3. Elm Creek watershed lake monitoring history.

		2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986
Lakes	*Cook*													T									T		T		T		T
	Cowley				C	C		C	C																				
	Diamond	T	T	T	T	T	T	T			T						T				C		T			T			T
	Dubay	C	C	C																						T			T
	Fish	T	T	T	T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
	Henry			C	C	C	C	C	C	C										C									
	Jubert														C									T		T		T	
	Laura	C																											
	Mill Pond	T	T	T	T	T							T			T								T			T		
	Mud			T																									T
	Rice	T		C	C/T	C	C	C																					
	Sylvan	C	C				C											T											
	Weaver	T	T	T	T	T	T	T	T	T	T		T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Wetlands	*French*	T	T	T	T	T			T	T	T		C	C											T				
	Medina		C																										

T = Monitored By Three Rivers Park District
C = Monitored through CAMP program

Table 4. Proposed Elm Creek Third Generation lake monitoring schedule. D R A F T

		Water Quality Monitoring												Aquatic Vegetation Survey										
Lake	**Freq.**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Camelot	*2-3*			C		C			C			C									X				
Cook	*3*			X			X			X			X					X						X
Cowley	*2-3*		C		C			C			C											X		
Diamond	*1*	X	X	X	X	X	X	X	X	X	X	X	X			X				X				
Dubay	*3*	C		C			C			C			C											
Fish	*1*	X	X	X	X	X	X	X	X	X	X	X	X		X				X				X	
French	*wetland*	X																						
Henry	*2*		C		C		C		C			C						X						X
Jubert	*3*		C			C			C			C					X				X			
Laura	*3*	C		C			C			C			C											
Medina	*wetland*																							
Mill Pond	*3*	X			X			X			X					X						X	
Rice	*1*	X	X	X	X	X	X	X	X	X	X	X	X				X				X			
Sylvan	*3*	C			C			C			C													
Weaver	*1*	X	X	X	X	X	X	X	X	X	X	X	X		X				X				X	
Commission		6	4	5	5	4	5	5	4	5	5	4	5		2	2	2	2	2	2	2	2	2	2
CAMP		3	3	3	3	2	3	2	3	2	2	3	2											

X Commission monitored

C CAMP monitored (volunteer)

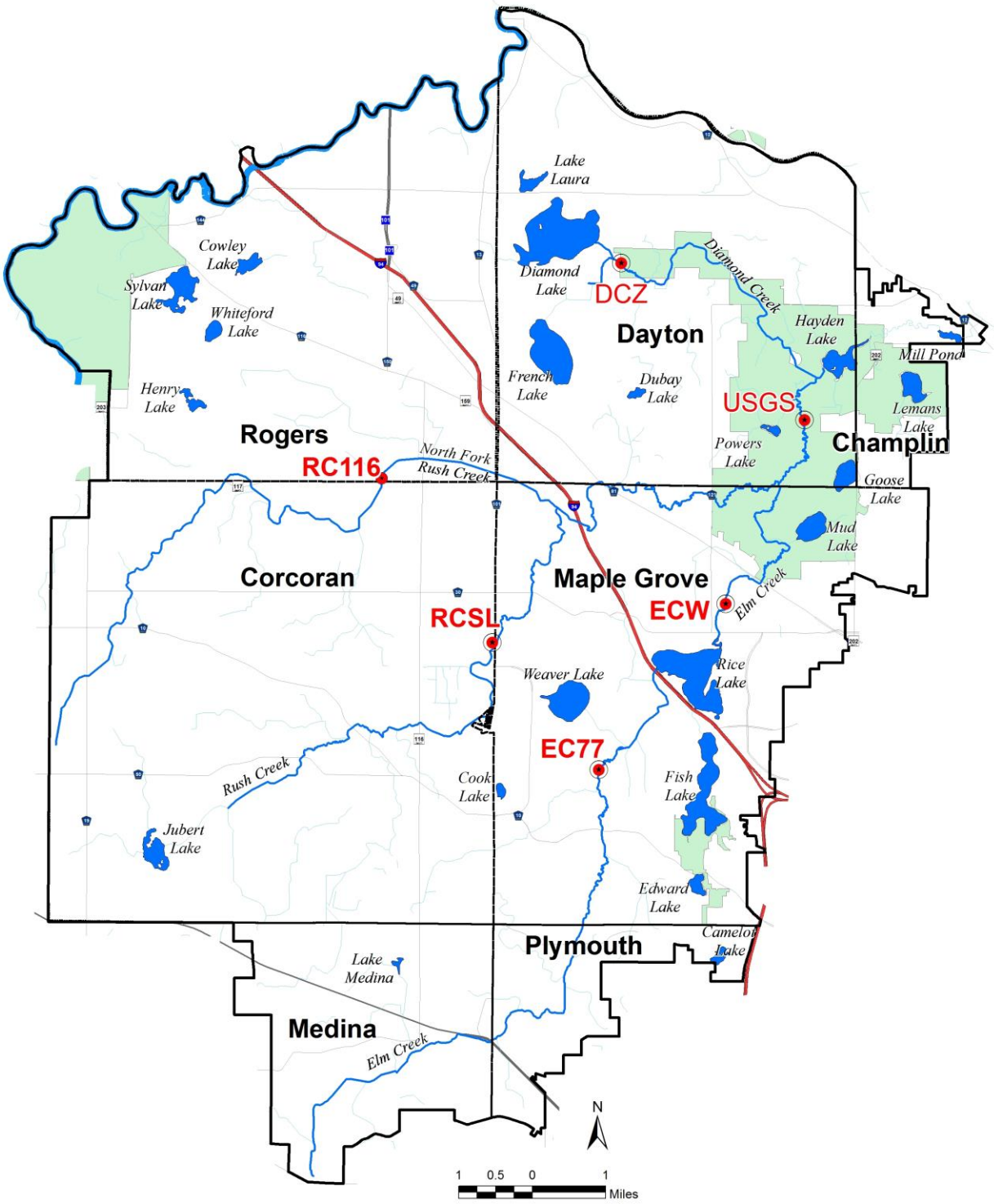

Figure 1. Elm Creek WMC Third Generation monitoring program – streams

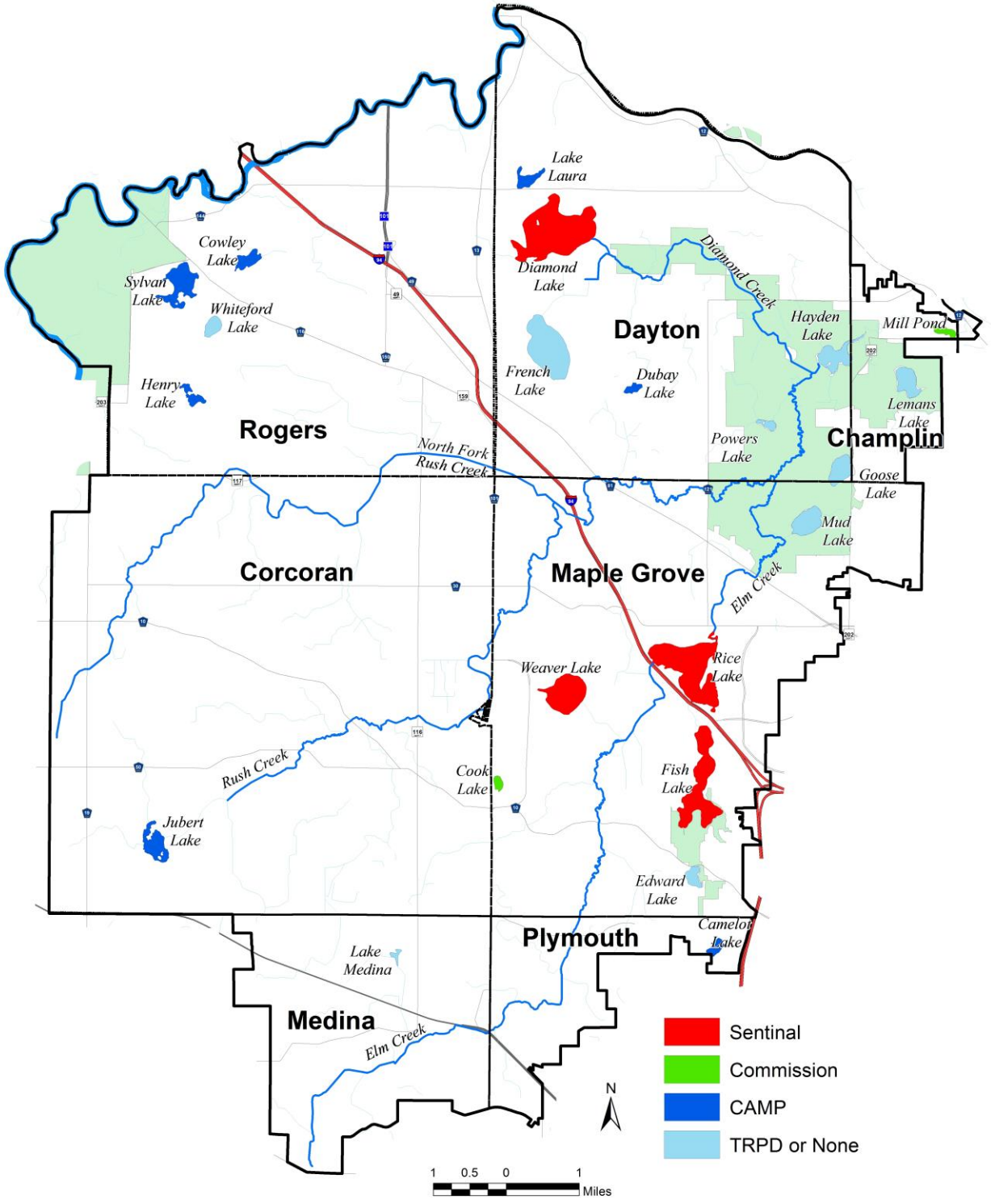

Figure 2. Elm Creek WMC Third Generation monitoring program -lakes.

Appendix E
Education and Outreach Plan

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Elm Creek Watershed Management Commission
Third Generation Watershed Management Plan
Education and Outreach Plan

The goal of the Elm Creek Watershed Management Commission's Education and Outreach Program is to educate and engage everyone in the watershed by increasing awareness of water resources, and by creating and supporting advocates willing to protect and preserve the resources in the watershed.

STAKEHOLDER EDUCATIONAL GOALS

Stakeholders and target audiences are individuals or groups to whom education is being directed. The Plan has identified the following target audiences and general educational goals for each. Often more than one target audience will benefit from an educational activity.

1. All property owners
   a. Understand that they live in a watershed and know where their stormwater runoff goes
   b. Understand nutrient sources and the impacts of excess nutrients on lakes and streams
   c. Understand how runoff rates and volumes affect lakes and streams
   d. Understand and undertake Best Management Practices (BMPs) on their properties to reduce nutrient loads and runoff volume
   e. Participate in volunteer activities or events

2. Lakeshore property owners
   a. Know the water quality status of their lake, and the types and magnitude of improvements needed
   b. Know both the major beneficial aquatic plants in their lake as well as the major invasives
   c. Have a general understanding of limnology (lake science)
   d. Understand and take action to reduce the risk of Aquatic Invasive Species (AIS)
   e. Understand and undertake Best Management Practices such as lakeshore buffers and proper application of fertilizer, herbicides, and pesticides

3. Government: elected and appointed officials, staff, board and commission members
   a. Have a general understanding of watersheds, water resources and where stormwater to and from the city goes
   b. Understand the water resources implications of land use change and the benefits of prevention and the costs of mitigation
   c. Are aware of water management policies and actions of other local, watershed, regional, and state organizations
   d. Understand how to incorporate water resources management actions into development and redevelopment as well as city operations

4. Educators and students
   a. Incorporate water resources education and activities into curricula
   b. Participate in family education and outreach events centered around water
   c. Create opportunities for volunteer monitoring, service projects, and other hands-on learning
   d. Educators are aware of and have access to continuing education centered around water

5. Agriculture and animal operators
    a. Understand and use Best Management Practices such as proper manure management and targeted fertilizer application
    b. Undertake conservation and nutrient management actions

IMPLEMENTATION STRATEGIES

- Participate in the West Metro Water Alliance (WMWA), Blue Thumb, and other groups to pool resources to undertake activities in a cost-effective manner, promote interagency cooperation and collaboration, and promote consistency of messages
- Use the Commission's, member cities', and educational partners' websites and newsletters, social media, co-ops, local newspapers and cable TV to share useful information to stakeholders on ways to improve water quality
- Prominently display the Commission's logo on information and outreach items, project and interpretive signs, and other locations to increase visibility
- Create opportunities for the public to learn about and participate in water quality activities
- Provide education opportunities, possibly through NEMO, for elected and appointed officials and other decision makers
- Enhance education opportunities for youth through Watershed PREP
- Identify and partner with co-ops and other entities to provide education and outreach to agriculture and animal operators.
- Provide technical and other incentives to property owners to adopt Best Management Practices

2014-2016 PRIORITY AREAS FOR EDUCATION AND OUTREACH

In setting its annual work plan, the Commission will review education and outreach priorities and recommendations from the CAC and develop specific education and outreach actions for the coming year. These actions may be ongoing or programs or activities; participation in programs or activities sponsored by other organizations; suggestions or information for member city implementation; or other actions depending on the education and outreach priorities. The following are the priority areas for the first few years of the Third Generation Plan:

1. All stakeholders: use multiple strategies to deliver simple messages: "where does our water go" and "why do we manage water quality."
2. Homeowners: Disseminate education materials to all stakeholders about actions they can take to protect and improve water quality. Targeted messages:
    a. Redirect your runoff onto pervious areas.
    b. Clean up after your pets.
    c. Keep organic matter (leaves, grass clippings, seeds, etc.) out of streets, ditches, lakefronts, and storm sewers.
    d. Reduce chemical and salt use.
3. Lakeshore property owners: sponsor workshops on basics of limnology, learning about AIS, and how to undertake lakescaping.
4. Elected officials and city staff: Sponsor watershed and water resources training opportunities such as NEMO (Nonpoint Education for Municipal Officials) for the city councils and planning commissions in the member cities. Develop a mechanism to share information about BMPs between the cities and with developers.
5. Students: expand the Watershed PREP program to all elementary schools in the watershed, and begin developing a companion program for older students.
6. Agricultural producers and hobbyists: identify and work with influential persons to spread the water quality and BMP message. Undertake a demonstration project with a co-op.

Table 1. Elm Creek Third Generation Watershed Management Plan Education and Public Outreach Activities.

Activity	Educational Outcomes	Example Actions	Estimated Cost	Schedule/ Frequency
Coordinate programming with West Metro Water Alliance (WMWA)	▪ Consistency of message across wider area ▪ Youth education ▪ Adult education ▪ Increased visibility for Commission	▪ Participate in developing education campaigns ▪ Provide Watershed PREP programming in watershed schools ▪ Provide Watershed PREP educators for lake associations, events, fairs, etc. ▪ Sponsor one or more Metro Blooms rain garden workshops	$6,550 to $8,000 Annually	Quarterly or as scheduled
Coordinate programming with other Metro organizations	▪ Consistency of message across wider area ▪ Access to additional education and outreach materials	▪ Continue membership in Blue Thumb and Watershed Partners ▪ Coordinate with NEMO	$1,000 Annually	Annual and ongoing
Maintain website	▪ Ability to provide a wide range of information to users for self-directed education	▪ Maintain and update website	$1,500 Annually	Ongoing
Distribute electronic and printed educational materials	▪ Distribution of useful information to assist in implementing BMPs	▪ Post electronic information on Commission and WMWA website ▪ Distribute printed materials to member cities, and make available at events	$300 Annually Cities fund repro cost	Printed– 1 per year Electronic – at least 3 new items per year
Contribute press releases and information material to local media	▪ Distribution of useful information to assist in implementing BMPs ▪ Increased visibility for and knowledge about Commission	▪ Submit press releases on programs and projects in the watersheds ▪ Submit press releases with useful, timely information	$330 Annually	At least 3 times/year
Sponsor volunteer water quality monitoring, watershed clean-up activities, and volunteer planting and maintenance opportunities	▪ Engage and educate residents, students, and other interested parties through hands-on activities ▪ Support positive actions to protect and improve water resources ▪ Increased visibility for and knowledge of Commission	▪ Sponsor volunteer lake, stream, and wetland monitoring ▪ Encourage and facilitate volunteer events ▪ Hold an annual family water quality event	$550 Annually + volunteer monitoring budget	Ongoing

Activity	Educational Outcomes	Example Actions	Estimated Cost	Schedule/ Frequency
Coordinate with other organizations to provide continuing education opportunities to elected and appointed officials	▪ Enhance understanding of watersheds and water resources ▪ Increase awareness of trends in regulations, maintenance, public opinions, etc.	▪ Sponsor Project NEMO workshops for all Commissioners, City Councils, and Planning Commissions ▪ Provide tailored education and outreach activities such as workshops, presentations, written materials, and on-line resources	$300 Annually	At least once per year
Provide education, outreach, and financial assistance to lake associations, schools, faith based-groups, community organizations, and other groups	▪ Improve general understanding of watersheds and water resources ▪ Encourage the adoption of practices that protect water resources ▪ Increase visibility for and knowledge of Commission	▪ Sponsor annual lake association summit ▪ Provide small grants as incentives to implement volunteer events and demonstration projects ▪ Provide small grants to educators to enhance environmental and water resources education in the schools	$3,000 - 5,000 Annually	Ongoing
			$13,530 to $16,980	

Appendix F
Public Waters Inventory

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Table F.1. Public waters basins in the Elm Creek watershed.

Name	PWI Number	City(ies)	Name	PWI Number	City(ies)
Champlin Mill Pond	27006100	Champlin	Unnamed	27021900	Dayton
Lemans	27006600	Champlin	Unnamed	27022000	Dayton
Mud	27011200	Maple Grove	Unnamed	27022100	Dayton
Rice Main Lake	27011601	Maple Grove	Unnamed	27022600	Champlin
Rice West Bay	27011602	Maple Grove	Unnamed	27022700	Champlin
Weaver	27011700	Maple Grove	Unnamed	27022800	Champlin
Fish	27011800	Maple Grove	Unnamed	27022900	Champlin
Cook	27012001	Maple Grove, Corcoran	Unnamed	27023000	Dayton
Edward	27012100	Maple Grove	Unnamed	27023700	Dayton
Goose	27012200	Champlin, Dayton, Maple Gr	Unnamed	27024500	Dayton
Laura	27012300	Dayton	Unnamed	27024600	Dayton
Diamond	27012500	Dayton	Unnamed	27024700	Dayton
French	27012700	Dayton	Unnamed	27026100	Maple Grove
Hayden	27012800	Dayton, Champlin	Unnamed	27026300	Maple Grove
Powers	27013000	Dayton	Unnamed	27026400	Maple Grove
Grass	27013500	Rogers, Dayton	Unnamed	27028200	Dayton
Medina	27014600	Medina	South Twin	27033900	Rogers
Jubert	27016500	Corcoran	Unnamed	27034000	Rogers
Cowley	27016900	Rogers	Unnamed	27034100	Rogers
Unnamed	27017000	Rogers	Unnamed	27034200	Rogers
Sylvan	27017100	Rogers	Unnamed	27034300	Rogers
Henry	27017500	Rogers	Unnamed	27034400	Rogers
Prairie	27017700	Rogers			

Source: Minnesota DNR.

Table F.2. Public Waters wetlands in the Elm Creek watershed.

Name	PWI Number	City(ies)	Name	PWI Number	City(ies)
Camelot, Lake	27009900	Plymouth	Unnamed	27031700	Maple Grove
Unnamed	27011300	Maple Grove	Unnamed	27031800	Maple Grove
Unnamed	27011400	Maple Grove	Unnamed	27031800	Corcoran
Unnamed	27012400	Dayton	Unnamed	27031900	Maple Grove
DuBay	27012900	Dayton	Unnamed	27031900	Corcoran
Unnamed	27013100	Champlin	Unnamed	27033400	Corcoran
Unnamed	27016300	Corcoran	Unnamed	27033500	Corcoran
Unnamed	27016700	Corcoran	Unnamed	27033600	Corcoran
Unnamed	27016700	Rogers	Unnamed	27033700	Corcoran
Whiteford	27017200	Rogers	Unnamed	27033800	Corcoran
Tiltons	27017300	Rogers	Unnamed	27034800	Corcoran
Unnamed	27021400	Dayton	Unnamed	27035000	Corcoran
Unnamed	27021500	Dayton	Unnamed	27035100	Corcoran
Unnamed	27021600	Dayton	Unnamed	27035200	Corcoran
Unnamed	27021700	Dayton	Unnamed	27035300	Corcoran
Unnamed	27021800	Dayton	Unnamed	27035400	Corcoran
Unnamed	27022200	Dayton	Unnamed	27035500	Corcoran
Unnamed	27022300	Dayton	Unnamed	27036100	Corcoran
Unnamed	27022400	Champlin	Unnamed	27041600	Corcoran
Unnamed	27023100	Dayton	Unnamed	27041700	Corcoran
Unnamed	27023200	Dayton	Unnamed	27042000	Corcoran
Unnamed	27023300	Dayton	Unnamed	27042100	Corcoran
Unnamed	27023400	Dayton	Unnamed	27042200	Corcoran
Unnamed	27023500	Dayton	Unnamed	27043700	Corcoran
Unnamed	27023600	Dayton	Unnamed	27043800	Corcoran
Unnamed	27023800	Dayton	Unnamed(east portion)	27043901	Maple Grove
Unnamed	27023900	Dayton	Unnamed(east portion)	27043901	Corcoran
Unnamed	27024000	Dayton	Unnamed(west portion)	27043902	Corcoran
Unnamed	27024100	Dayton	Unnamed	27044000	Corcoran
Unnamed	27024200	Dayton	Unnamed	27044100	Maple Grove
Unnamed	27024300	Dayton	Unnamed	27044100	Corcoran
Unnamed	27024400	Dayton	Unnamed	27044200	Maple Grove
Boundary Crk Pond	27025600	Maple Grove	Unnamed	27044300	Maple Grove
Boundary Crk Pond	27025700	Maple Grove	Unnamed	27044400	Maple Grove

Name	PWI Number	City(ies)	Name	PWI Number	City(ies)
Boundary Crk Pond	27025800	Maple Grove	Unnamed	27044500	Maple Grove
Unnamed	27025900	Maple Grove	Unnamed	27044600	Maple Grove
Unnamed	27026000	Maple Grove	Unnamed	27044700	Maple Grove
Unnamed	27026500	Maple Grove	Unnamed	27044800	Maple Grove
Unnamed	27026600	Maple Grove	Unnamed	27045400	Maple Grove
Unnamed	27026900	Maple Grove	Unnamed	27045500	Plymouth
Unnamed	27027100	Maple Grove	Unnamed	27045600	Plymouth
Unnamed	27027300	Maple Grove	Unnamed	27045700	Plymouth
Unnamed	27027400	Maple Grove	Unnamed	27045800	Plymouth
Unnamed	27027500	Maple Grove	Unnamed	27045900	Plymouth
Unnamed	27027600	Maple Grove	Unnamed	27048100	Medina
Unnamed	27027800	Dayton	Unnamed	27048200	Medina
Unnamed	27027900	Dayton	Unnamed	27048300	Medina
Unnamed	27028000	Dayton	Unnamed	27048500	Medina
Unnamed	27028100	Dayton	Unnamed	27048600	Medina
Unnamed	27028400	Dayton	Unnamed	27048900	Medina
Unnamed	27028400	Rogers	Unnamed	27049000	Medina
Unnamed	27028400	Dayton	Unnamed	27049100	Medina
Unnamed	27028400	Rogers	Unnamed	27049200	Medina
Unnamed	27028500	Dayton	Unnamed	27049300	Medina
Unnamed	27028600	Dayton	Unnamed	27049300	Corcoran
Unnamed	27028700	Dayton	Unnamed	27049400	Corcoran
Unnamed	27028800	Rogers	Unnamed	27049600	Medina
Unnamed	27028900	Rogers	Unnamed	27050300	Medina
Unnamed	27029000	Rogers	Unnamed	27052300	Maple Grove
Unnamed	27029100	Rogers	Unnamed	27052400	Maple Grove
Unnamed	27029200	Rogers	Unnamed	27052500	Maple Grove
Unnamed	27029300	Rogers	Unnamed	27052600	Maple Grove
Unnamed	27029400	Rogers	Unnamed	27052700	Maple Grove
Unnamed	27029500	Rogers	Unnamed	27052800	Maple Grove
Unnamed	27029600	Rogers	Unnamed	27052900	Maple Grove
Unnamed	27029700	Rogers	Unnamed	27053000	Maple Grove
Unnamed	27030000	Rogers	Unnamed	27053100	Maple Grove
Unnamed	27030100	Rogers	Unnamed	27053200	Maple Grove
Unnamed	27030200	Rogers	Unnamed	27053300	Maple Grove
Unnamed	27030300	Rogers	Unnamed	27053400	Maple Grove
Unnamed	27030500	Rogers	Unnamed	27053500	Maple Grove
Unnamed	27030600	Rogers	Unnamed	27053600	Maple Grove
Unnamed	27030700	Dayton	Unnamed	27053700	Maple Grove
Unnamed	27030900	Maple Grove	Unnamed	27053800	Plymouth
Unnamed	27031000	Maple Grove	Unnamed	27053800	Maple Grove
Unnamed	27031100	Maple Grove	Unnamed	27053900	Plymouth
Unnamed	27031200	Maple Grove	Unnamed	27053900	Maple Grove
Unnamed	27031400	Corcoran	Unnamed	27054300	Maple Grove
Unnamed	27031500	Corcoran	Unnamed	27054400	Maple Grove
Unnamed	27031600	Corcoran	Unnamed	27054500	Maple Grove
Morin	27042300	Corcoran	Unnamed	27054600	Maple Grove
Unnamed	27042400	Corcoran	Unnamed	27054700	Maple Grove
Unnamed	27042500	Corcoran	Unnamed	27054800	Maple Grove
Unnamed	27042600	Corcoran	Unnamed	27054900	Maple Grove
Unnamed	27042700	Corcoran	Unnamed	27055100	Maple Grove
Unnamed	27042800	Corcoran	Unnamed	27055200	Maple Grove
Unnamed	27042900	Corcoran	Unnamed	27059500	Plymouth
Unnamed	27043000	Corcoran	Unnamed	27059600	Plymouth
Unnamed	27043100	Corcoran	Unnamed	27059800	Plymouth
Unnamed	27043200	Corcoran	Unnamed	27060000	Plymouth
Unnamed	27043300	Corcoran	Unnamed	27108900	Maple Grove
Unnamed	27043400	Corcoran	Unnamed	27109100	Corcoran
Unnamed	27043500	Corcoran	Scott	27110200	Corcoran
Unnamed	27043600	Corcoran	Unnamed	27110300	Corcoran
			Unnamed	27110400	Dayton

Source: Minnesota DNR.

Appendix G
CIP Project Descriptions

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Elm Creek WMC Third Generation Watershed Management Plan
Capital Improvement Projects Descriptions

Projects proposed for the Capital Improvement Program (CIP) are described below and shown on the Implementation Plan and Capital Improvement Program in the Plan. It is the intent of the Commission to finance these projects using its most current Cost Share Policy. Additional funding options are set forth in the Joint Powers Agreement.

Special Studies

Both by itself and also in partnership with member cities the Commission will undertake special studies to target BMP implementation and to perform feasibility analyses to develop grant applications. These special studies will be solicited and identified each year through the budget/CIP review process. Some examples of these are:

Stream Segment Prioritization. The Commission will periodically conduct stream surveys to better define stream restoration needs and to guide future improvement projects. General needs include:

- The Elm Creek Channel Study identified several locations where streambank stabilization is needed or channel modification should be considered to prevent future erosion.
- The Elm Creek TMDL and Stressor Identification Study identified additional stream enhancements that should be considered to improve habitat, increase stream reaeration, and improve water quality.
- Field assessments and aerial photo interpretation suggests that a fair amount of improvement could be achieved simply through selective tree thinning, minor bank grading and reseeding to open the canopy and encourage the growth of stabilizing herbaceous vegetation and woody understory.

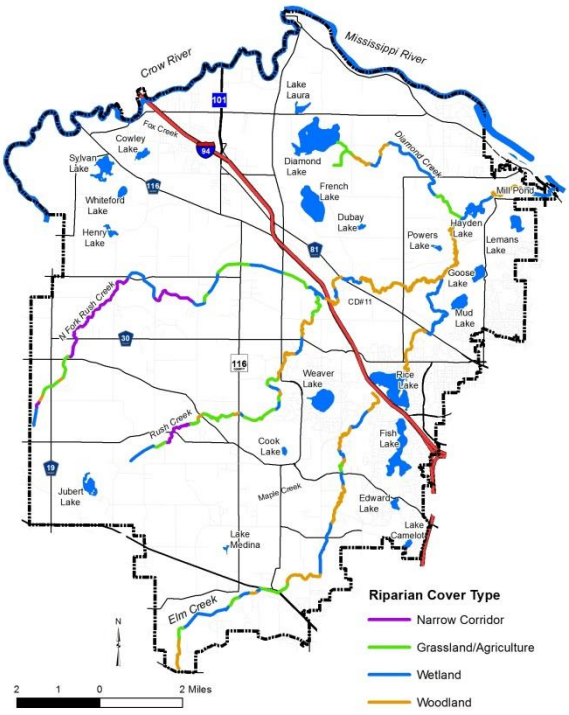

Figure 1. Stream riparian cover type.

The Commission's technical staff and consultant staff will walk priority areas on both the four major streams and key tributaries to identify segments that could benefit from tree thinning. Grant applications for crew work days will be developed and submitted to the Minnesota Conservation Corps where hand labor would be sufficient to improve the banks. Other segments will be classified based on the type of and extent of work to be completed, e.g., tree thinning and live staking on bends; extent and need for boulder toe; need for grade controls. Priority areas include those with known erosion problems; publicly-owned lands; and areas upstream of monitoring stations recording elevated TSS and TP concentrations.

TMDL Implementation. The Elm Creek Watershed TMDL implementation actions include a number of strategies that would require additional, more detailed study to identify specific BMPs and their costs and benefits. The Commission will share 50% of the cost of feasibility studies and subwatershed assessments.

- A high-infiltration potential assessment study to identify and prioritize infiltration projects to supplement stream baseflow.
- Vegetation management plans for curly-leaf pondweed in Rice, Diamond, Cowley, Sylvan, and Henry Lakes.
- Feasibility studies for internal load reduction projects in Rice, Diamond, Goose, Cowley, Sylvan, and Henry Lakes.
- Completing subwatershed assessments in priority areas to identify load and volume reduction BMPs. Tools such as the modeling performed for the Elm Creek watershed TMDL will be used, in consultation with member cities, to prioritize subwatersheds for review.

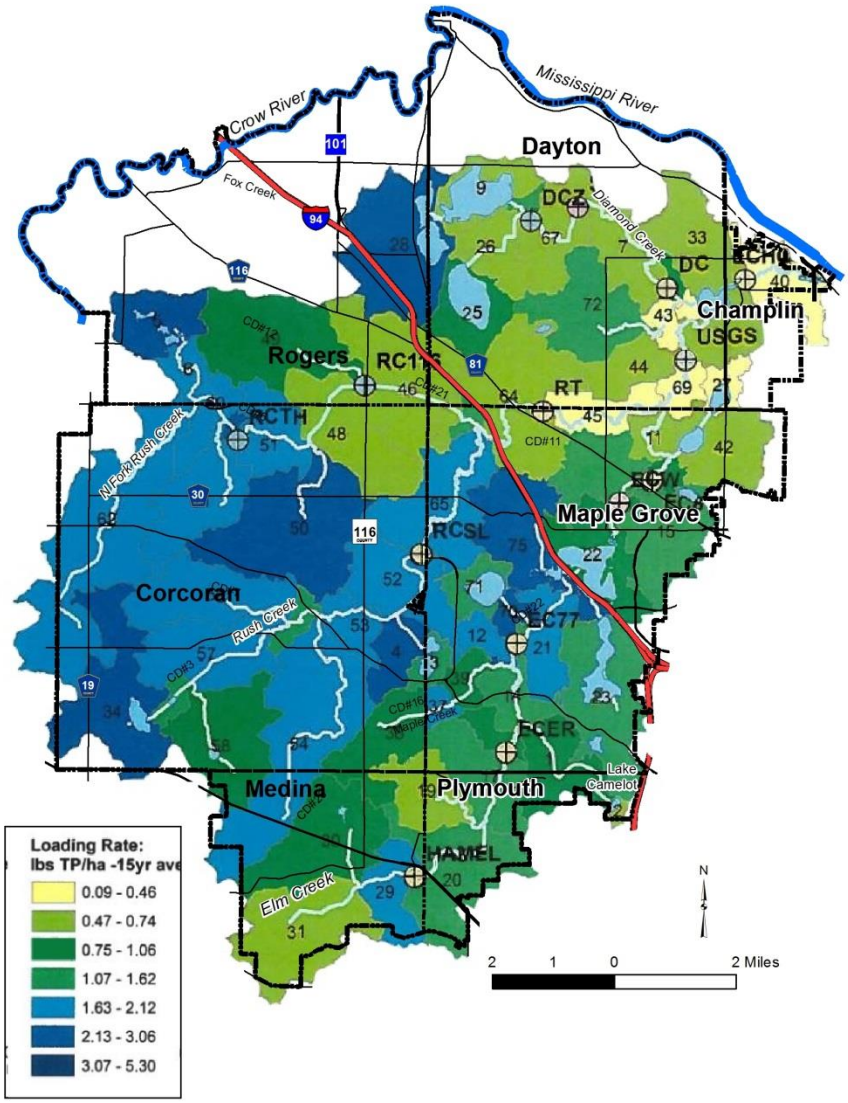

Figure 2. Modeled TP loading rate by subwatershed.

High Priority Stream Restoration Projects

The 2007 Elm Creek Channel Study identified a number of locations on Elm, Rush, North Fork Rush, and Diamond Creeks experiencing streambank erosion and mass wasting. This erosion not only threatens the structural integrity of the creek channels, but also contributes to in-stream and downstream water quality issues, including impairments to the biologic communities. The Commission annually will be undertaking subwatershed assessments in high-loading potential areas of the watershed, and those assessments may identify additional priority projects.

The Commission and member cities will continue to assess conditions on the streams in the watershed, and will undertake period stabilization and restoration projects, both on priority reaches identified in the Channel Study and WRAPS and any new priority reaches. Potential projects include, but are not limited to:

Elm Creek Stabilization, Plymouth. Undertake 5,000 linear foot stream stabilization project within Elm Creek Reach E. Increase channel area, lower hydraulic shear stress. Selectively thin trees and remove invasive species. Plant understory and herbaceous buffer. Stabilize streambanks. Add in-stream habitat features.

Fox Creek Streambank Stabilization, Rogers. Provide stabilization and protection along several reaches of streambank at Edison Court, Creekview Drive, and I-94/Hyacinth. Enhance/ expand adjacent wetland, reduce sediment transport and provide habitat enhancement and wooded upland protection.

Fox Creek South Pointe Streambank Stabilization, Rogers. Provide stabilization and protection along 600 feet of streambank tributary to Fox Creek at its headwaters, reducing sediment transport and providing habitat enhancement and wooded upland protection.

Mississippi Point Park Riverbank Repair, Champlin. Repair and stabilize 500 feet of Mississippi River streambank damaged by recent high waters.

Elm Creek Dam. The Elm Creek Dam project will replace the dam and spillway, stabilize streambanks, and provide an emergency Elm Creek bypass. It will reduce flood hazards, remove 60 acres from floodplains, improve water quality, provide stabilization for Elm Creek and improve stream/dam access.

Tree Thinning and Bank Stabilization Project. The Commission will periodically undertake small projects to selectively thin trees on segments of the four primary streams and tributary streambanks, regrading the banks as necessary, and seeding to establish stabilizing native vegetation.

Other High Priority Stream Restoration Projects. Additional stream restoration projects addressing water quality or biotic impairments on Elm, Diamond, Rush, and North Fork Rush Creeks or their tributaries may be identified though the stream segment prioritization process or be submitted by member cities for consideration. Some projects already identified include:

- *Elm Creek Reach K, Maple Grove.* Undertake 600 linear foot bank stabilization and erosion control project within Elm Creek Reach K. Increase channel area and lower hydraulic shear stress. Increase x-sectional area and meander width, plant disturbed areas with native floodplain forest vegetation to prevent erosion and increase habitat value.
- *Rush Creek Reach M, Maple Grove.* Undertake 1,000 linear foot bank stabilization and erosion control project within Rush Creek Reach M. Widen stream along existing alignment, plant native vegetation to prevent erosion.
- *Elm Creek Reach O, Elm Creek Park.* Undertake 1,100 linear foot bank stabilization and erosion control project within Elm Creek Reach O. Construct new channel alignment within floodplain, improve habitat in stream corridor.
- *Elm Creek Reach R, Elm Creek Park.* Undertake 2,000 linear foot bank stabilization and erosion control project within Elm Creek Reach R. Remove fallen trees to increase channel capacity and reduce bank scour. Reduce channel bank side slopes at existing toe locations, stabilize with riprap and native floodplain forest vegetation to prevent erosion and increase habitat value.
- *Elm Creek Channelization and Stream Restoration, Champlin.* 3,000 feet from 0.5 mile upstream of Cartway Road to Hayden Lake including bank stabilization and channelization, riprap to protect toe of stream bank and native vegetation.
- *Rush Creek, Maple Grove.* Stabilize and restore approximately 11,000 feet of Rush Creek east of I-94 and west of Fernbrook Lane, significantly reducing potential for bank erosion and sediment transport to Elm Creek. Restore native vegetation to provide habitat for wildlife, creating natural area for city demonstration.
- *Rush Creek, Maple Grove.* Stabilize and restore approx. 4,500 feet of Rush Creek north of 101 Avenue, significantly reducing potential for bank erosion and sediment transportation to Elm Creek. Restore native vegetation to provide habitat for wildlife.

High Priority Wetland Improvements

Wetlands provide numerous functions and ecological services, including upland and aquatic habitat, flood storage and attenuation, and groundwater recharge. Key wetland restoration projects have been identified for potential implementation in 2015-2024.

DNR #27-0437 in Maple Grove, Corcoran. Develop channel protection volume storage, flood storage and associated water quality improvements within wetland complex at Maple Grove/Corcoran boundary by providing extended detention within the storage basin.

Stone's Throw Wetland Restoration, Corcoran, Rogers. Acquire easements and restore 135 acre wetland adjacent to County Ditch #6.

Other High Priority Wetland Projects. Additional projects may be identified through ongoing management efforts.

Lake TMDL Implementation

Reducing lake internal loading is an essential component of achieving lake water quality standards. This may include options such as chemical treatment with alum, rough fish management aquatic and vegetation management.

Mill Pond Fishery and Habitat Restoration. To improve water quality, eliminate rough fish, restore the native aquatic plant community, and re-establish a healthy fish population that is beneficial to improved biotic integrity in Mill Pond and in Elm Creek, Champlin proposes to undertake the Mill Pond Fishery and Habitat Restoration Project. This project includes removing up to four feet of accumulated phosphorus-rich sediment and creating a deeper refuge for fish and other organisms during times of low dissolved oxygen in Elm Creek.

Other High Priority Lake Internal Load Projects. The Elm Creek TMDL identified Rice, Diamond, Goose, Cowley, Sylvan, and Henry Lakes as in need of substantial internal load reductions through actions such as aquatic vegetation management, rough fish control, and chemical treatment of lake sediments. As noted under Special Studies, the Commission will cost-share in feasibility studies and vegetation management plans that would then lead to internal load improvement projects. Priority would be given to lakes with public access.

Urban BMPs

Within urbanized areas, nutrient and sediment load reductions may require modifying existing infrastructure or adding BMPs where possible. As noted under Special Studies, the Commission will partner with the cities and Hennepin County to undertake subwatershed assessments in urbanized areas to identify these BMP opportunities, and then to share in the cost of installation. Some retrofits have already been identified.

Stonebridge, Maple Grove. Retrofit street stormsewers with hydrodynamic separators and SAFL baffles in existing storm sewer circuits where construction of ponds is not feasible, reducing TP loading by 50-60%, TSS loading by 75-90% to Rice Lake and Elm Creek.

Other High Priority Urban BMP Projects. The subwatershed studies may identify additional projects installing or modifying BMPs in developed areas to address water quality impairments in the watershed.

Livestock Exclusion, Stream and Channel Buffer, and Stabilized Access

There are numerous locations in the Elm Creek watershed where livestock (cattle, horses, etc.) graze adjacent to streams and channels, and have free access to the stream for water. This can result in broken-down streambanks and denuded pastures and paddocks. Sediment and animal waste is conveyed directly into the stream every time it rains, and the physical destruction of the banks and the lack of a rooted buffer lead to erosion and sediment accumulation in the stream.

Livestock Exclusion, Buffer, and Stabilized Access. The Commission will use the TMDL findings and local knowledge and work with partners at Extension, NRCS, and HCES to identify priority locations to provide technical and cost-share assistance to owners willing to install exclusionary fencing, resort stream buffers, and either provide stabilized access to the stream for water or an alternate water source for livestock.

Agricultural BMPs Cost Share

Agricultural fields are a significant source of sediment and nutrient loading to impaired waters. Modeling being conducted for the TMDL identified areas at highest risk, based on soil type, slope, and other factors, for erosion and sediment transport.

Ag BMP Technical Assistance and Cost Share. Using the TMDL modeling to help identify priority areas for implementation, the Commission will work with local co-ops, Extension, NRCS, and HCES to provide technical and cost-share assistance to agricultural operators to implement such priority BMPs as:

- Cover crops
- Grassed waterways
- Targeted fertilizer application
- Closed intakes
- Buffers

Hydrologic & Hydraulic Modeling

The existing Flood Insurance models for streams in the watershed are based on the critical 10-day snowmelt event. Commission rules requiring rate control have been in place since the models were developed, and were subsequently amended to require management of the Channel Protection Volume. As a part of this Plan the Commission has adopted volume management requirements intended to limit the creation of new volumes of runoff.

Hydrologic and Hydraulic Modeling. The Commission has identified a few key locations where additional hydraulic and hydraulic modeling may help improve the existing hydraulic model of Elm Creek, and may undertake this work as necessary and as desired.

Next Generation Watershed Management Plan

This Third Generation Plan presents goals, policies, and actions to be undertaken 2015-2024. While there will likely be amendments to this Third Generation Plan over that period, state statute does require that the management plan be updated in full at least every ten years.

Next Generation Watershed Management Plan. In approximately 2022 the Commission will begin planning for its Next Generation Watershed Management Plan, with the expectation that it will be complete and approved prior to this Plan's expiration in 2024.