

# Appendix D

## Monitoring Program

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**Elm Creek Watershed Management Commission  
Fourth 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.*

**BACKGROUND**

The Commission operates a monitoring program that includes both routine annual sampling of lakes and streams and special monitoring as needed to assess progress toward its goals. The Third Generation Watershed Management Plan expanded the annual monitoring program to undertake more lake and stream routine monitoring and incorporate other monitoring as needed. The Fourth Generation Plan continues that effort.

Diamond Creek, Rush Creek, North Fork Rush Creek and Elm Creek are Impaired Waters, and do not meet state water quality standards for several parameters, including sediment, nutrients, bacteria, chloride, and biotic integrity. Cowley, Sylvan, Diamond, Henry, Rice, and Goose Lakes are impaired by excess nutrients. The Commission in 2012-2016 partnered with the Minnesota Pollution Control Agency and Three Rivers Park District to undertake a Watershed Restoration and Protection Strategies (WRAPS) study. 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's ongoing monitoring program meets the requirements of Minnesota Rules, helps determine progress toward meeting the TMDLs, and guides management decisions to support healthy aquatic ecosystems through the protection and improvement of water quality.

**FOURTH GENERATION MONITORING PROGRAM FRAMEWORK**

The Fourth Generation Monitoring Program has two organizing principles:

1. Continue to obtain detailed flow and water quality data annually at sites on Elm, Diamond and Rush Creeks and on sentinel lakes, and collect data on other lakes and streams on a rotating basis.
2. Collect other data as needed to document water quality trends and assess progress and guide management decisions.

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 compared 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.
- To evaluate progress toward meeting TMDL load reduction and other goals.

Monitoring data will be used:

- To guide management decisions to support healthy aquatic ecosystems through the improvements in water quality.
- To quantify any changes to receiving waters as land use conversion and development occurs.
- To convey information about the water resources in the watershed and their condition.
- To target implementation and resource protection actions based on cost-effectiveness.
- To perform TMDL/WRAPS progress reviews.
- To accumulate 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 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 2025-2034. The Commission currently partners with the USGS to operate a flow 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 information at this site.

The Commission will also monitor flow and water quality at designated sites in the watershed (Figure 1) per year: a station on Elm Creek upstream of the USGS site (EC77); Rush Creek at Territorial Road (RC); and Diamond Creek in Elm Creek Park (DC). In addition, the Commission may from time to time undertake special stream monitoring on other tributaries, to add to the period of record, calibrate models or refine source assessments. This monitoring will continue under the Fourth Generation Plan. Some of the member cities also undertake lake and stream monitoring, especially at sites where restoration actions have been completed. This Commission is aware of these efforts and the data supplements that which the Commission collects.

Additional special stream monitoring that may be completed is longitudinal dissolved oxygen (DO) monitoring. Longitudinal monitoring assesses stream DO along the entire length of the stream from upstream to downstream prior to 9 am, when DO levels are the lowest. This data is used to better understand stream dynamics and how management actions are impacting DO in the streams.

There is limited biologic data on the resources in the watershed. The Commission may elect to undertake fish and/or macroinvertebrate sampling to supplement the data collected by the DNR or other parties at a few representative locations.

The Hennepin County Environment and Energy Department had in the past sponsored various stream and wetland water quality and biota volunteer monitoring opportunities, which had been implemented at various locations in the watershed. These programs – RiverWatch, Wetland Health Evaluation Program (WHEP), and Stream Health Evaluation Program (SHEP) were discontinued during the COVID pandemic. A new program called Watershed Connections has been developed for students in grades 6-12 and includes modules on aquatic invasive species (AIS), macroinvertebrates, and stewardship projects. This is a new program in its early stages, and over the course of the Plan the Commission may elect to assist in or sponsor some sites in the watershed.

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 currently completes these assessments on ditches that are under its ditch authority.

## **LAKES**

There are numerous basins in the Elm Creek watershed, with 22 primary lakes (Figure 1). The Commission contracts with Three River Park District to undertake water quality and aquatic vegetation monitoring on lakes in the watershed. The Commission has also participated in the Metropolitan Council's Community 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 Table 2.

The Third Generation Plan established four "Sentinel Lakes" that are 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 are monitored on a rotating basis either by Three Rivers Park District or through CAMP. Some lakes are difficult to access; no data is available and there are no plans for monitoring unless access can be gained.

## **ANNUAL MONITORING PROGRAM**

This Fourth Generation Plan monitoring framework is generally unchanged from the Third Generation Plan. Each year the Commission will review the proposed annual monitoring program and any other proposed monitoring for the coming year. Data are annually summarized and presented to the Commission for review and incorporation into the annual report. Results are also posted on the Commission's website.

Table 1. Elm Creek Fourth Generation Plan monitoring framework.

Resource	Activity	Purpose	Parameters	Frequency	Comments/Standards
Streams	Continue to partner with USGS on flow at USGS site in Elm Creek Park Reserve	Current conditions and long-term trends; TMDL compliance; annual water yield trend; calibrate models	Flow	Annually	Modify or add parameters as necessary based on current data needs
	Routine flow and water quality monitoring at three anchor sites: Diamond Creek (DC), Elm Creek (EC77), and Rush Creek (RT)	Current conditions and long-term trends; TMDL compliance; annual water yield trend; calibrate models	Flow, temp, pH, TP, SRP, TN, DO, TSS, specific conductance	Annually, bi-weekly	Modify or add parameters as necessary based on current data needs
	Periodic flow and water quality monitoring at other sites on Rush Creek (RC116), and South Fork Rush (RC101)	Current conditions and long-term trends; TMDL compliance	Flow, temp, pH, TP, SRP, TN, DO, TSS, specific conductance	As needed, bi-weekly	Modify or add parameters as necessary based on current data needs
	DO longitudinal and diurnal assessment on impaired streams	TMDL compliance	DO, temp	As needed	DO standards, biotic response
	Macroinvertebrate community	TMDL compliance	Inverts	Every 5 years	IBI Standards
	Volunteer stream monitoring	Current condition; trends; education & outreach	Inverts	As available	Educational Activity
	Fish community	TMDL compliance	Fish	Every 5 years	IBI Standards
	Land use/ stream condition/ buffer assessments	Long-term trends	Condition	As needed	TMDL compliance and BMP implementation
Lakes	Citizens Assisted Monitoring Program (CAMP)	Current condition; trends; education & outreach	Surface water TP, chl-a, Secchi depth, temp, water condition observations,	1-2 lakes per year, biweekly, Apr-Oct	Lake water quality standards; education and outreach
	Sentinel Lakes annual monitoring (Diamond, Fish, Rice, and Weaver Lakes)	Current conditions and long-term trends	DO and temperature profiles, TP, SRP, TN, chl-a	4 lakes, biweekly, annually	Lake water quality standards
	Periodic monitoring through Three Rivers Park District	Current conditions and long-term trends	DO and temperature profiles, TP, SRP, TN, chl-a	2 lakes total, monthly, every three years	Lake water quality standards
	Vegetation surveys	Current conditions and long-term trends	Species and abundance	Spring and fall every 5 years	Lake restoration
	DNR fish surveys	Current conditions and long-term trends	DNR protocol	DNR schedule	Lake restoration
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	As needed	As needed	Some special monitoring may require cost-share from a benefitting MS4
	Periodically log BMPs undertaken in the subwatershed of each resource	Progress toward meeting load reductions	Location, area treated, TP, TSS, and volume removals	As needed	Member cities report annually

**Table 2. Lake monitoring history since 2009.**

Year	Cook	Cowley	Diamond	Dubay	Fish	French	Goose	Henry	Jubert	Laura	Medina	Mill Pond	Mud	Rice	Sylvan	Teal	Weaver
2025			T	T	T	T		T	C	T				T			T
2024		T	T		T	T								T	T	C	T
2023		T	T		T									T	T		T
2022			T		T		T						T	T			T
2021			T		T		T					T	T	T			T
2020			T		T									T		C	T
2019			T		T									T			T
2018			T		T				C					T			T
2017			T		T				C					T			T
2016		C	T		T				C					T			T
2015			T		T				C	C				T			T
2014			T	C	T					C		T		T	C		T
2013			T	C	T	T				C		T		T	C		T
2012			T	C	T	T	T				C	T	T		C		T
2011			T	C	T	T	T	C				T	T	T			T
2010		C	T		T	T		C				T		T			T
2009		C	T		T	T		C				T		C			T

C = CAMP; T = Three Rivers; RB = recommended from budget; RO = recommended from other source.

Shaded = Impaired Waters; Sentinel Lakes: Diamond, Fish, Rice, Weaver

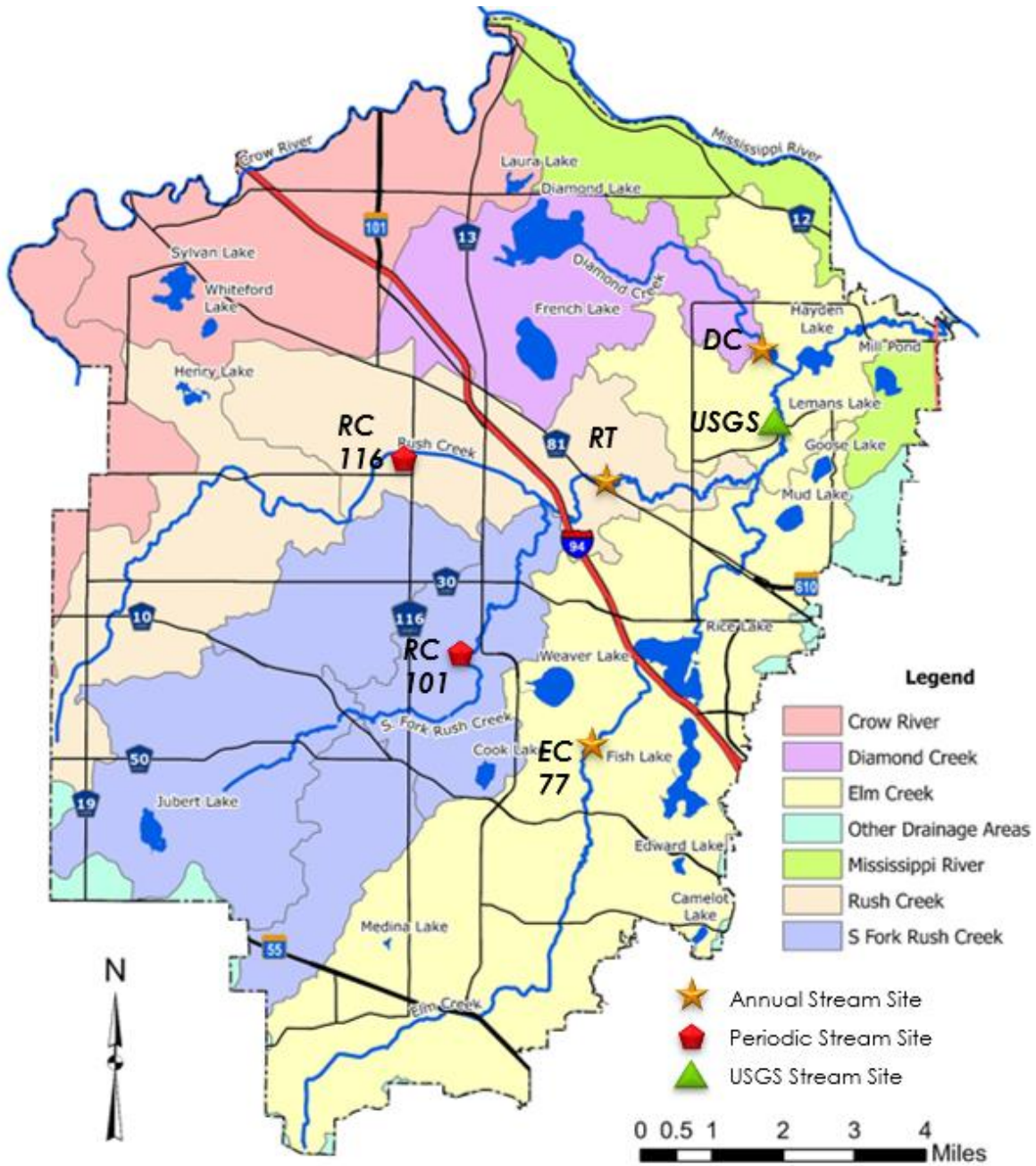


Figure 1. Elm Creek WMC Fourth Generation monitoring.