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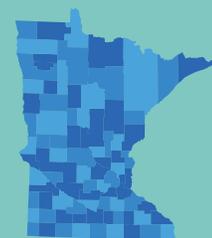
# Cooperative Surface Water Quality Monitoring System for Minnesota

How state agencies coordinate work for monitoring and evaluating Minnesota's lakes, rivers, streams, and wetlands.



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Pollution Control Agency  
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## Operation of a Cooperative Surface Water Quality Monitoring System for the State of Minnesota

The Minnesota Department of Agriculture, Minnesota Department of Health, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency and Metropolitan Council Environmental Services (agencies) agree that the attached document, *Cooperative Surface Water Quality Monitoring System*, dated April 15, 2021 represents the agencies' joint approach for coordinating surface water quality monitoring on a statewide basis in Minnesota. The purpose of this document is to coordinate an integrated approach to surface water quality monitoring that optimizes state resources while minimizing duplication of effort.

This document outlines the individual agencies' purposes, goals and roles in surface water quality monitoring based on their individual state and federal authorities and requirements. It identifies how the agencies will accomplish monitoring in an integrated fashion, as resources allow. It further establishes inter-agency cooperation in shared monitoring design, sample collection, monitoring location selection, data management, and waterbody assessment to ensure efficiencies in the system.

Through this document, the agencies will conduct a joint annual review of their surface water quality monitoring systems to allow for modifications, along with a five-year evaluation, at which time this document will be updated.

By signing this document, the agencies commit to fulfilling the monitoring activities outlined herein in cooperation with the other agencies. An individual agency may choose to terminate its participation in this with a 30-day notice to the other agencies.

Signed,

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# Cooperative surface water quality monitoring system

The Minnesota Department of Agriculture (MDA), Minnesota Department of Health (MDH), Minnesota Department of Natural Resources (MDNR), Minnesota Pollution Control Agency (MPCA) and Metropolitan Council (MC) all conduct surface water quality monitoring activities to meet their individual authorities and responsibilities. This document describes the activities of each agency for condition and effectiveness monitoring of surface water resources. It also outlines how the agencies will work cooperatively on surface water quality monitoring to best serve the interests of the State.

## Monitoring purpose and goals

The MDA, MDH, MDNR, MPCA and MC share a common need to collect and evaluate surface water quality monitoring data in an effort to determine impacts to surface water resources, identify water quality impairments, and manage and protect water resources. However, the various agencies are guided by different statutory and programmatic drivers and thus focus on different aspects of surface water quality monitoring. In general, the MDA focuses its monitoring efforts on the collection of water chemistry data pertaining to agricultural chemicals (including pesticides and fertilizers). The MDH focuses monitoring efforts on waterbodies that are current or potential drinking water sources, as well as recreational beaches on Lake Superior, to ensure that water quality does not endanger public health. The MDNR focuses in on water quantity and the sustainable use of water resources without unacceptable social, economic, or environmental consequences. The MPCA focuses its monitoring efforts more broadly on aquatic life and recreation uses and collects water chemistry, biological, and physical data on lakes, wetlands, streams, and large rivers. The MC water resources monitoring focuses on lakes, large rivers, and tributary streams is to provide information to empower Council and local actions that ensure clean, healthy, and sustainable water resources for the Twin Cities Metro Area (Metro Area).

## MDA

The goal of the MDA's surface water monitoring program is to provide information on the impact of agricultural chemicals (pesticides and fertilizers) on Minnesota's surface waters. The fundamental purpose of the MDA's monitoring program is to protect Minnesota's citizens and water resources from agricultural chemicals. Guided by the Pesticide Control Law and the Comprehensive Groundwater Protection Act ([Minnesota Statutes 18B, 18C, 18D, and 103H](#)) and the MDA's [Pesticide Management Plan](#), the activities of the Monitoring and Assessment Program focus on:

1. The collection and analysis of water samples from multiple locations throughout the agricultural and urban areas of the state to determine the identity, concentration magnitude and the frequency of pesticide presence in Minnesota's groundwater and surface water resources.
2. Assessment of the long-term trends associated with normal pesticide use on waters of the state.
3. Conducting intensive monitoring of specific areas that are more sensitive to pesticide contamination based on geology, pesticide usage or based on historical data.
4. Providing data to guide activities in the Pesticide Management Plan, including the development of best management practices to minimize the impacts of pesticide application to water resources.
5. The collection of nutrient data from surface water and Edge of Field monitoring locations to inform fertilizer management and assess agricultural and non-agricultural fertilizer use and impacts.

For more information on program design, annual work plans, and water quality reports, please visit the [MDA Monitoring and Assessment webpage](#).

## **MDH**

The goal of the MDH's monitoring is to gather water quality data to characterize the suitability of waterbodies and aquifers used as drinking water sources. The objectives of the MDH's surface water monitoring activities are:

1. To determine the condition of waterbodies used as drinking water sources, whether they are streams, lakes, reservoirs or mine pits, to ensure that public water suppliers are able to meet all federal and state drinking water compliance standards in a cost-effective and equitable manner.
2. To evaluate the effectiveness of drinking water treatment processes, given the ambient quality of the available source(s).
3. To assess whether chemical or biological parameters endanger drinking water or recreational users depending on the waterbody.
4. To track long- and short-term changes in source water quality over time.
5. To monitor for emerging contaminants and other public health threats.
6. To ensure resilience to drinking water threats like climate change and upstream land use via source water protection planning with public water suppliers.

## **MDNR**

The goal of the MDNR's surface water monitoring program is to gather surface water levels and stream flow through time and ecosystem data to help the MDNR and others carry out statutory responsibilities and water management programs.

1. To provide data needed for water resource related regulatory programs (i.e., appropriation of waters for consumptive use, permitting of work done in public waters and protection of special features such as calcareous fens and trout streams).
2. To determine the ordinary high water level of water basins, watercourses, public waters and public waters wetlands.
3. To track long-term changes in lake and wetland elevations through time.
4. To track long-term records of streamflow to determine thresholds required for ecosystem health and annual Q90 exceedance flow values to determine suspension of surface water appropriations.
5. To track ecosystem health indicators in surface waters.
6. To track climate-related changes to the quantity of Minnesota waters.

## **MPCA**

The goal of the MPCA's monitoring is to gather surface water quality and biological data to determine the character of Minnesota's water resources. The objectives of the MPCA's surface water monitoring program activities are:

1. To determine the ambient condition of Minnesota's surface waters, including assessing whether or not the chemical, physical and biological integrity of lakes, streams/rivers, and wetlands are being protected so that water quality standards and designated uses are met.

2. To use surface water monitoring data to inform water resource management decisions at the state and local levels.
3. To track long-term changes in surface water quality over time.
4. To track progress and determine if management activities, such as protection and restoration best management practices, are effective at the systems scale.
5. To determine pollutant loads at the basin, watershed, and subwatershed scales, which are foundational to high-quality watershed modeling.
6. To provide data needed for water resource-related regulatory programs (i.e., effluent limits for National Pollutant Discharge Elimination System (NPDES) permits) and for the development of water quality standards and health benchmarks.
7. To track climate-related changes to the quality and biological integrity of Minnesota's surface waters.

## MC

The purpose of the MC's water resources monitoring is to provide information to empower Council and local actions that ensure clean, healthy, and sustainable water resources for the Metro Area. This work supports the Water Resource Section vision that Metro Area waters fully support public and ecosystem health, economic growth, and all recreational uses for current and future generations. This work also aligns with the Metropolitan Council Environmental Services (MCES) Mission to provide wastewater and integrated planning to ensure sustainable water quality and water supply for the Metro Area.

Monitoring program purpose statements:

### Lake program:

1. Provide scientifically valid water quality data and information for the Council and the partners (federal, state, regional, local communities, and citizens of the Metro Area) to help effectively manage the lakes of the Metro Area.
2. The Citizens-Assisted Monitoring Program (CAMP) was added to the lake program to efficiently expand regional coverage and better address local priorities while engaging citizen-scientists that promote water quality advocacy.

### Large river program:

1. Support MC's permit compliance strategy by providing context on relative point and non-point source contributions of pollution incoming to and within the Metro Area in order to find economically viable water quality solutions.
2. Provide baseline water quality data on the major rivers, communicate historical progress and current conditions, to inform local, regional, state/federal agencies on water assessment, planning, and management efforts.
3. Meet NPDES permit requirements and provide technical support to wastewater treatment plant (WWTP) process and operation staff.

### **Tributary river and stream program:**

1. Support the MC's regulatory strategies by quantifying regional stream tributary non-point source pollution. This data allows the utility to assess the relative contributions of point and non-point source pollution within the Metro Area and pursue economically viable water quality solutions.
2. Measure regional stream health to communicate progress of water quality improvements and provide actionable information to local, tribal, state, and federal partners to support local water plans, guide implementation efforts, and inform impairment assessments.
3. Partner with local public-sector water resource practitioners to monitor and assess regionally significant streams, build local monitoring capacity, and develop local monitoring expertise.

## **Monitoring roles of MDA, MDH, MDNR, MPCA, and MC**

While the MDA, MDH, MDNR, MPCA, and MC share similar purposes and goals while conducting water monitoring activities, the authorities under which they are operated create distinct roles for each agency. The authorities granted to the agencies at the state level are derived from federal and state statutes. The MDA has narrow authority to monitor surface water for agricultural chemicals and the MPCA has broad authority to monitor surface water for a variety of chemical, biological and physical parameters. The MDH has broad authority to monitor surface water upstream of an intake for contaminants and parameters that may present a threat to public health. The MDNR authority is to regulate the consumption and alteration of public waters. The MPCA authority is to monitor and assess the condition of waters for beneficial uses. The MC has authority to provide wastewater treatment services, develop regional policy and provide planning guidance for the Metro Area. This includes implementing total watershed management with regional partners and developing a regional Water Resource Policy Plan with watershed management objectives.

### **MDA**

The MDA is authorized by the U. S. Environmental Protection Agency (EPA) to be the lead state agency for management and regulation of pesticides registered under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) in Minnesota. The EPA Office of Pesticide Programs conducts a biennial review of the MDA's pesticide programs, including water quality monitoring. The MDA's FIFRA authorities account for the focus of the MDA monitoring activities on pesticides. The MDA is also authorized to conduct pesticide monitoring in accordance to [Minn. Stat. § 18B.04](#) which states: *"The commissioner shall: (1) determine the impact of pesticides on the environment, including the impacts on surface water and groundwater in the state."* Similarly, the MDA registers, manages and regulates the sale of fertilizers and in response the MDA also monitors for nutrients in surface waters. Typically, the MDA conducts monitoring of pesticides and nutrients concurrently at most surface water locations. The additional resources needed to conduct nutrient monitoring are minimal when placed in the context of the overall scope of implementing the pesticide monitoring program. Additionally, the data provides corollary or interpretive value in that the relative concentration of nutrients in a sample may provide evidence as to the primary source of the water in a stream at a given point in time.

The MDA also has statutory requirements to protect water quality and may make pesticide registration decisions based on water quality monitoring data as outlined in [Minn. Stat. § 18B.26](#) subd. 5(b): *"The commissioner shall review each application and may approve, deny or cancel the registration of any pesticide. The commissioner may impose state use and distribution restrictions on a pesticide as part of the registration to prevent unreasonable adverse effects on the environment."*

## MDH

The MDH is authorized by the EPA to be the lead state agency for the implementation of the Safe Drinking Water Act (SDWA) and all subsequent amendments to the act. Monitoring for SDWA compliance involves collecting and analyzing water samples to determine if disease-causing organisms or toxic chemicals are present. In the event that unacceptable levels of contamination are found in treated drinking water, the MDH works with the public water supplier to alert the public and take corrective action. Sampling can include analysis for up to 118 different contaminants, with additional emerging contaminants possible, and scheduling varies depending upon contaminant detection history and unique conditions found in the water supplier's contributing watershed, such as land use.

Additionally, the SDWA authorizes the MDH to conduct source water protection planning for public water suppliers in Minnesota. The monitoring of both surface- and groundwater potable water sources supports these efforts. More detail on these sampling activities is provided below.

The MDH also administers the Lake Superior Beach Monitoring Program, as authorized by the EPA under the Beaches Environmental Assessment and Coastal Health (B.E.A.C.H.) Act of 2000. This program monitors *E. coli* counts at public beaches along Lake Superior and posts health advisories when counts are above acceptable levels.

## MDNR

The MDNR's water regulatory authority is supported by Minn. Stat. 103.G Waters of the State. Chapter 103G gives the commissioner authority to regulate work in public waters; control water appropriation and use; ensure the safety of dams; and conduct water resource surveys, investigations and studies.

## MPCA

The MPCA is authorized by the EPA to be the lead state agency for the implementation of the Clean Water Act (CWA). The CWA has a wide focus and scope and includes a variety of regulations and pollutants. As a result, the MPCA's monitoring activities focus on a greater number of chemical, biological, and physical parameters that can affect different designated uses (aquatic life, recreation, and consumption) assigned to surface waters.

The MPCA's monitoring programs are authorized by the general authorities granted to the agency in Minn. Stat. § 115.03, charging the agency to "investigate the extent, character and effect of pollution of waters of this state and to gather data and information necessary or desirable in the administration or enforcement of pollution laws, and to make such classification of the waters of the state as it may deem advisable." The general agency statutes also authorize the MPCA to require regulated parties operating disposal systems to undertake monitoring, as deemed necessary by the Agency. In addition, Minn. Stat. § 115.06 subd. 4 authorizes the MPCA to encourage citizen monitoring of ambient water quality by providing technical assistance, integrate citizen monitoring into water quality assessments, and seek public and private funding to collaboratively develop and distribute guidelines for water quality monitoring with partners, to expand MPCA monitoring, and to continue to provide electronic and Web access to water quality data and information.

## MC

The MC's water resource monitoring work is supported by Minn. Stat. 473.157 which states "to achieve federal and state water quality standards, provide effective water pollution control, and help reduce unnecessary investments in advanced wastewater treatment, the Council adopts a water resource plan that includes management objectives for watersheds." This statute guides the development of the Water Resources Policy Plan (WRPP) and the MC's monitoring program work helps implement many of the strategies outlined in that plan.

Furthermore, Minn. Stat. 473.505 states "the Council may enter into agreements with other governmental bodies and agencies and spend funds to implement total watershed management. The purpose of total watershed management is to achieve the best water quality for waters of the state receiving effluent of the MDS for the lowest total costs, without regard to who will incur those costs." Activities outlined in the WRPP often are similar to those conducted by the MPCA. A separate Memorandum of Agreement between the MC and the MPCA outlines coordination between Metro Area and state-wide activities with the MC covering most of the surface water quality monitoring activities in the Metro Area.

## Monitoring strategy and design

### MDA

The MDA surface water monitoring program was developed in 1990, and data collection began in 1991 with a statewide grab sampling program. Many changes to the monitoring strategy have occurred since the program began. The MDA continues to focus the collection of water samples from surface waterbodies with the potential to have elevated pesticide concentrations, and targets sample collection during the pesticide application periods when the risk to water resources is highest. MDA created 10 Pesticide Monitoring Regions (PMRs) separating the state into similar agricultural, geologic and hydrologic areas. Monitoring strategies in each of the PMRs are based in part on the relative risk to surface waters as indicated by previous data collection. The MDA works with a variety of local watershed groups, the MPCA and the MC to collect samples across Minnesota. Finally, the MDA reviews its pesticide laboratory analyte list annually to ensure the appropriate pesticide compounds are included.

The MDA has established an advisory committee with the MDH and the MPCA to coordinate efforts to identify pesticides and their degradates that are a priority for monitoring. The goal is to prioritize chemicals for monitoring that are most likely to reach groundwater and surface water. As new pesticides are registered for use in the state, or new information becomes available, the MDA assesses their relative risk and shares information with the advisory committee. In some instances, use restrictions or expanded monitoring requirements may be placed on pesticide products based on risk to water resources.

The core of the MDA's surface water quality monitoring is conducted on rivers and streams from May through August across Minnesota using a tiered approach targeting storm flow (runoff) periods after pesticide applications have occurred. Approximately 50 to 60 stream locations are monitored for pesticides each year. Monitoring intensity increases at locations with a previous detection(s) of any pesticide above 50% of the lowest applicable numeric water quality reference value within the last five years. Tier 1 locations are general survey locations including eight sample collection events between May and August. Tier 2 locations are similar to Tier 1 but include additional samples (up to 16 per

season) to provide more concentration data for duration assessment. Tier 3 locations are fully automated and utilize automated equal time increment composite samplers to collect pesticide water quality data that are directly comparable to applicable water quality standards (4-day composites during storm events). The data generated from this tiered structure allow for water quality assessment and long-term trend analysis. Most of the MDA's tiered sites are co-located with MDNR, MC, MPCA and/or U. S. Geological Survey (USGS) monitored locations where a continuous record of river stage is available. In addition to the tiered surface water monitoring platform, the MDA operates a network of automated rainfall collectors that allow for an assessment of atmospheric pesticide transport in Minnesota. The MDA also provides analytical and interpretive support for several MPCA projects or programs that occur on a rotating schedule. Those programs have included the National Lakes Assessment, National Rivers and Streams Assessment and National Wetland Condition Assessment. The MDA and MPCA meet and confer frequently to discuss potential collaboration as new projects develop.

The MDA and MPCA meet annually to review pesticide water quality data collected from surface waterbodies. The MPCA formally assesses the data for possible inclusion on the Impaired Water List for waterbodies that have violated a water quality standard.

The MDA has also developed a network of edge-of-field monitoring stations throughout the agricultural areas of the state to determine the amount of nutrients and sediment leaving small watersheds. The information collected from Discovery Farms Minnesota and other edge-of-field monitoring conducted by the MDA should prove useful for the MPCA's assessment and implementation strategies to better quantify and estimate pollutant contributions from agricultural landscapes.

The MDA publishes a report of the monitoring results every year. These reports are made available on the Minnesota Water Research Digital Library and on the MDA's monitoring reports webpage and are provided to the MPCA, MDH, DNR and other interested Agencies, organizations or the general public. All pesticide water quality data is provided to the MPCA for assessment purposes on an annual basis.

## **MDH**

The MDH's surface water monitoring efforts focus on SDWA compliance. Sampling for SDWA compliance usually assesses treated water quality, but can include some intake source sampling to determine incoming water quality. The SDWA also mandates sampling for unregulated contaminants under the Unregulated Contaminant Monitoring Rule. These contaminants are chosen by the EPA through a rigorous process, and the resulting dataset provides information about contaminant occurrence in drinking water throughout the state.

Additional efforts characterize surface water quality for Source Water Protection planning, including refinement of Source Water Assessments for surface water based public water systems and Wellhead Protection Plan development for groundwater-based systems. Sampling for Wellhead Protection characterizes the vulnerability of drinking water aquifers and assesses the degree of connection with surface waterbodies. Source Water Assessments contain information about surface water quality that could pose a challenge or threat to existing drinking water intakes.

Additional surface water sampling has been conducted as a component of special studies. For example, the ongoing Unregulated Contaminants Monitoring Project is comparing contaminant concentrations within surface intake water and treated drinking water to determine how treatment processes address contaminants of emerging concern that are not regulated under the SDWA. Other studies have been conducted to date to address how land use and activities upstream impact SDWA compliance at individual drinking water intakes. The Pathogen Project also included a small number of samples from

surface waterbodies to look at correlation with adjacent groundwater sources to which they are hydraulically connected.

The Lake Superior Beach Monitoring Program monitors 38 Lake Superior public beaches from Memorial Day to Labor Day. Higher use beaches are monitored twice a week and beaches that have lower use are monitored once a week. A health advisory is posted at the beach when bacteria counts are high. Basic sanitary surveys are built into routine sampling, with extensive sanitary surveys conducted every several years as needed.

## MDNR

**Lake level monitoring:** The MDNR monitors approximately 900 lake levels across the state. The Lake Level Minnesota Program is a program in which volunteer citizens and local partner organizations collect and report lake levels. Each spring the MDNR staff reset and survey the lake gages at each monitoring location to prepare them for the field season. The volunteer citizens and local organizations then monitor lake levels using the gages throughout the open water season.

The lake level data are available on the MDNR's website through a searchable tool called Lake Finder. Lake Finder contains data for more than 4,500 lakes and rivers throughout Minnesota. Lake Finder data include: fish species and abundance, lake depth maps, lake water quality data and lake water clarity data (from the MPCA), satellite-based water clarity information (from the University of Minnesota), lake notes, and fish consumption advice (from the MDH). Lake Finder also provides information about lakes infested with invasive species.

**Wetland monitoring:** The MDNR has recently begun monitoring wetland levels across the state. Monitoring started at 13 sites in the summer of 2019 and will expand to approximately 60 sites over the next few years.

**Streamflow monitoring:** The MDNR monitors approximately 275 streamflow sites across the state. Approximately 125 of them are in partnership with the MPCA pollutant load monitoring program and 4 of them are in partnership with MDA in Pesticide Management Region 9.

The MDNR installs, upgrades, and calibrates stream gages and collects, compiles, analyzes and distributes the hydrologic data collected at the gaging stations. The stream gaging data are used to evaluate trends in stream base flow conditions, determine the frequency and magnitude of floods and low flows, and assist in assessing changes in watershed condition that may be caused by land use changes or changes in climate changes. The MDNR also uses the stream gaging data to develop hydrologic models to evaluate problems involving surface/groundwater interactions and to make decisions regarding suspensions of certain water appropriation permits.

**Climate monitoring:** The MDNR collects climate data including temperature, rainfall, relative humidity, barometric pressure, wind speed and direction and solar radiation. The MDNR's climate "mesonet" was installed in 2015, currently, the state has 40 stations, concentrated first in agricultural areas, and then in areas with data gaps. Many of the sites are on state lands, for instance in state parks or scientific and natural areas. About half of the stations only collect climate data, and the other half have been added onto existing stream gaging sites. The data is publicly available at this location:

[https://www.dnr.state.mn.us/climate/climate\\_monitor/mesonet.html](https://www.dnr.state.mn.us/climate/climate_monitor/mesonet.html)

**Lake biological monitoring:** The MDNR collects an array of biological data on lakes including information on fish populations, zooplankton, benthic invertebrates and aquatic plant communities in lakes to inform its efforts to protect aquatic ecosystems and manage fisheries.

The MDNR augments their biological data collection by using fish and plant survey data to compute an Index of Biotic Integrity (IBI) for lakes, similar to the approach used by the MPCA to determine the biological health of streams, rivers, and wetlands. The MPCA uses the fish IBI to evaluate lakes for potential placement on the impaired waters list. Lakes on the impaired waters list are then addressed in Watershed Restoration and Protection Strategy (WRAPS) reports. The aquatic plant IBI data are used in the stressor ID process to help determine the source of the fish IBI impairment and to help develop effective strategies for addressing these impairments.

**Sustaining Lakes in a Changing Environment Program:** The MDNR administers a statewide, collaborative long-term lake monitoring program that assesses status and trends of lake ecosystem indicators in selected lakes that are representative of the state's most common aquatic environments. The information gathered through this program will be used to develop management approaches that can mitigate or minimize negative impacts caused by conventional "high-impact" residential development and agriculture, aquatic plant removal, invasive species and climate change. The MPCA is the MDNR's primary partner on this project. More information about the Sustaining Lakes in a Changing Environment (SLICE) Program is available: <http://www.MDNR.state.mn.us/fisheries/slice/index.html>.

## MPCA

The MPCA's surface water monitoring strategy lays out the design for current monitoring efforts.

**Intensive watershed monitoring:** Much of the MPCA's surface water monitoring is organized on a rotating watershed schedule, with each watershed intensively monitored for two years to determine the overall health of lakes and streams and determine which need restoration and which need protection. The MPCA, in addition to conducting its own monitoring, utilizes partner-collected data, volunteer-collected data, and data from remote sensing to have the most complete picture of current water quality conditions. The MPCA collects water quality and biological data on large rivers on a similar rotating basis. These data are used for water quality assessments and to steer protection and restoration efforts.

The MPCA passes through Clean Water Fund dollars for the monitoring of stream and lake chemistry locations identified as part of the intensive watershed approach. These contracts align with the watershed schedule set by the MPCA and data are collected specifically for the purposes of water quality assessments and to address local data gaps and needs as identified in the WRAPS and One Watershed One Plan.

Citizen monitoring is a cost effective way to gather data on a large number of waterbodies annually. The MPCA houses two programs, one based on streams (Secchi tube) and one based on lakes (Secchi disk). Both measure transparency, which can be used in water quality assessments and for trend detection. Locations are driven by volunteer interest; the MPCA recruits specifically for sites identified as priorities for intensive watershed monitoring.

The MPCA relies on data from other state agencies, as well as local partners, to complete water quality assessments across the state. The MPCA partners with the MDNR to complete lake biological assessments for fish; with the MDA to complete pesticide assessments; with the MDH to complete BEACH assessments, and with the MC to complete assessments of water quality across the Metro Area.

**Pollutant load monitoring:** In addition to Intensive Watershed Monitoring, the MPCA and the MDNR support a fixed stream and river network where water quality (MPCA) and streamflow (MDNR) are monitored on a continuous basis. The MPCA uses these data to determine pollutant loads and long-term trends. The pollutant load monitoring sites span three ranges of scale – basin, major watershed, and

subwatershed. The network has 22 basin, 51 major watershed (HUC 8), and 122 subwatershed (HUC 10) sites. The MPCA passes through Clean Water Fund dollars to local partners to complete a considerable portion of the monitoring. The MPCA and its partners collect ~25-35 water quality samples at each site annually. Sampling frequency is greatest during all major snowmelt and rain events. Using this staggered approach, samples are distributed well over the entire range of flows despite discharge-related differences in sample collection frequency.

**EPA National Aquatic Resource Surveys:** The National Aquatic Resource Surveys are statistical surveys designed to assess the status of and changes in quality of the nation's coastal waters, lakes and reservoirs, rivers and streams, and wetlands. Using sample sites selected at random, these surveys provide a snapshot of the overall condition of the nation's water. Surveys occur on a five-year rotation (i.e., National Lake Assessment in 2012, 2017, 2022, etc.), and surface water quality and biological sampling occurs in each survey. The EPA offers additional funding to enhance or supplement the national survey design. The MPCA routinely applies for the federal funding to support the national survey and the supplemental funding to expand upon the national survey. The EPA randomly selects the sites, and this design can be used for a wide variety of experimental purposes. The MPCA regularly coordinates with MDNR and MDA when planning for these surveys.

Data is made available for download at the [MPCA's Environmental Data Access \(EDA\) website](#) and is available on the National [Water Quality Portal](#).

## MC

### Lake monitoring program:

The MCI has conducted water quality monitoring of Metro Area lakes since 1980. This is done by the MC staff as well as citizen volunteers through the lake CAMP. The purpose of the Lake Monitoring Program is to provide scientifically valid water quality data and information for the Council and the partners (federal, state, regional, local communities, and citizens of the Metro Area) to help effectively manage the lakes of the Metro Area.

The CAMP was added to the lake program to efficiently expand regional coverage and better address local priorities while engaging citizen-scientists that promote water quality advocacy.

- **CAMP** involves coordination, training, and laboratory analysis by the MC staff and volunteer coordination performed by a local sponsor (often a local community or watershed organization). A citizen scientist volunteer conducts the sampling, usually at a lake they live on or is nearby and has easy access to. This monitoring focuses on trophic state determinations and other physical characteristics. A similar sub-program within the CAMP involves monitoring by local governmental unit professionals who may collect additional constituents of concern such as depth profiles and chloride for example.
- The **MC** staff lake monitoring work is more intensive monitoring on a prioritized subset of lakes in the Metro Area each year (every other week, April-October), generally around six lakes per year. The monitoring includes depth profiling with a field meter and shallow and deep-water quality samples and other physical characteristics.

### Tributary river and stream program:

The tributary river and stream program started in 1989 to understand non-point source (NPS) pollution in the Metro Area. The original focus was on collecting information on water quality for the tributaries to the Minnesota River. In 1995, the program was expanded to include monitoring stations across the

Metro Area in collaboration with local partnerships through the Watershed Outlet Monitoring Program (WOMP). WOMP differs from the NPS. For the streams in WOMP, local organizations conduct most of the field work and MC coordinates work on tasks for flow measurements, equipment programming, and event sampling. WOMP was expanded again in 1998 with funding from the Interagency Water Monitoring Initiative (IWMI). IWMI funding ceased in 2007, but funding from the MPCA continues to this day and supports a portion of the MC Tributary River and Stream Program.

### **Monitoring design for this program includes:**

1. Stations located at outlets of tributary watersheds to improve accuracy of watershed pollutant loading to the large rivers.
2. Automated water samplers: Due to the flashy nature of the smaller metro-area streams manual grab sampling is insufficient to capture rain events, so automated equipment is needed.
3. Stage and flow information needed for pollutant loading and other uses like flood forecasting are installed at the monitoring stations as well and flow records computed by MC staff.
4. The Metro Area is mostly urban but contains a diverse set of watersheds, so a one size fits all approach was modified in 2017 to a new tiered approach for their monitoring stations. This new tiered system specified how event samples would be collected and improved monthly baseflow sampling to include routine sampling done unbiased to flow regimes every other week to assist with long term trend modeling. Previously, the focus had been focused primarily on pollutant load sampling, and all stations were equipped with an automated sampler and collecting a flow-weighted composite for event samples, augmented by a monthly baseflow grab sampling.
  - a. Tier 1: Larger watersheds that can be captured with manual grab sampling only for events and baseflow (no automated samplers installed).
  - b. Tier 2: Medium sized watersheds where an auto-sampler could be programed to capture discrete samples along a hydrograph based.
  - c. Tier 3: Small watersheds to flashy watersheds capture either a flow-weighted composite or a single sample per event.
5. Stream biological and habitat monitoring: designed to be co-located with an existing stream water quality location as close as possible. Used to assess integrated impacts of NPS pollution and progress of watershed management. The MPCA protocols are followed to allow for information to assist with impairment assessments. Every stream station is sampled annually in August-September if safely accessible.

### **Large river monitoring program:**

The large river monitoring program originated in 1927 when a predecessor agency began assessing the water quality of the Mississippi River after it had been declared a public health hazard. The program was enhanced in 1976 with more frequent site visits and additional parameters. Monitoring stations are located to evaluate water quality entering and exiting the Metro Area to track improvements from local watershed management and near the MC's Wastewater Treatment plants to document the effectiveness of the regional treatment system. Currently, the program consists of three different types of water quality monitoring:

1. **Continuous water quality:** Initiated in 1973 as a cooperative with the USGS, the network currently includes five locations: four on the Mississippi River and one on the Minnesota River (currently looking for a new Minnesota River station following damage in 2019 spring flooding). These stations continuously monitor water temperature, conductivity, dissolved oxygen, and pH. Also starting in

2020, new equipment is being pursued to deploy multi-parameter meters instream. The design is being set up to meet wastewater treatment plant regulatory requirements, assess wastewater system effectiveness, and assess river quality at a scale to detect diurnal cyclic dynamics that can't be detected with grab sampling.

2. **Grab sampling:** Grab samples are collected from boats if possible, with alternate locations from shore or bridges. Locations are fixed and located to assess waters coming in and leaving the Metro Area and to assess river conditions upstream and downstream of WWTPs. Monitoring is done weekly from March through October and every other week November through February. Trace metals are collected quarterly and organic compounds are collected every other year. Results of these analyses help determine the extent and nature of any toxics problems that may exist and help determine the effectiveness of the MC Industrial Waste/Pollution Prevention Program.
3. **River biological monitoring:** Started in 1978 and designed to assess the integrated effect of water pollution on aquatic organisms to track overall health of the rivers. The MC annually conducts monitoring at six sites on the Mississippi River and two sites on the Minnesota River. To align with state-wide standards and the MPCA protocols, the MC currently deploys Hester-Dendy sampler assembly for macro-invertebrates. Samples are identified to species level and IBI is calculated to track health and water quality improvement progress. Additionally, phytoplankton samples are collected from four sites throughout Lake St. Croix by the combined efforts of the National Park Service and volunteers. Those samples are currently analyzed by the USGS.

## Opportunities for coordination and cooperation between agencies

The shared purpose and goals provide opportunities for the MDA, MDH, MDNR, MPCA and MC to work together to maximize resources. Given adequate resources to support field and laboratory analytical activities, the MDA, MDH, MDNR, MPCA and MC can work together to expand monitoring to include additional locations, increase monitoring frequency, and expand chemical parameters. While it is impossible to predict all possible future opportunities, the following areas provide current opportunities for cooperation:

- Sharing monitoring strategies and plans between the agencies to coordinate sample collection where possible, including coordinating other agencies monitoring activities to coincide with MPCA's 10-year Intensive Watershed Monitoring Assessment to the fullest extent possible.
- Co-locating monitoring locations, especially those sites where continuous stage/discharge data are needed by multiple agencies.
- Co-locating the MPCA's biological monitoring sites at the MDA's Tier 3 sites.
- Sharing data and information between the agencies. This includes but is not limited to the MDA providing the MPCA with information on agricultural chemical incident sites, pesticide and nutrient use information, contaminant source inventory data, etc.; MDNR, MC, and MDH providing data to the MPCA for assessments; MPCA collecting lake information for MDNR.
- Coordinating the use of the Minnesota EQulS database to store public water quality data. Currently, the MDA and MDNR have separate interagency agreements with the MPCA to administer the database and make the data publicly available through the MPCA website.
- Coordinating appropriate collection and management of time-series data in the WISKI database. Currently, the MPCA, MDNR and MDA have interagency agreements to administer the database and make the data publicly available through the MDNR Cooperative Stream Gaging website.

- Share best practices and data management policies for WISKI database, including discrete water quality, time series chemistry/hydrologic data, and biological information (Example: Minnesota WISKI Users Group).
- Facilitating discussions of individual, elevated pesticide detections with the MPCA, MDH and MDNR membership on the MDA Pesticide Management Plan Committee.
- Sharing information on pesticide toxicity to aquatic organisms for the purpose of prioritizing the verification or development of aquatic life reference values (standards, benchmarks or guidance) in order to ensure a common understanding and communication of potential water quality impacts from pesticides.
- Relying on the MDA's expertise with agricultural chemicals, in the case of pesticide impairments, and recognizing that monitoring efforts (by the MDA or other parties) may need to be enhanced to satisfy the requirements.
- Relying on the MDH's expertise on the public health effects of contaminants found in waterbodies and recognizing that monitoring efforts by all agencies may need to be enhanced to best address drinking water source quality.
- Considering the resource needs of all agencies and identifying priority gaps and opportunities for funding.
- Coordinating technical expertise for the collection and analyses of monitoring data, including technical support for the assessment of impaired waters.
- Sharing equipment, as appropriate to achieve mutual goals.
- Evaluating current monitoring protocols to determine whether protocol changes could benefit all agencies including the enhancement of data collection related to impaired waters assessments.
- Representatives from the MC, MDNR, MDH, MDA and MPCA have membership on the Clean Water Fund Surface Water Monitoring and Assessment Interagency Team. This allows coordination of both Clean Water Fund surface water monitoring activities and additional surface water activities in which state agencies take part.
- Working to integrate the MC's biological monitoring more closely with the MPCA program work and impairment assessments (wadeable and non-wadeable streams and rivers), including adjusting reaches in close proximity to improve efficiency and cooperating on analyzing laboratory sample shipment.
- Continued MPCA/MC partnership for funding of water quality monitoring in the Metro Area which includes tributary rivers and streams and lakes.
- The MC assisting with MDA pesticide monitoring at existing MC locations.
- Consultation of drinking water-specific issues between the MC and MDH.
- Lake monitoring coordination in Metro Area between the MPCA and MC (example: Metro Area Chloride Monitoring Project).
- Large river monitoring coordination on special studies or fish surveys between the MC, MDNR, MPCA and MDH.
- Coordination of fish collections and contaminant analysis for public health fish consumption guidelines, identifying impaired waters, and fish contaminants research (MDNR, MPCA, MDA and MDH).
- Funding partnerships on multi-use flow gages with USGS (MPCA, MDNR, MC and MDH).
- High flow measurement equipment collaboration in Metro Area (MC and MDNR).

The agencies will continue to identify areas for coordination and cooperation and will promote implementation as resources allow.

## Quality assurance, data management, data analysis and reporting

Each agency will follow their respective Quality Assurance and Data Analysis processes required for the respective program, available upon request.

For data management and reporting, the field and chemistry data from the MPCA and MDA, and a subset of MDNR data are entered into the statewide water quality database (Minnesota Environmental Quality Information System; EQUIS) administered by MPCA. These data are accessed through the MPCA's Environmental Data Access webpage and EPA's Water Quality eXchange database (WQX) and Water Quality Portal, all of which allow users to view and download the data via a Geographic Information System (GIS)-based system or text based search. Time-series data (continuous sonde, wetland level, streamflow, etc.) from the MPCA, MDNR and MDA are collected and managed in the statewide database (WISKI). Future work to include lake level data and biological monitoring data in WISKI is planned. WISKI data are available through the MPCA/MDNR Cooperative Stream Gaging website.

The MC also uses WISKI for their data management and quality control processes (discrete water quality, continuous water quality, stream flow and level, groundwater level). Future work to include biological monitoring data in WISKI is planned. Real-time continuous data are shared along with discrete water chemistry data on MC's Electronic Environmental Information Management System (EIMS). The MC is working on sharing approved chemistry data to EPA's WQX system where it can easily be accessed by the MPCA for assessments. In the interim, MC lake data is shared directly to EQUIS and shared on MPCA's Environmental Data Access webpage.

Data from the MDH are stored in MDH enterprise databases tailored to the Agency's unique needs. SDWA compliance data are stored in the Minnesota Drinking Water Information System (MNDWIS) database. This data is shared with the EPA via upload to the Safe Drinking Water Information System Federal Reporting Services system. Data collected for Wellhead Protection and surface water intake protection efforts are stored in the Water Chemistry (WChem) database and are available to interested parties upon request.

Similar to the MDH, both MDNR and MPCA have enterprise databases which store a subset of their data; such as biological monitoring and lake level data.

Each agency will use their data, as well as the data from the other agency, to prepare reports based on their statutory requirements and the need for sharing information with stakeholders and the public. When appropriate, the agencies will coordinate interpretation of data and presentation of results to stakeholders and the public. The agencies will consider opportunities to jointly report, on a regular basis, the results of surface water monitoring activities.

## Programmatic evaluation

Annually, the agencies will review their monitoring plans for water quality monitoring, and make adjustments, as necessary. On a five-year cycle, the agencies will review this document to determine if changes are needed. A full update is planned once every 10 years to reflect available resources, alterations made to their respective monitoring systems, and changes to program goals over that period.

## **General supporting infrastructure planning**

This document represents an implementable, coordinated surface water quality system between the agencies, given current resource constraints. Any resource reductions that may occur will impact the ability of the agencies to implement this plan, whereas, any additional available resources will allow the agencies to coordinate more closely and implement all aspects of the plan.