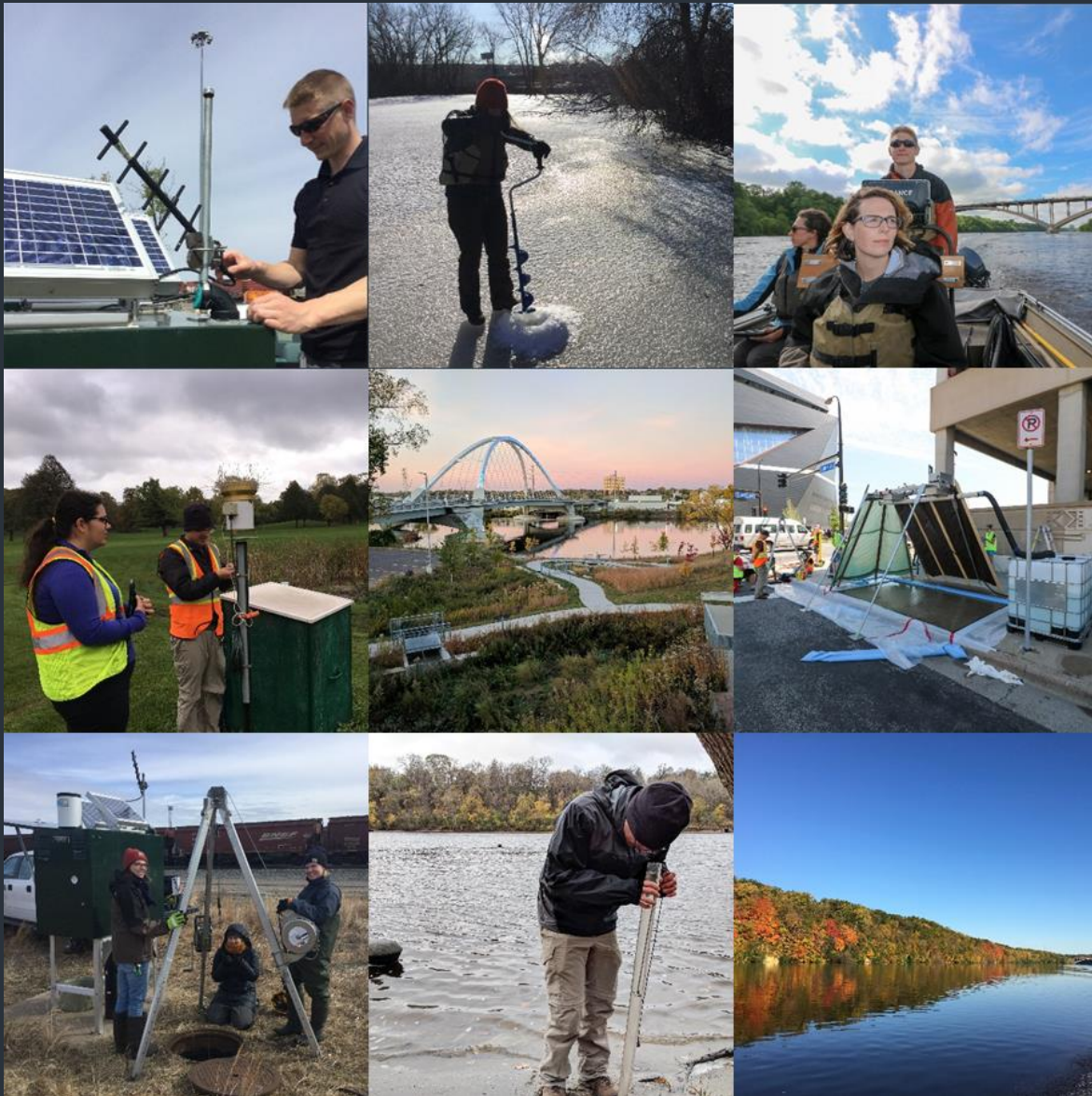




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MISSISSIPPI
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2017 Monitoring Executive Summary





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Front Cover

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Executive Summary

The Mississippi Watershed Management Organization's Monitoring team has completed another successful and active year of monitoring the watershed and is pleased to share the results of their work. The [Monitoring section](#) of the MWMO website has been updated with the latest [precipitation](#), [stormwater](#), [river water quality](#), [river bacteria](#), and [lake](#) monitoring data from 2017. Data summaries from other years can also be found on those pages.

Each year, MWMO staff publishes an annual report that summarizes the year's activities and outlines the next year's work plan. MWMO monitoring staff have begun publishing monitoring data results and summaries in the monitoring section of the website on an annual basis in lieu of a compiled monitoring report. This change has been made to make the data results more accessible and understandable. Current and past reports are available on the MWMO website at mwmo.org/monitoring-and-reports/water-quality-monitoring.

The MWMO monitors water quality in the watershed's stormwater drainage system, the Mississippi River, lakes, and wetlands. Within these systems, major factors influencing water quality include the amount of precipitation, timing of precipitation events, and land use practices in the watershed. Long-term monitoring is necessary to characterize the impact of various land use practices on surface water runoff within the MWMO and, ultimately, the Mississippi River. Water quality in the Mississippi River is also influenced by precipitation and land use practices in the entire Mississippi River basin upstream of the MWMO. Long-term monitoring of the river will aid the understanding of upstream weather patterns and land use impacts on the MWMO watershed.

The 2017 monitoring season included collection of precipitation data from seven monitoring locations, collection of bacteria samples from seven sites along the Mississippi River and water quality samples from eight locations in the Mississippi River, collection of water quantity and/or water quality data from five stormwater outfall sites draining to the Mississippi River and one stormwater pipe at the jurisdictional boundary of the Cities of Saint Anthony Village and Minneapolis, water quality sampling and bathymetric mapping at the Kasota Ponds, collection of water quality samples from five stormwater best management practices, and an assessment of stormwater runoff characteristics from impervious surfaces in downtown Minneapolis with the University of Minnesota. The Anoka Conservation District (ACD) collected water elevation data at Sullivan Lake and Highland Lake for the MWMO.

As previously mentioned, MWMO monitoring staff collected precipitation data across the MWMO watershed. In 2017, the average total rainfall was 27.48 inches and the location with the most rainfall in one month was the rain gauge at Waite Park Elementary with 7.19 inches in August. The watershed experienced the lowest average precipitation in November (0.36 inches), and the highest average precipitation in August (5.35 inches). The Columbia Golf Course precipitation monitoring site had the lowest total annual precipitation with 22.07 inches and 10SA had the highest total annual precipitation with 28.94 inches.

Portions of the 14-mile stretch of the Mississippi River in the MWMO are listed on the Federal Clean Water Act's Section 303(d) list of impaired waters for fecal coliform. The Minnesota Pollution Control Agency (MPCA) has moved from a fecal coliform standard to an *Escherichia coliform* (*E. coli*) standard; therefore, all fecal coliform impairments are now evaluated with *E. coli* data. Long-term monitoring of both the river and the stormwater drainage system is necessary to evaluate *E. coli* inputs from within the watershed compared to those inputs from upstream sources. The MPCA initiated the [Upper Mississippi River Bacteria Total Maximum Daily Load \(TMDL\) Project](#) in 2008 to develop daily *E. coli* load limits for the Mississippi River. In 2014, the MPCA released its [Upper Mississippi River Bacteria TMDL Study and Protection Plan](#). This document designated the stretch of the Mississippi River within the MWMO as a Protection Reach and deferred it for a TMDL study. Within the MWMO, the Mississippi River is divided by the Saint Anthony Falls into two reaches for classification. Above the Saint Anthony Falls, the river has a water use classification of 2Bd (aquatic life and recreation and source of drinking water). Below the Saint Anthony Falls, the water use classification is 2B (aquatic life and recreation). The chronic standard for *E. coli* in 2B and 2Bd waters is 126 CFU/100 mL for a monthly geometric mean of at least five samples. The MPCA *E. coli* acute standard states that *E. coli* cannot exceed 1,260 CFU/100mL in more than 10 percent of the samples taken in one month. In 2017, 112 river samples were collected on the first and third Thursday of each month April through November. Three river sites exceeded the acute standard in September. Five river sites exceeded the chronic standard in May, and all seven river sites exceeded the chronic standard in July, September, and October. Sampling in May and November occurred concurrently with a rain event, one sampling day in July and September occurred 6-12 hours after a rain event, and one sampling day in July and October occurred 24 – 48 hours after a rain event which likely resulted in higher *e. coli* levels in the river.

MWMO staff began collecting water quality samples from the Mississippi River in 2014. The purpose of monitoring the water quality of the Mississippi River is to establish baseline water quality data within the watershed that can be used for understanding characteristics of the river and how they may change over time. Water quality measurements and samples were collected at eight sites, twice per month April through November and once per month January, February, March, and December. Sampling locations in the Mississippi River and within the MWMO's boundaries were selected to represent three distinct reaches of the river. Each site is located within, at the beginning of, or at the end of a river reach. MWMO monitoring staff collected 159 river water quality samples in 2017 (including duplicates). Samples were collected from the middle of the river at three feet below the water surface and were analyzed for nutrients, sediment, inorganics, organics, and metals. MWMO staff also records river water elevation data April through December. MWMO monitoring staff recorded a total change of 4.5 feet at the MWMO river gage (highest recorded level in October and lowest levels in June and July), and the river rose 2.8 feet higher and about 1.7 feet lower than the five-year average elevation of 800 feet. MWMO staff also continued to collect bathymetric data on the Mississippi River between Lock and Dam 1 and the Canadian Pacific Railway (CPR) Bridge in line with North 41st Avenue. The purpose of collecting Mississippi River bathymetric data is to provide baseline data on the shape and condition of the river bed and how it changes over time.

The MWMO continued monitoring water quantity and water quality of the watershed's stormwater drainage system by monitoring baseflow, snow-melt and rain events in six stormwater tunnels draining to the Mississippi River. In 2017, MWMO staff collected 202 stormwater quality samples. Samples were analyzed for nutrients, sediment, *e. coli*, inorganics, organics and metals. Water quality standards do not exist for stormwater; therefore, data were not compared to standards. The MWMO will continue to monitor stormwater drainage systems to develop a record of baseline data with which to characterize stormwater quality within the watershed. The MWMO also provides stormwater data to the MPCA for TMDL projects within the watershed. To support the MWMO and City of Minneapolis's H and H modeling effort, the MWMO collected stormwater data in additional tunnels within monitored subwatersheds. Due to high river levels, two of the outfall monitoring locations, 6UMN and 4PP, were under river water for almost two months all together between February and October. In 2017, approximately 139,600,000 gallons of stormwater passed by the 10SA monitoring station, 304,300,000 gallons at 11CHF, 339,560,000 gallons at 1.2NE, and 559,300,000 gallons of stormwater passed by the 6UMN monitoring station. Stormwater quantity data were not collected at 4PP due to ongoing construction work in the tunnel.

MWMO continued to monitor the three Kasota Ponds wetlands (Kasota Pond North, Kasota Pond West, and Kasota Pond East). Water quality samples analyzed for chloride, total dissolved solids, total phosphorus, nitrate, nitrite, and total suspended solids were collected once per month January through November (37 samples including duplicates). In February of 2017, monitoring staff collected depth measurements in a twenty-foot grid pattern to create bathymetric maps of the three Kasota Pond wetlands. A 2008 – 2017 summary report can be found on the MWMO website here: [Kasota Ponds Report](#).

In 2017, the MWMO monitored the effectiveness of four best management practices (BMPs) within the watershed. The monitored BMPs include: [St. Anthony Regional Treatment and Research System \(SART\)](#), [Towerside District Stormwater System \(Minneapolis\)](#), [Edison High School Green Campus](#) parking lot tree trench and athletic field underground storage tank (Minneapolis), and the MWMO Stormwater Park and Learning Center and its Media Filter Beds (Minneapolis). MWMO monitoring staff collected stormwater flow, volume, and water quality data at SART, Edison High, and MWMO Stormwater Park, and tank and outlet level at Towerside. In September, a system cleanout was performed at SART, resulting in the removal of 28,550 lbs of dry material and 10.2 lbs of total phosphorus.

A research study with the University of Minnesota Bioproducts and Biosystems Engineering Department was conducted in downtown Minneapolis to investigate the water quality of stormwater runoff from four different types of impervious surfaces. Three different streets, sidewalks, parking lots, and rooftops were test sites for this study. The water quality samples and runoff data from the street, sidewalk, and parking lot surfaces were collected using a rainfall simulator. The roof sites were outfitted with automated samplers to collect rainfall and runoff data. More details of the study and results can be found here: [Analysis of Runoff from Impervious Surfaces in Downtown Minneapolis](#).

The MWMO contracted with the ACD to conduct water level and water quality monitoring activities on Sullivan Lake and Highland Lake in Columbia Heights. Regular water level monitoring was conducted in 2017 between April and October. Lake levels were measured 35 times at each lake. Sullivan Lake water levels fluctuated by about half a foot in response to rainfall and had an overall level fluctuation of about 2 feet. Highland Lake had an overall water level fluctuation of 0.57 feet. Detailed summaries of these data are located on the [Lake Monitoring page](#) of the website.

2017 Monitoring Data (Links)

- [Precipitation \(PDF\)](#)
- [Stormwater water quality and water quantity](#) (located under site descriptions)
- [River water quality \(PDF\)](#)
- [River elevation data \(PDF\)](#)
- [River bacteria \(PDF\)](#)
- [Sullivan and Highland Lakes \(PDF\)](#)