



Marsh River Watershed

Watershed approach

Minnesota has adopted a watershed approach to address the state’s 80 major watersheds. This approach looks at the drainage area as a whole instead of focusing on lakes and stream sections one at a time, thus increasing effectiveness and efficiency. This watershed approach incorporates the following activities into a cycle repeated on a regular basis:

- Monitoring waterbodies and collecting data over two years on water chemistry and biology (2014-2015).
- Assessing the data to determine which waters are impaired, which conditions are stressing water quality, and which factors are fostering healthy waters (2016-2017).
- Developing strategies to restore/protect the watershed’s waterbodies, and report them in a document called Watershed Restoration and Protection Strategies (WRAPS) (2019-2020).
- Coordinating with local One Watershed-One Plan efforts for implementation of restoration/protection projects (2019-beyond).

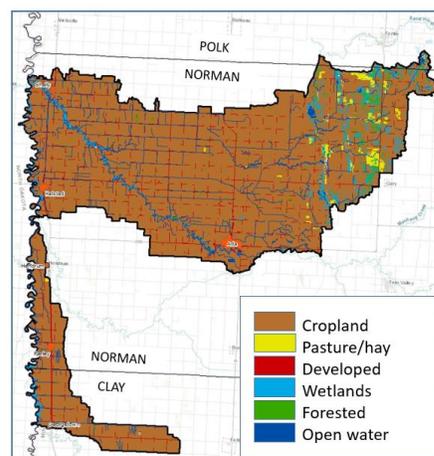


The Minnesota Pollution Control Agency (MPCA) leads the technical work and coordinates and supports strategy development with local, state, and federal partners. Watershed partners are leaders in implementing strategies to restore and protect waters. Their past and current work provides opportunities for watershed improvement and will continue to be a critical component to overall water quality. The main purpose of the WRAPS report is to summarize all the technical information so that local partners such as soil and water conservation districts and watershed districts can use it for planning and implement the best strategies in prioritized locations.

Watershed characteristics

- Size: 361.7 square miles Counties: Norman (91% of the watershed), Clay (8%), Polk (1%)
- Ecoregion: Lake Agassiz Plain
- Major tributaries: Marsh River, County Ditch 11, Spring Creek
- Towns: Halstad, Ada, Hendrum, Perley, and Shelly
- Land cover: Cropland (88.2%), pasture and hay (0.7%), developed (3.8%), wetlands (5.7%), forested (1%), open water (0.6%).
- The 8-digit hydrologic unit code (HUC): 09020107

Land use in the Marsh River Watershed



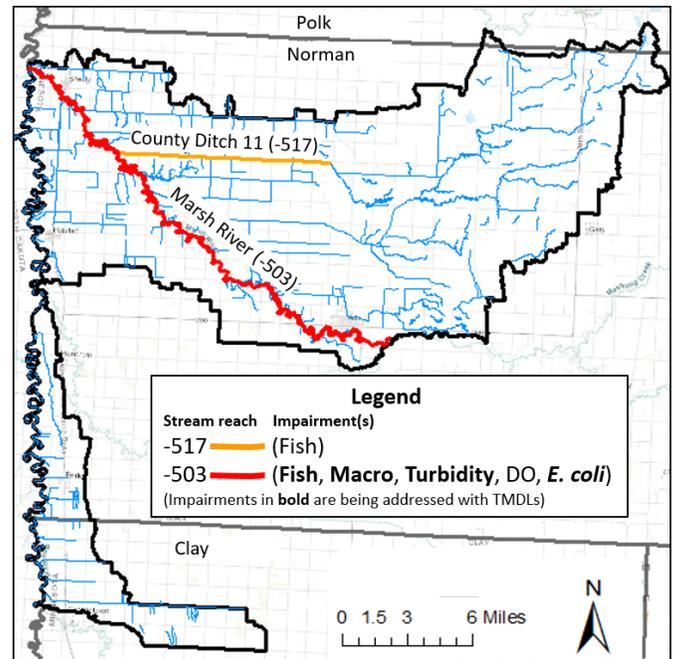
Assessments: Are waters meeting standards and providing beneficial uses?

During the first phase of the watershed approach – intensive watershed monitoring – the MPCA and partners collected data about biology such as fish populations and chemistry such as pollutant levels to determine if lakes and streams were meeting water quality standards. Waters are “impaired” if they fail to meet standards. Impaired waters require a study called a Total Maximum Daily Load (TMDL), a federal Clean Water Act and state Clean Water Legacy Act requirement. The goal of a TMDL study is to quantify pollutant reductions needed to meet water quality standards.

Excluding the mainstem of the Red River, the Marsh River Watershed (MRW) contains 16 stream reaches that have been assigned a number for assessment purposes. Of those, six have been assessed for aquatic life use (i.e., can they support fish and aquatic insect communities) and one for aquatic recreation use (i.e., is it safe for human contact such as swimming). The Marsh River (reach -503) is impaired for aquatic life use (as indicated by poor fish and aquatic insect communities, high turbidity, and low dissolved oxygen [DO]) and aquatic recreation use (as indicated by high levels of *E. coli* organisms). County Ditch 11 (reach -517) is designated as impaired for aquatic life use due to low fish [index of biotic integrity](#) (FIBI) scores. The remaining stream reaches were not able to be assessed due to insufficient data or inability to collect data.

Two TMDL studies were developed in one report to address four impairments in the Marsh River (reach -503). The total suspended solids (TSS) TMDL addresses the aquatic life use impairment caused by high turbidity and calculates reductions needed to achieve water quality standards for TSS. The TSS TMDL also addresses the impairments identified by poor biological communities in reach -503 when combined with other restoration efforts that are needed to address other stressors. The *E. coli* TMDL addresses the aquatic recreation use impairment caused by high *E. coli* in the Marsh River (reach -503).

Map of impairments in the Marsh River Watershed



Stressors and pollutants: What factors are affecting fishing and aquatic insect communities?

Intensive watershed monitoring and stressor identification work identified potential stressors to fish and aquatic macroinvertebrates (insects) within two assessed stream reaches in the MRW. These stressors include loss of connectivity (conditions or structures that limit movement of fish and insects), flow regime instability (unstable flows such as very high flows during spring runoff and summer rain events, and little or no flow at other times), insufficient physical habitat, high suspended sediment, and low DO.

Conditions stressing fish and aquatic insects in streams

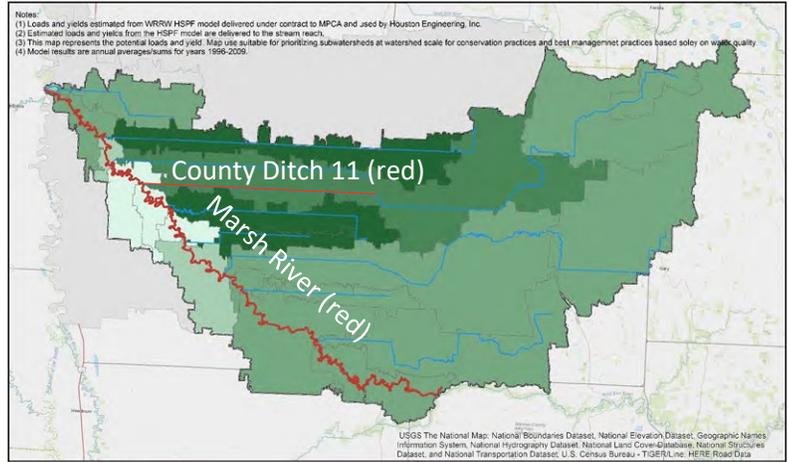
12-HUC subwatershed	AUID (Last 3 digits)	Stream	Reach description	Biological impairment	Primary stressor				
					Loss of longitudinal connectivity	Flow regime instability	Insufficient physical habitat	High suspended sediment	Low dissolved oxygen
Marsh River	503	Marsh River	Headwaters to Red River	Fish	0	+++	+	++	0
				Macroinvertebrates	NE	+++	++	++	+
County Ditch 11	517	County Ditch 11	County Ditch 66 to Marsh River	Fish	+++	++	+++	++	++

+++ the available evidence convincingly supports the case for the candidate cause as a stressor, ++ the available evidence strongly supports the case for the candidate cause as a stressor, + the available evidence somewhat supports the case for the candidate cause as a stressor, 0 neither supports nor weakens the case for the candidate cause as a stressor, and NE no evidence is available.

Restoration and protection strategies

The WRAPS process includes a means to categorize waterbodies for restoration and varied levels of protection. Numerous restoration and protection strategies, and their associated best management practices (BMPs), have been developed through collaboration with local partners in the Marsh River Watershed.

- The MRW WRAPS Report includes numerous maps local water managers can use to identify areas within the watershed where implementing BMPs would likely have the greatest impact in reducing various types of pollutants. For example, darker areas in the **map at right** indicate where BMPs to decrease sediment loading to the Marsh River would have the greatest impact to address excessive turbidity and loss of habitat.
- The report includes three BMP scenarios that were developed, and the benefits estimated, to guide local implementation efforts. The scenarios describe various levels of water quality improvement that might be expected by implementing low (scenario 1), medium (scenario 2), and high (scenario 3) numbers of BMPs.
- The scenarios show that doubling the amount of area treated with water and sediment control basin (WASCOB) BMPs from scenario 1 to scenario 2 would result in doubling the percentage of TSS load reductions, with the same amount of reduction occurring by again doubling the amount of area treated by WASCOB BMPs from scenario 2 to scenario 3. In short, this means a large portion of the sediment in the MRW stems from overland sources and increased implementation of BMPs will provide roughly the same magnitude of treatment or pollutant reduction.
- The report outlines strategies to reduce levels of pollutants in the watershed from both point and non-point sources. Point sources can be controlled by ensuring compliance with existing permits covering construction stormwater, industrial stormwater, and wastewater discharge facilities. Examples of strategies targeting pollution from non-point sources are shown in the table at right.
- Nearly 100% of the watershed is privately owned so the vast majority of the nonpoint source strategies rely on voluntary implementation by landowners, land users, and residents of the watershed.
- Examples of BMPs that have already been implemented in the MRW by local partners and landowners include nutrient management on 14,421 acres, cover crops on 7,771 acres, restoration of three wetlands totaling 180 acres, four grade stabilization structures, one water and sediment control basin, and many more, as tracked on MPCA's Healthier Watersheds [webpage](#).



Strategies targeting non-point pollutant sources

BMP (NRCS standard)	Targeted pollutant(s)			
	<i>E. coli</i>	Sediment	Nitrate	Phosphorus
Filter strips (636)	X	X		X
Riparian buffers (390)	X	X		X
Clean water diversion (362)	X			X
Access control/fencing (472 and 382)	X	X		X
Water storage facilities (313) and nutrient management (590)	X		X	X
Drainage water management (554)			X	
Bioreactors (605)			X	
Grassed waterways (412)		X		X
Water and sediment control basins (638)		X		X
Conservation cover (327)		X	X	X
Conservation/reduced tillage (329 and 345)		X		X
Cover crops (340)		X	X	X

Photo shows sediment-laden County Ditch 11 entering the Marsh River. County Ditch 11 (which is in a high priority area for sediment-reducing BMPs) also appears in the map near the top of this page.



Key conclusions of first cycle

- Throughout the watershed, four of the six assessed streams fully support aquatic life and the only stream with enough data to be assessed for aquatic recreation use is not supportive.
- Not all stream reaches were able to be assessed due to insufficient data or inability to collect data.
- Water quality in the MRW is generally poor and reflects the highly altered landscape. Much of the land has been converted to agricultural use and most waterways have been channelized (67%). Excess *E. coli*, elevated TSS, low DO levels, and reduced biological communities (fish, aquatic insects) are problems in the assessed waterways.
- The vast majority of poor water quality and stressors to aquatic life are the result of nonpoint sources and related conditions such as widespread drainage networks, shortage of long-term water storage, and lack of vegetative cover. All three of these conditions cause water to move through the watershed quickly, leading to higher and quicker peak flows in streams during wet times of the year, followed by lower or no flow in streams for extended periods of time during dry times of the year.
- Rain and snowmelt on land with little to no vegetation (particularly cropland) moves overland quickly and causes sediment and particles, including manure, which may have high levels of *E. coli*, to be exposed and dislodged. Nutrients such as phosphorus and nitrogen and can also be carried with overland flows.
- Higher and quicker peak flows exacerbate elevated sediment loads in streams through increased bank erosion. During extended periods of lower flow, adverse conditions include decreased DO, increased temperature, disconnected streams, and loss of physical habitat caused by sediment settling and embedding objects that would otherwise be suitable for use by aquatic life.
- Flow regime instability was identified as the most impactful stressor to fish and aquatic insect communities in the Marsh River (reach -513). Loss of connectivity and insufficient physical habitat were identified as the stressors causing the most harm to fish communities in CD 11 (reach -517). Upstream habitat for fish species in CD 11 is completely inaccessible due to a high gradient culvert.

Next steps

The Marsh River WRAPS approach began in 2014, and was completed in 2021 with publication of the WRAPS report. The restoration and protection strategies listed in the report were helpful for developing comprehensive local water management plans that include implementation efforts to restore and protect water resources. The report lays out goals, milestones, and responsible entities to address protection and restoration opportunities in the watershed. The targets are intended to provide guidance and “measuring sticks” to assess the watershed’s health and success of actions taken. The Wild Rice - Marsh One Watershed, One Plan (1W1P), which includes the area of the MRW, was completed in December 2020, so interested and eligible local partners now qualify to receive watershed-based funding to implement projects within the planning area.

Full report To view the full WRAPS report, search “Marsh River Watershed” on the MPCA website at www.pca.state.mn.us.

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