WRAPS report summary
Watershed Restoration and Protection Strategy

Snake-Middle Rivers Watershed

Watershed approach

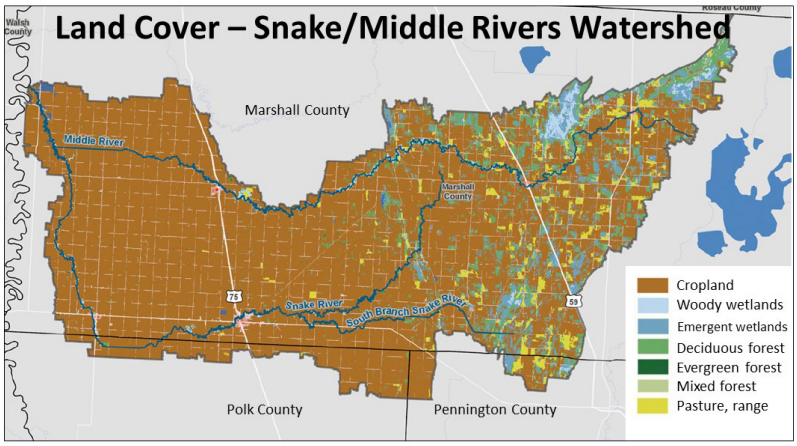
Minnesota has adopted a watershed approach to address the state's 80 major watersheds. This approach looks at the drainage area as a whole instead of focusing on lakes and stream sections one at a time, thus increasing effectiveness and efficiency. This watershed approach incorporates the following activities into a 10-year cycle:

1. Monitoring water bodies and collecting data over two years on water chemistry and biology. (2013-2014)
2. Assessing the data to determine which waters are impaired, which conditions are stressing water quality, and which factors are fostering healthy waters. (2015)
3. Developing strategies to restore and protect water bodies, and report them in a document called Watershed Restoration and Protection Strategies (WRAPS). (2020)
4. Coordinating with local One Watershed-One Plan efforts for implementation of restoration and protection projects.

The Minnesota Pollution Control Agency (MPCA) leads the technical work and coordinates and supports strategy development with local and state partners. Watershed partners are leaders in implementing strategies to restore and protect water resources. Their past and current work provides promising 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 local partners can use it for planning and implementing the best strategies in prioritized locations.

Watershed characteristics

- Size: 779 square miles.
- Surface water: Snake River, South Branch, Middle River, numerous small streams and ditches.
- Counties: Marshall, Polk, Pennington.
- Land cover: 79% cropland, 7% wetland, 6% forested, 3% rangeland, 5% developed.
- The 8 digit HUC for the watershed is 09020309.



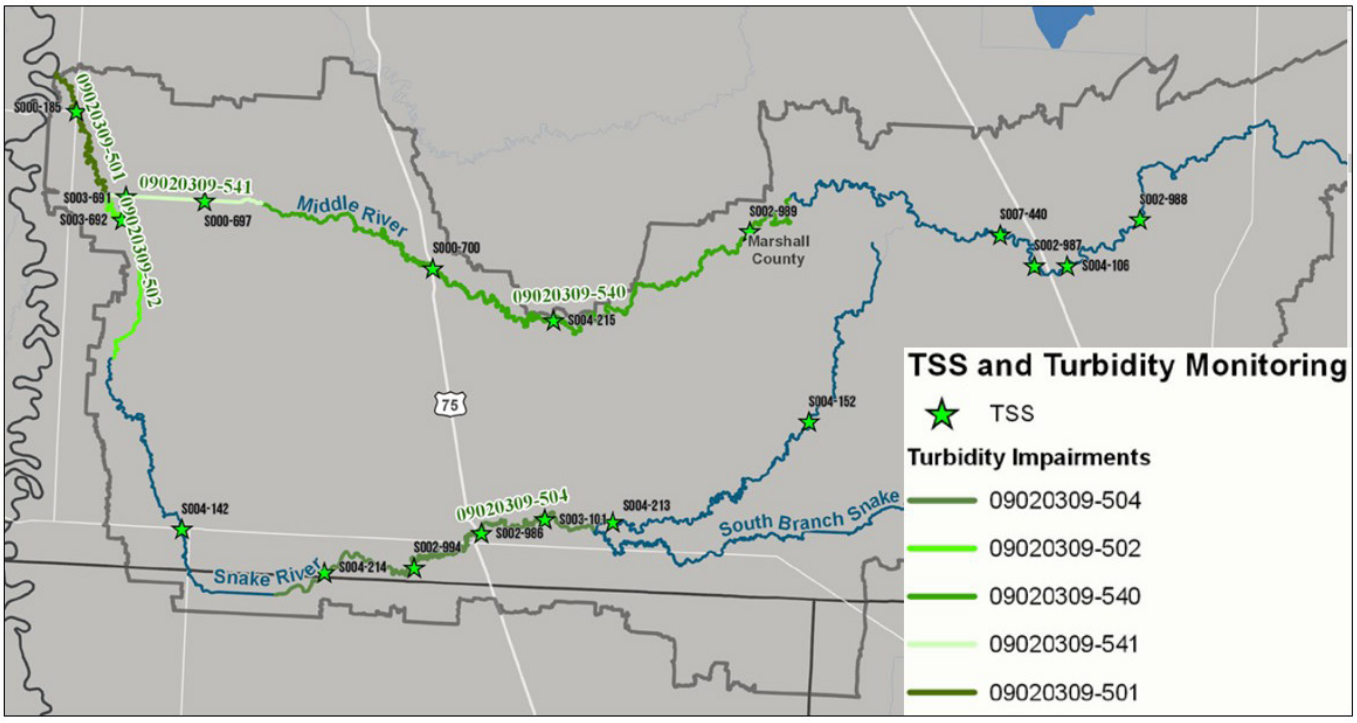
The watershed is in the Lake Agassiz Plain ecoregion. Flat terrain combined with rich soils enable the area to be one of the most productive agricultural regions in the Great Plains; however, it also experiences numerous major floods. These led to the creation of extensive drainage networks (altered hydrology) to remove surface water quickly from fields. This continues to be a focus with underground drainage systems becoming widely used within the region.

Assessments: Are waters meeting standards?

During the first phase of the watershed approach – intensive watershed monitoring – the Minnesota Pollution Control Agency (MPCA) and local partners collect data about biology such as fish populations, chemistry such as pollutant levels, and flow volumes to determine if lakes and streams are meeting water quality standards. Waters are "impaired" if they fail to meet standards. The maps below show impairments for streams in the SMRW. No lakes were assessed (most large surface waters are wetlands).

There are a total of 31 impairments on the 2018 impaired waters list (three for bacteria, five for turbidity, seven for dissolved oxygen (DO), and 16 biological impairments). Total maximum daily load (TMDL) studies have been done to address eight of those 31 impairments: three river/stream-reach aquatic recreation use impairments caused by elevated Escherichia *E. coli* (*E. coli)* levels and five river/stream-reach aquatic life use impairments caused by turbidity, or too much suspended solids in the water (soil particles, etc.). The goal of the TMDLs is to quantify pollutant reductions needed to meet state water quality standards. The remaining 23 impairments were not addressed with TMDLs for various reasons ranging from lack of information to lack of reasonable assurance that the TMDL reductions could be met.

Location of *E. coli* (3) and turbidity (5) impairments/TMDLs in the SMRW



Stressors: What factors are affecting fish and bugs?

To develop strategies for restoring or protecting water bodies with biological impairments, agencies and local partners must first identify the possible causes, or stressors of fish and/or aquatic insects. The table below summarizes the predominant stressors to the fish (F-IBI) and/or aquatic insects/macroinvertebrates (M-IBI) in the indicated streams in the watershed.

IBI stands for "index of biological integrity." The IBI can help watershed managers gauge the health of a water body and identify water bodies that need further stressor review. More information can be found in the Snake River Watershed Stressor Identification Report.

HUC-10 Subwatershed	AUID (Last 3 digits)	Stream	Reach description	Biological Impairment	Candidate Causes [a]				
					Dissolved Oxygen	Turbidity	Fish Passage	Altered Hydrology	Habitat
Middle River (0902030902)	529	Judicial Ditch 28 [b]	Unnamed ditch to Middle R	MIBI	+	+	NE	++	++
	538	Middle River	Headwaters to -96.171 48.4349 (AUID 539)	FIBI	++	+	0	+	++
	540	Middle River	Co Ro 114 to T156 R49W S3, north line (AUID 541)	MIBI	+	++	NE	++	++
Upper Snake River (0902030901)	546	Snake River, South Branch (new channel)	Headwaters to Snake R	FIBI	++	+	0	++	++
	544	Snake River, South Branch (old channel)	JD 25-1 [b] to Snake R	FIBI	+	++	0	++	++
				MIBI	++	+	NE	++	+
	543	Snake River	Unnamed cr to S Br Snake R	FIBI	+++	++	0	++	++
				MIBI	+++	+	NE	++	++
	504	Snake River	S Br Snake R to CD 7	FIBI	+	++	0	++	++
				MIBI	+	+	NE	++	++
Lower Snake River (0902030903)	519	Judicial Ditch 29	Headwaters to Snake R	FIBI	+	++	0	+++	+++
	537	Snake River	T154 R49W S17, east line to CD 3	FIBI	++	++	0	++	++
				MIBI	++	++	NE	++	++
	502	Snake River	CD 3 to Middle R	FIBI	++	+	0	++	+++
				MIBI	++	+	NE	++	++
	501	Snake River	Middle R to Red R	FIBI	++	+	0	++	+++

[a] Key:
+++ 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 The available evidence neither supports nor weakens the case for the candidate cause as a stressor; and
NE no evidence is available.

[b] Note that while MPCA's name for this waterbody is "Unnamed ditch", it was changed to represent the local name.

Restoration and protection strategies

Numerous restoration and protection strategies, or best management practices (BMPs), have been developed through collaboration with local and state partners. Strategies are largely focused on addressing sediment and phosphorus loading and altered hydrology and range from small-scale, agronomic practices such as nutrient management and cover crops to larger, engineered solutions such as stream restoration, wetland restoration, or impoundments. Addressing runoff, erosion, and altered hydrology will be key to restoring habitat by increasing dissolved oxygen concentrations and providing more suitable in-stream habitat. A sediment source study was done to identify potential high-priority areas deserving further study.

Next steps and measuring results

The restoration and protection strategies listed in the WRAPS report will be the basis for developing local implementation plans (e.g. the comprehensive watershed management plan that results from the One Watershed One Plan process) to restore and protect water resources. The WRAPS report lays out goals, milestones, and responsible entities to address protection and restoration priorities in the watershed. The targets are intended to provide guidance and "measuring sticks" to assess the watershed's health and success of actions taken.

Water quality in some areas in Minnesota has declined over many decades. While restoration activities continue, new problems develop, such as converting land to intensive cropping that negatively impacts water quality. The perpetual challenge is to make improvements and keep up with new problems. Impacts from other factors such as climate change are still not completely understood. Consequently, it may take decades to fully restore impaired waters. For these reasons, it is much more cost-effective to protect clean waters while we can by implementing protection strategies.

Key conclusions of first cycle

- Throughout the watershed, four streams fully support aquatic life (healthy fish and aquatic insect communities) and seven fully support aquatic recreation use (direct contact with water such as swimming). Sixteen streams do not support aquatic life and four do not support aquatic recreation use. Aquatic recreation impairments are due to high *E. coli* levels.
- The main resource concerns in the watershed are wind and water erosion, nutrient management, wetland management, surface water quality, and flood damage reduction. Many of the resource concerns relate directly to flooding, increased sediment, and pollutant loadings to surface waters.
- Changes in land use patterns including wetland removal and the conversion of tallgrass prairie into agriculture have likely contributed to sediment and other pollutant loadings to surface waters, leading to decreased habitat and water quality, thus reducing populations of sensitive aquatic species.
- Not all stream reaches were able to be assessed due to insufficient data, inability to collect data, or their status as limited resources waters.
- The natural flow conditions of streams in the watershed have been altered by substantial channelization, ditching, and impoundment of watercourses (more than 60%) in addition to agricultural drainage. This results in more accelerated peak flows and prolonged periods of low- or no-flow conditions.
- Evidence shows that stream alterations and "flashy" flow conditions are largely responsible for the degradation of physical habitat, high suspended sediment, and low dissolved oxygen conditions that are limiting the fish and aquatic insect communities in the watershed.

Images of sediment sources, including bank slumping along an unnamed ditch at the 200th Avenue NW and CSAH 14 intersection on May 28, 2014 (left); and streambank erosion on May 29, 2014 (right).

Full report

To view the full report, go online and search for "MPCA Snake-Middle Rivers WRAPS report."

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CLEAN WATER LAND & LEGACY AMENDMENT