Appendix A
Land and Water Resources Inventory

Drafted by the Bois de Sioux Watershed District

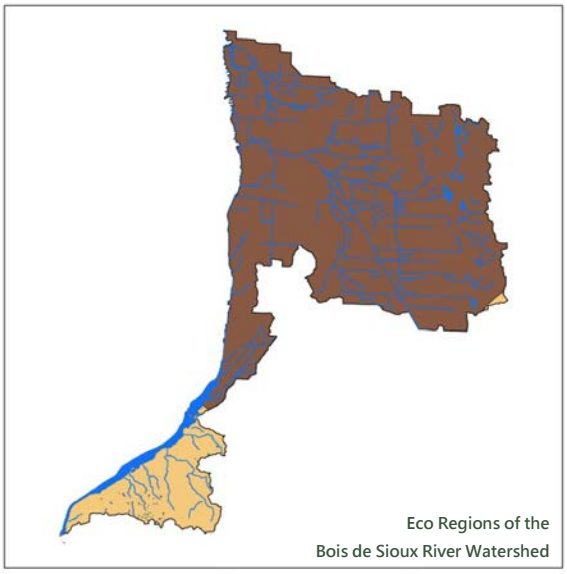
Contents

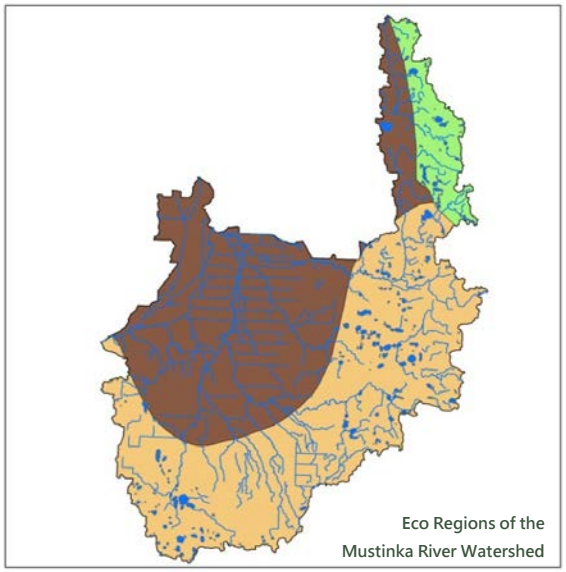
1 - ECOREGIONS

SUBREGIONS

The US Environmental Protection Agency (EPA) defines an ecoregion as "a relatively homogenous ecological area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables" (EPA 2010). Due to the relative homogeneity within ecoregions, Minnesota has developed several water quality standards based on these delineations.

Ecological Subregions of the United States (1994), https://www.fs.fed.us/land/pubs/ecoregions/					
	Northern Glaciated Plains		Lake Agassiz Plain (another name for RRV ecoregion)		North Central Hardwoods
Watershed	*Bois de Sioux*	*& Mustinka*	*Bois de Sioux*	*& Mustinka*	*Mustinka*
Elevation Ranges	750 to 2,000 ft		900 to 1,250 ft		600 to 2,000 ft
Local Relief	20 to 100 ft		low; most areas are nearly level		Not Available
Abbreviation	NGP		LAP / RRV		NCHF
TP (µg/L)	130 – 250		23 – 50		23 – 50
CHLA (µg /L)	30 – 55		5 – 22		5 – 22
Secchi (ft)	1 – 3.25		5 – 10.5		5 – 10.5


Eco Regions of the Bois de Sioux River Watershed


Eco Regions of the Mustinka River Watershed

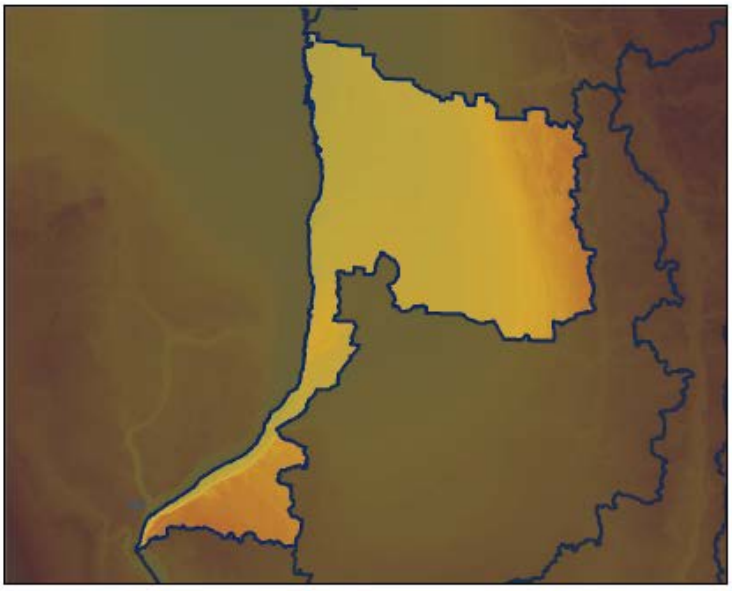
BOIS DE SIOUX RIVER WATERSHED:

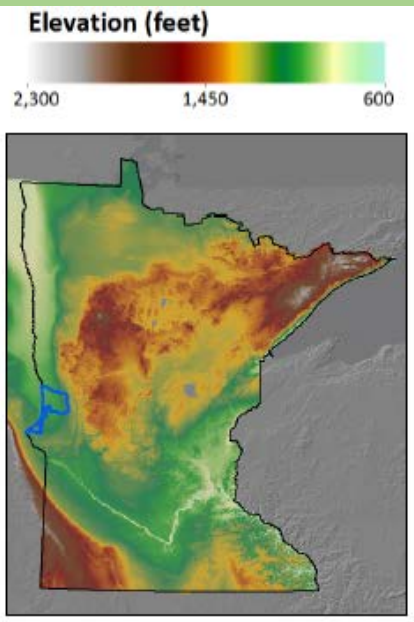
The Bois de Sioux River Watershed (718,685 acres) is split between Minnesota (361,222 acres) and North Dakota and South Dakota (357,463 acres). The Bois de Sioux River watershed includes the Lake Traverse and Bois de Sioux River drainage basins (MPCA, DRAFT Bois de Sioux River Watershed WRAPS, January 2019). The watershed's ecoregions include (MPCA, Bois de Sioux River Watershed Monitoring and Assessment Report, November 2013):

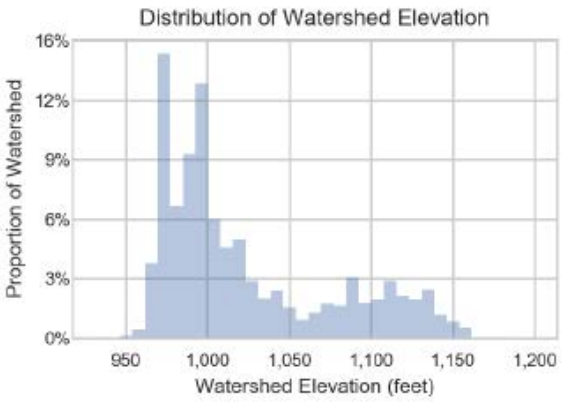
> *Lake Agassiz Plain*
> *Northern Glaciated Plains*

The Bois De Sioux River Watershed spans MN, ND & SD (MPCA 2013)

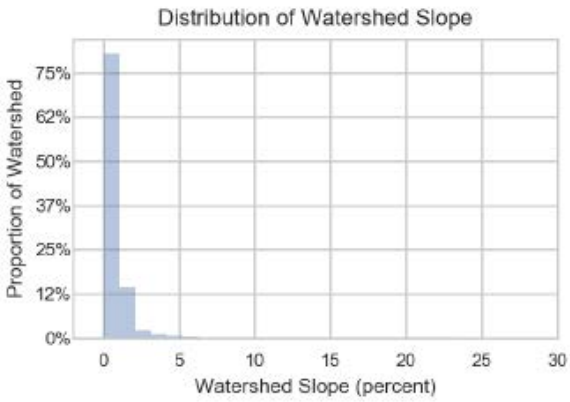
Physical Characteristics







The distribution of watershed area over the elevation range. Each vertical bar represents the percent of this watershed at that elevation value.



The distribution of watershed area over the range of hillslope. Each vertical bar represents the percent land area for a given slope value.

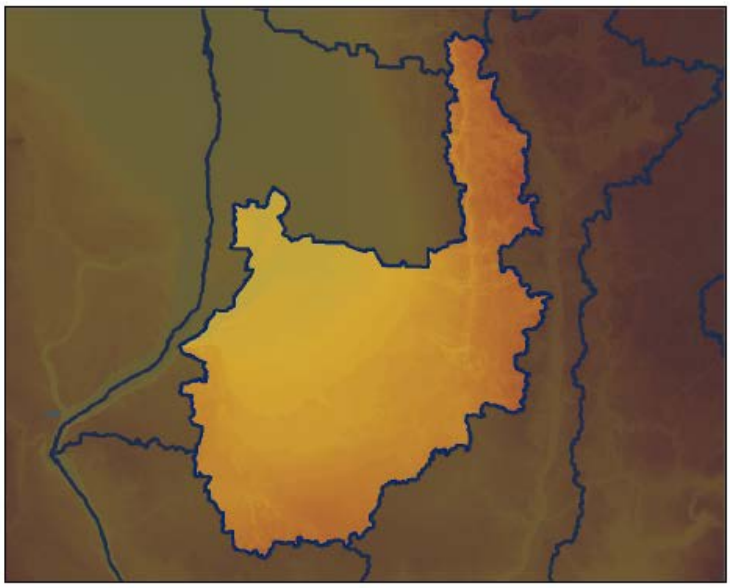
MUSTINKA RIVER WATERSHED:

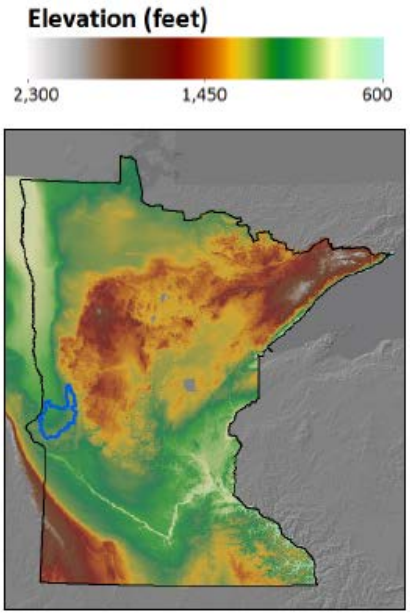
Composed of 562,112 acres the Mustinka River watershed includes the drainage basins of the Mustinka River, Stony Brook and Lightning Lakes. The watershed's ecoregions include (MPCA, Mustinka River Watershed Monitoring and Assessment Report, November 2013):

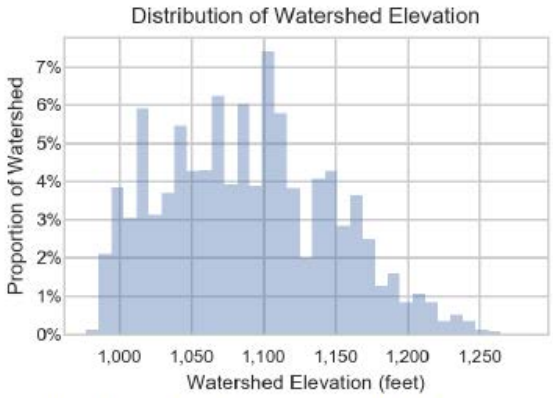
- *Lake Agassiz Plain*
- *Northern Glaciated Plains*
- *Northern Central Hardwoods*

The Mustinka River Watershed (MPCA 2013)

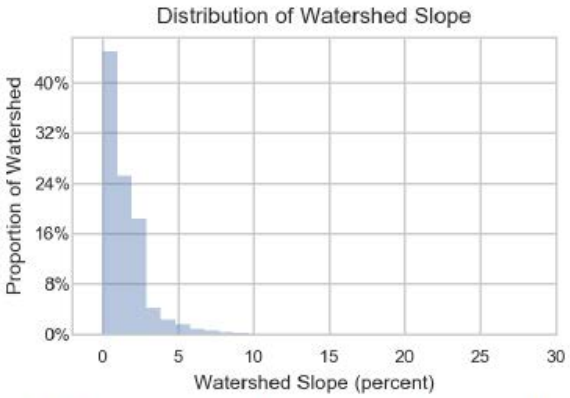
Physical Characteristics







The distribution of watershed area over the elevation range. Each vertical bar represents the percent of this watershed at that elevation value.



The distribution of watershed area over the range of hillslope. Each vertical bar represents the percent land area for a given slope value.

GEOLOGY

The watersheds are underlain by bedrock that was formed during the precambrian period of geologic time, approximately 3 billion years ago. These are igneous and metamorphic rocks, predominantly granite and gneiss. A map of bedrock elevational contours is shown in the Precambrian Bedrock Elevations Map Figure. The depth below the surface to the bedrock varies from only 14 feet near Herman to 600 feet near the southwest corner of the Bois de Sioux Watershed.

Overlying the bedrock, in most of both watersheds, are sediments that were formed when oceans covered parts of the area, during the cretaceous period, about 100 million years ago. These sedimentary deposits include layers of soft shales, sandstones, and limestone. Their thickness varies from zero in the high bedrock areas around Herman to 280 feet in the southwest corner of the watershed. A map of cretaceous bedrock elevation contours is shown in the Cretaceous Bedrock Elevations Map Figure.

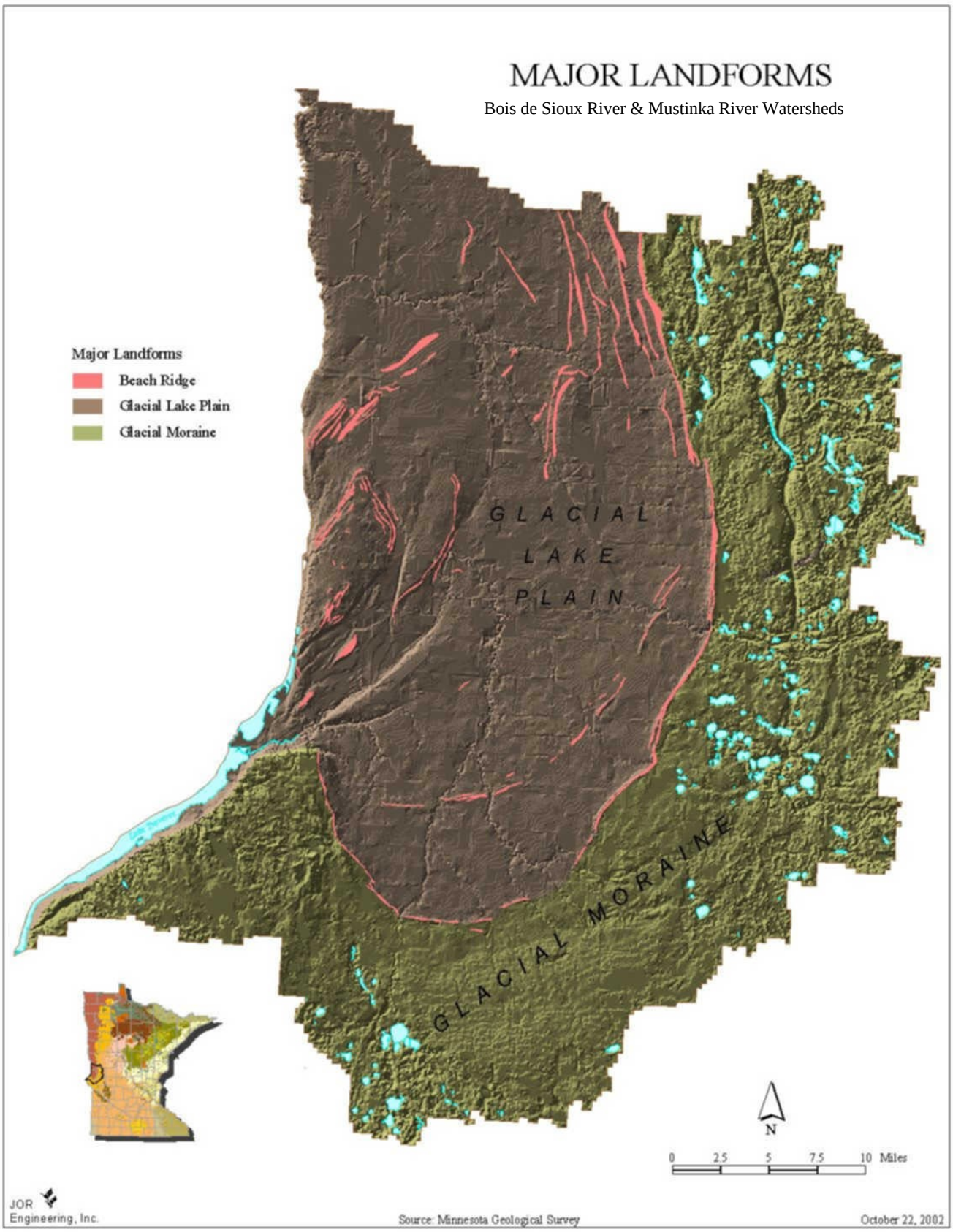
The zone above the cretaceous sediments and up to the ground surface consists of glacially transported materials called glacial drifts that were deposited during the Great Ice Age, from 2,000,000 to 12,000 years ago. Major deposits, referred to as glacial moraines, were built up and remain at the terminal extent of the more recent glaciers. Glacial moraines form the upland regions in the eastern and southern parts of the Mustinka Watershed.

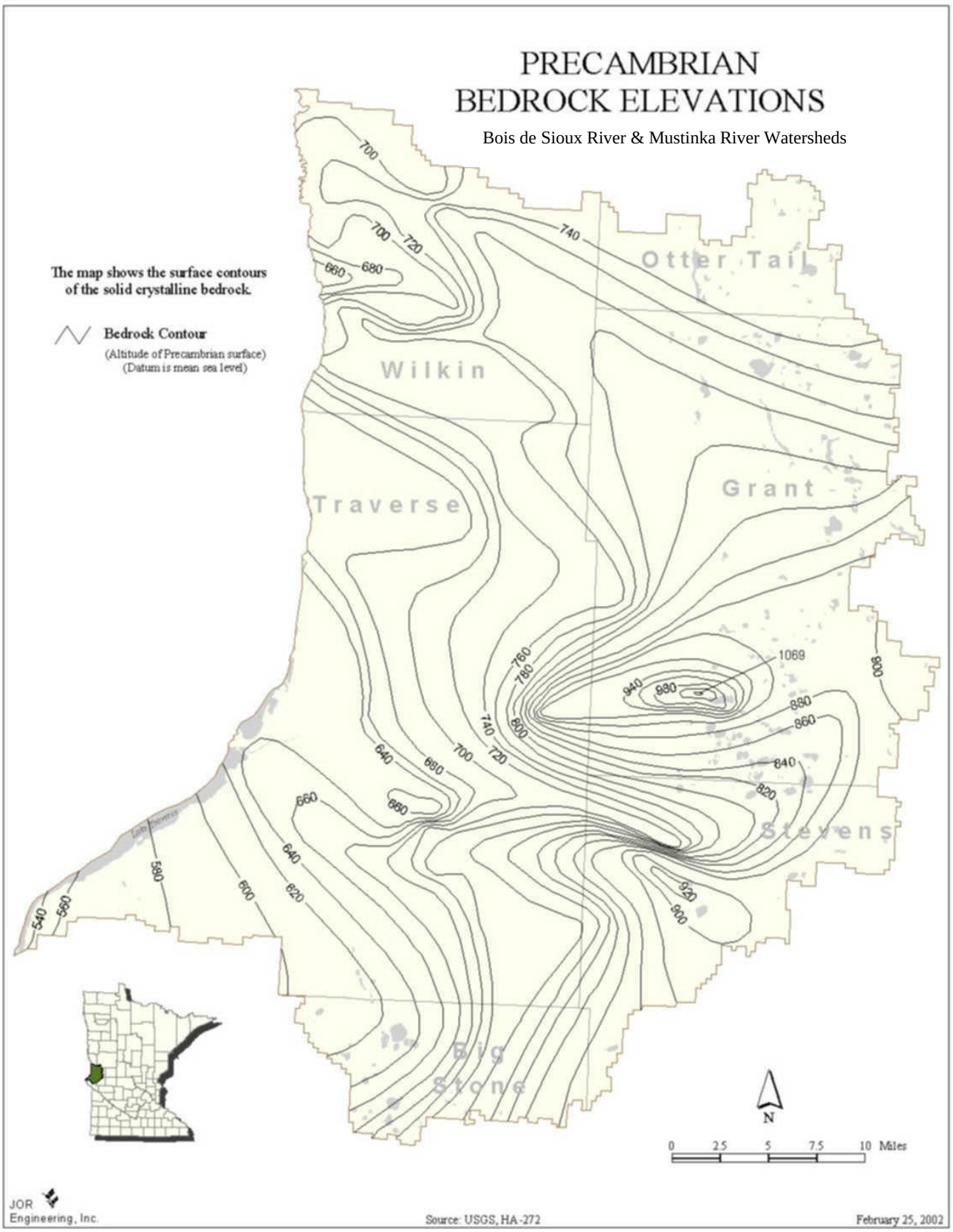
As the last glacier retreated, meltwater was trapped between the continental divide at the southwest corner of the Bois de Sioux Watershed near Browns Valley and the ice mass to the north. A huge water body was formed which is referred to as Glacial Lake Agassiz. Wave action at the margins of the lake formed the beach ridges that remain as prominent features of the landscape. In the northwestern area of the Bois de Sioux Watershed, one will find the broad, flat, glacial lake plain which was the bed of the lake. The locations of the moraine and lake plain areas are shown on the map in Major Landforms Map Figure.

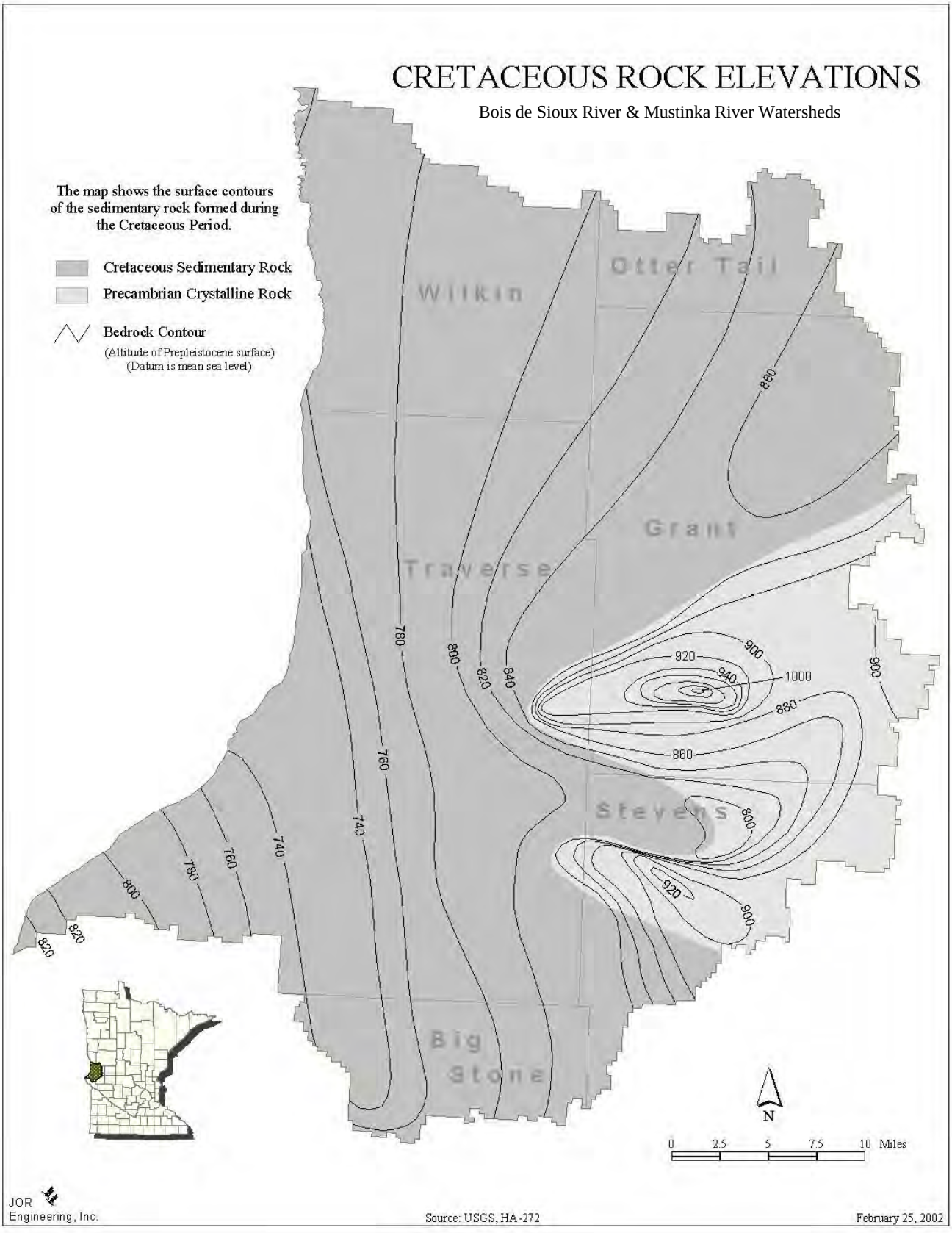
The thickness of the glacial deposits varies from 14 feet near Herman to 350 feet at Graceville. It is made up of a mix of materials, including clay, silt, sand, gravel, stones, and boulders. In some areas, the materials are very well mixed and are commonly referred to as glacial till. In other areas, they have been worked on and sorted by wind and water and redeposited as sediments of various gradations of particle size.

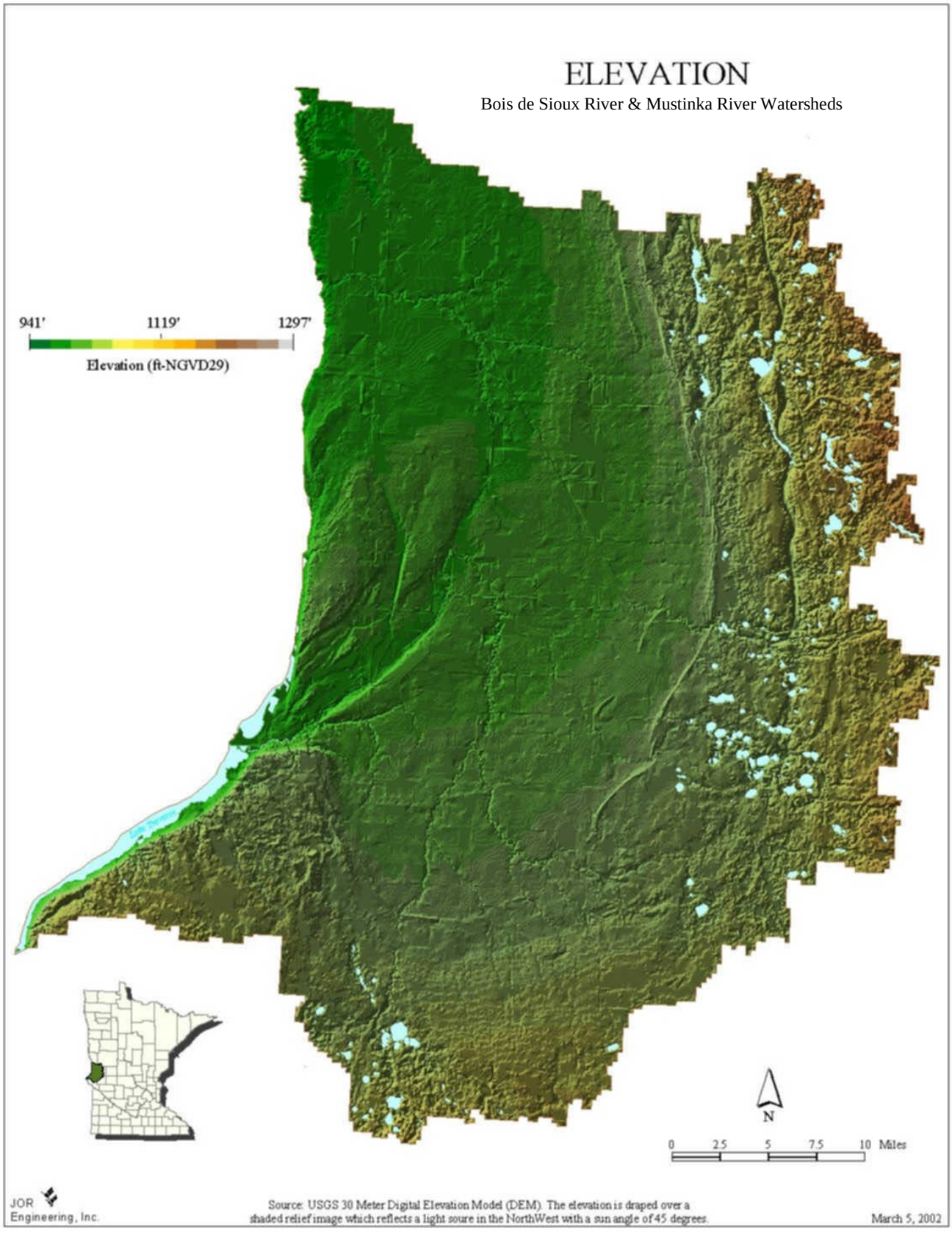
TOPOGRAPHY

The topography of the watersheds varies from gently rolling with interspersed lakes and wetlands in the morainal areas to very flat and level in the lake plain areas. Land elevations range from 1,280 feet above mean sea level northeast of Elbow Lake to 950 feet at Breckenridge. Land slopes of up to 20 percent are found in the morainal areas. In the lake plain, zero slope is not uncommon. A map of the general surface topography is shown in the Elevation Map Figure.

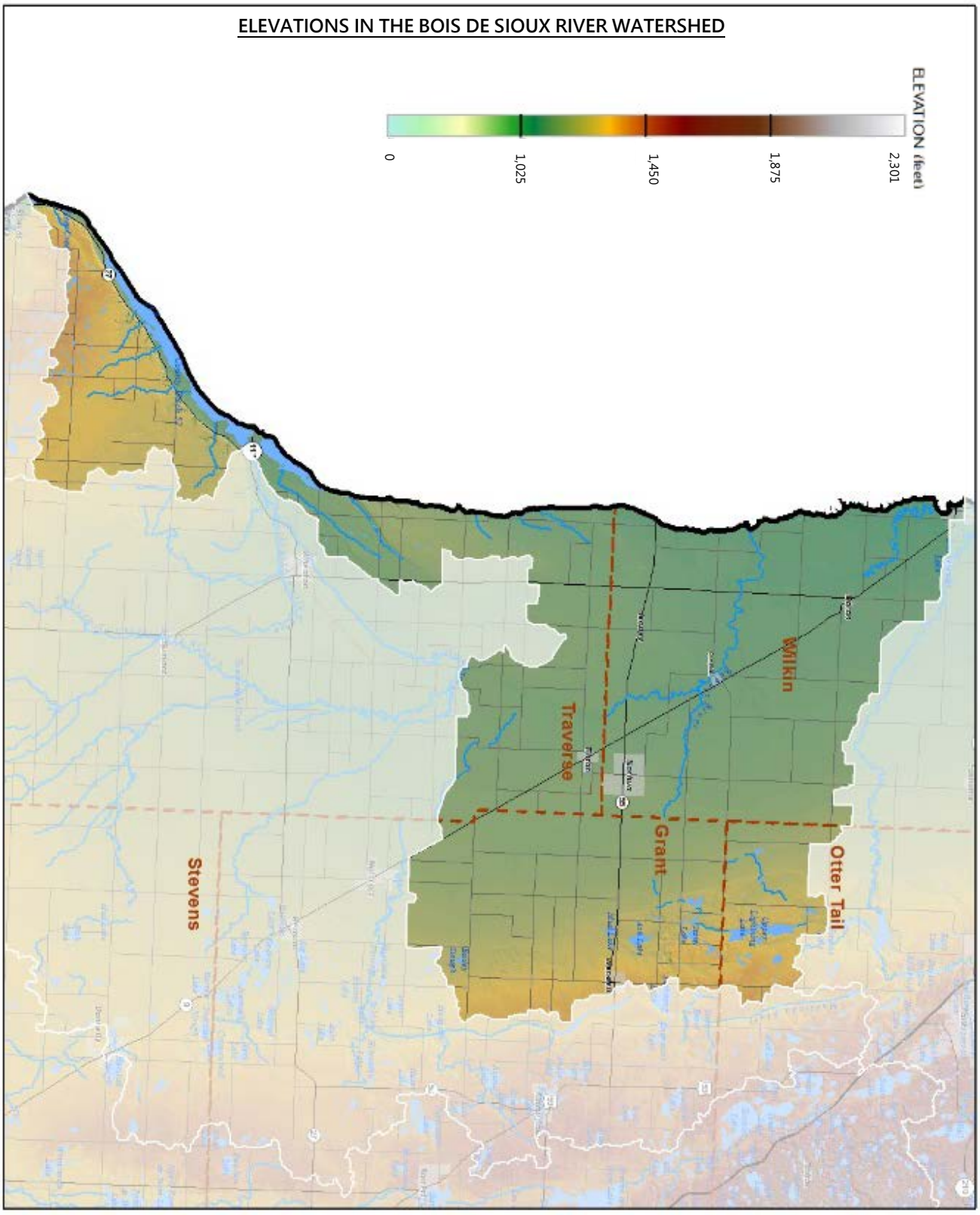

MAJOR LANDFORMS
Bois de Sioux River & Mustinka River Watersheds
Major Landforms
Beach Ridge
Glacial Lake Plain
Glacial Moraine
GLACIAL LAKE PLAIN
GLACIAL MORAINE
N
0 2.5 5 7.5 10 Miles
JOR Engineering, Inc.
Source: Minnesota Geological Survey
October 22, 2002


PRECAMBRIAN
BEDROCK ELEVATIONS
Bois de Sioux River & Mustinka River Watersheds
The map shows the surface contours of the solid crystalline bedrock.
Bedrock Contour
(Altitude of Precambrian surface)
(Datum is mean sea level)
Otter Tail
Wilkin
Traverse
Grant
Stevens
Big Stone
1069
N
0 2.5 5 7.5 10 Miles
JOR Engineering, Inc.
Source: USGS, HA-272
February 25, 2002


CRETACEOUS ROCK ELEVATIONS
Bois de Sioux River & Mustinka River Watersheds
The map shows the surface contours of the sedimentary rock formed during the Cretaceous Period.
Cretaceous Sedimentary Rock
Precambrian Crystalline Rock
Bedrock Contour
(Altitude of Prepleistocene surface)
(Datum is mean sea level)
Wilkin
Otter Tail
Grant
Traverse
Stevens
Big Stone
740
760
780
800
820
840
860
880
900
920
940
1000
N
0 2.5 5 7.5 10 Miles
JOR Engineering, Inc.
Source: USGS, HA-272
February 25, 2002

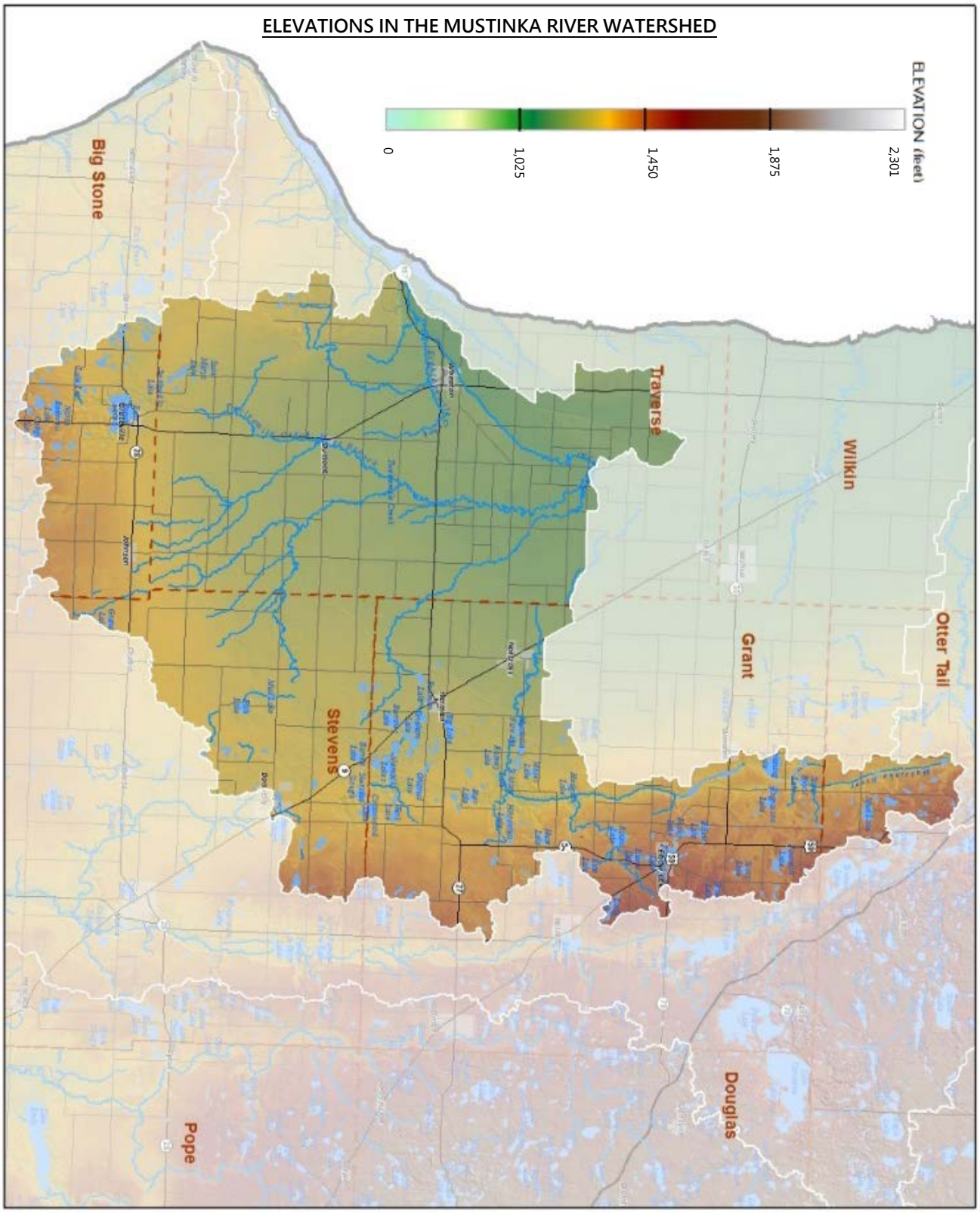

ELEVATION
Bois de Sioux River & Mustinka River Watersheds
941'
1119'
1297'
Elevation (ft-NGVD29)
N
0 2.5 5 7.5 10 Miles
JOR Engineering, Inc.
Source: USGS 30 Meter Digital Elevation Model (DEM). The elevation is draped over a shaded relief image which reflects a light soure in the NorthWest with a sun angle of 45 degrees.
March 5, 2002

ELEVATIONS IN THE BOIS DE SIOUX RIVER WATERSHED



Bois de Sioux River Watershed, https://mrbdc.mnsu.edu/mnnutrients/watersheds/bois-de-sioux

ELEVATIONS IN THE MUSTINKA RIVER WATERSHED



Mustinka River Watershed, https://mrbdc.mnsu.edu/mnnutrients/watersheds/mustinka-river-watershed

SOILS

The soils of both watersheds are all based in glacial materials. The soil texture differences depend on the sorting processes that wind and water have applied to the glacial deposits. The unsorted glacial till is a mixture of clay, silt, sand, gravel, and rock. The action of running water or waves on the till washed away the smaller particles in some areas, leaving behind the characteristic gravel pit deposits. The clay, silt and sand particles were transported by the water to more quiet areas within the streams or lake area. In general, the fine clay particles were carried farthest and deposited in the depths of the lake. The sands were the first to settle and form deposits in streambeds or near the edges of the lake where wave action further distributed them up and down the shoreline.

Topsoil development may include the addition of windborne deposits and organic remains that accumulate both above ground and within the root zone. Soils have been extensively mapped by the U.S. Department of Agriculture primarily to encourage suitable land use applications. Detailed soil surveys have been published covering each of the counties. These maps are detailed enough for land use planning on a small acreage basis.

From a water management viewpoint, soil texture is an important characteristic. Sandy soils have higher water infiltration rates but are more prone to drought and erosion than clay soils. Soil Texture Map Figure is a generalized soil landscape map of the watersheds showing the soil texture.

SOIL RUNOFF

Soil types also effect potential run-off. Hydrologic soil groups are classified in the map below by USDA as:

> *Group A—sand, loamy sand, or sandy loam soils that have low runoff potential and high infiltration rates even when thoroughly wetted.*
>
> *Group B—silt loam or loam soils that have moderate infiltration rates when thoroughly wetted.*
>
> *Group C—sandy clay loam soils that have low infiltration rates when thoroughly wetted.*
>
> *Group D—clay loam, silty clay loam, sandy clay, silty clay, or clay soils that have very low infiltration rates when thoroughly wetted. (USDA, 2014)*

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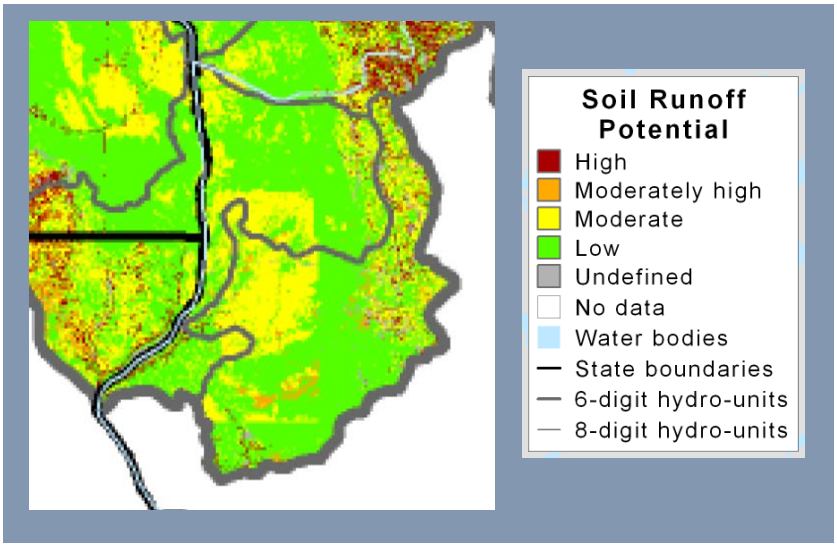
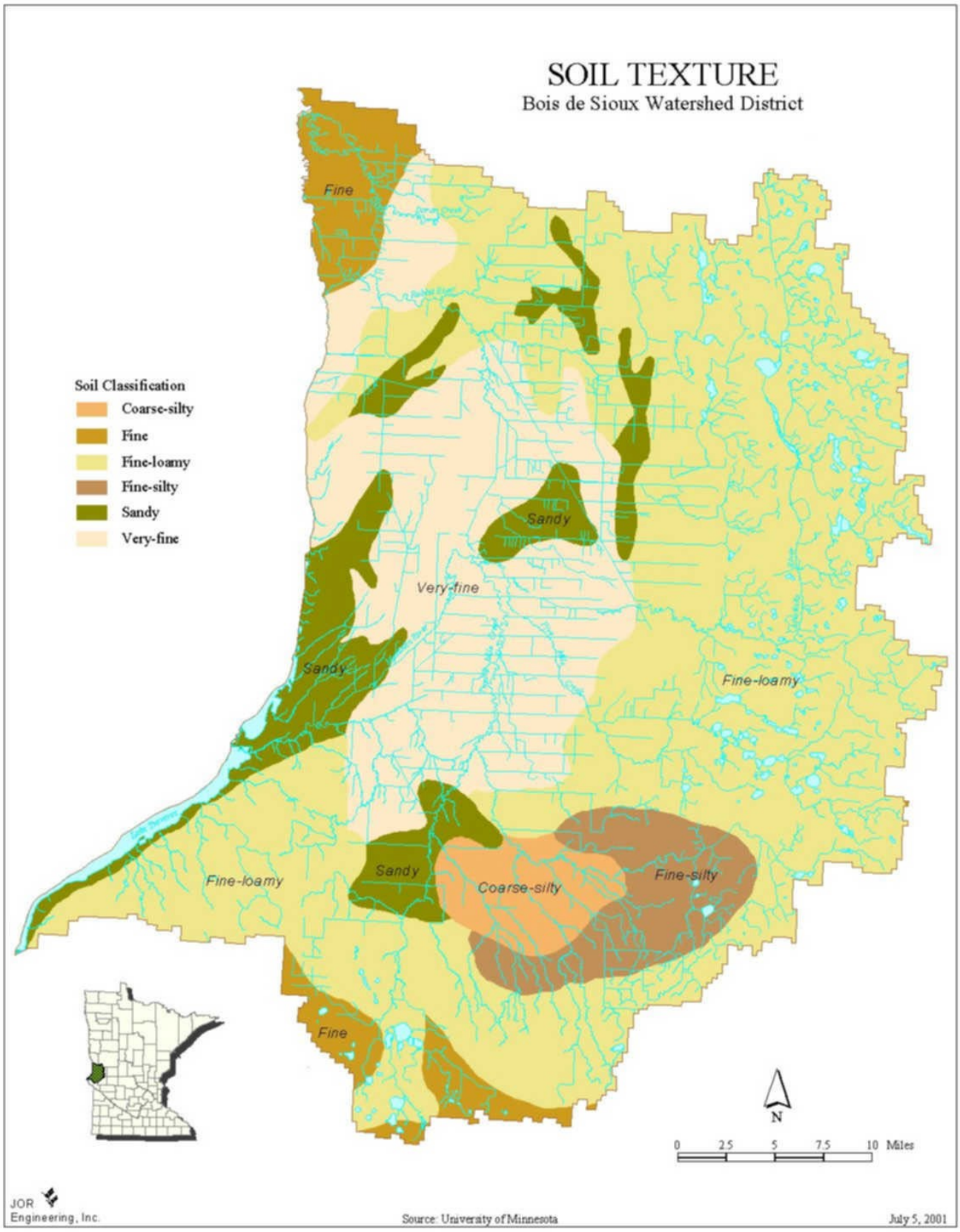


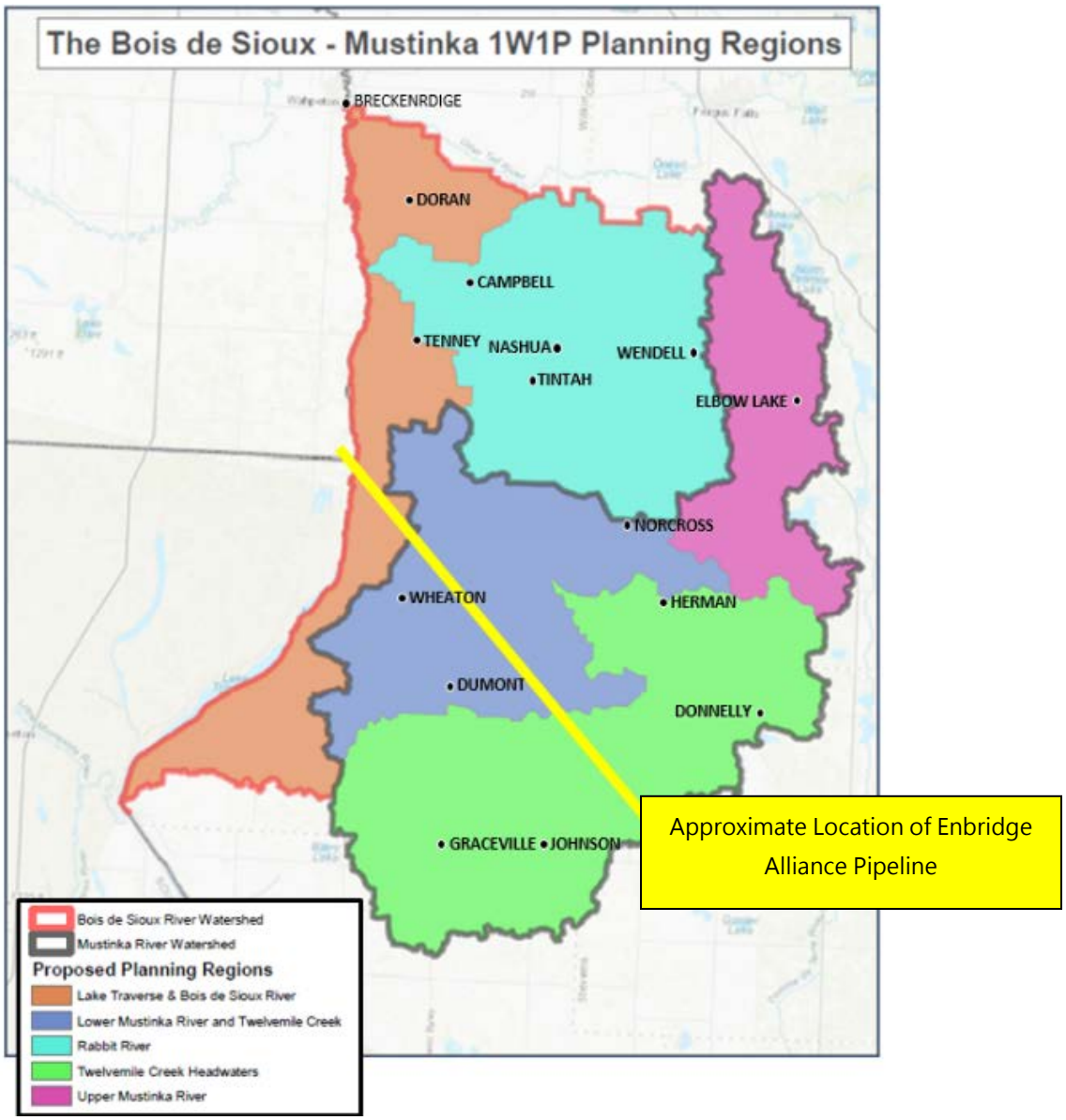

SOIL TEXTURE
Bois de Sioux Watershed District
Soil Classification
Coarse-silty
Fine
Fine-loamy
Fine-silty
Sandy
Very-fine
Fine
Sandy
Very-fine
Sandy
Fine-loamy
Fine-loamy
Sandy
Coarse-silty
Fine-silty
Fine
N
0 2.5 5 7.5 10 Miles
JOR Engineering, Inc.
Source: University of Minnesota
July 5, 2001

BELOW THE TOPSOIL

Underneath the topsoils of the Bois de Sioux and Mustinka River Watersheds, there is limited infrastructure. One noteable system is the Enbridge Natural Gas Pipeline (recently acquired by Enbridge from Alliance).

Per Enbridge (https://www.enbridge.com/map#map:infrastructure):

The Alliance Pipeline system consists of a 2,391-mile (3,848-kilometre) integrated U.S. and Canadian natural gas gathering and transmission pipeline system, delivering rich natural gas from the Western Canadian Sedimentary Basin and the Williston Basin to the Chicago market hub. The United States portion of the system consists of approximately 967 miles (1,556 kilometres) of infrastructure, including the 80-mile Tioga Lateral in North Dakota. Enbridge has a 50 percent ownership interest in Alliance Pipeline. The map below shows the approximate location of the pipeline in the Bois de Sioux and Mustinka River Watersheds. No cities in the watersheds are supplied with natural gas utilities.



2 - ENVIRONMENTAL CONDITIONS

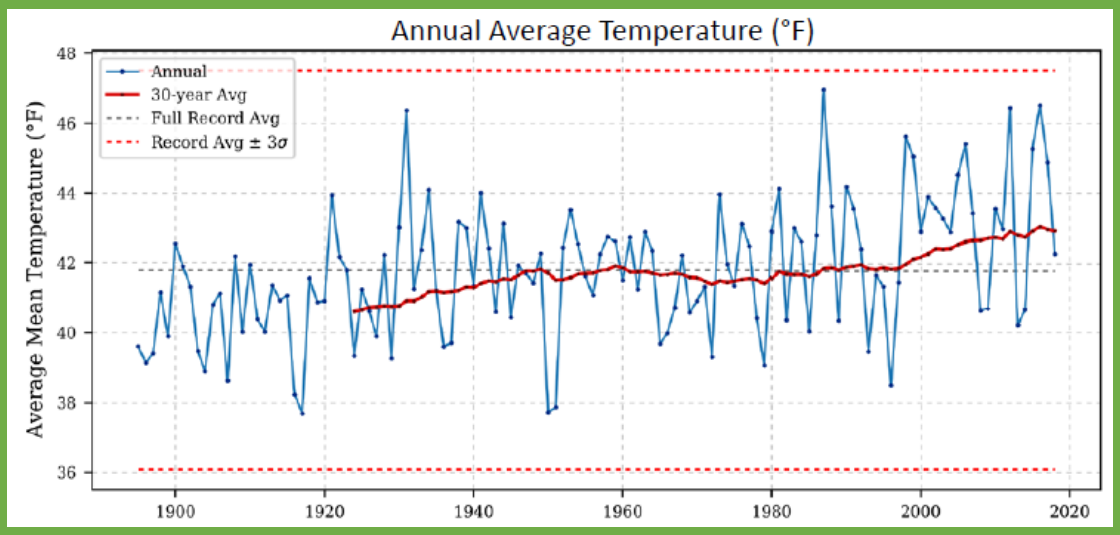
The climate of both watersheds is characterized by extreme temperature fluctuations and seasonal precipitation patterns.

Ecological Subregions of the United States (1994), https://www.fs.fed.us/land/pubs/ecoregions/				
Watershed	*Bois de Sioux*	*& Mustinka*	*Bois de Sioux*	*& Mustinka*	*Mustinka*
	Northern Glaciated Plains		**Lake Agassiz Plain (another name for RRV ecoregion)**		**North Central Hardwoods**
Growing Season	120 to 160 days		120 days		130 to 160 days
Precipitation averages	20 to 33 in		20 to 22 in		24 to 35 inches
Precipitation timing	50% during the growing season		40% during the growing season		Not Available
Mean annual temperatures	40 to 48 degrees F		37 to 41 degrees F		41 to 44 degrees F
Disturbance Regimes	Historically, fire was the most common natural disturbance. Floods and tornadoes also occurred. Fire suppression has allowed woodlands to develop from what was originally oak openings or brush prairies.		Fire was the most common natural disturbance, followed by floods and tornadoes. Fire frequency and intensity were reduced by natural barriers.		Not Available

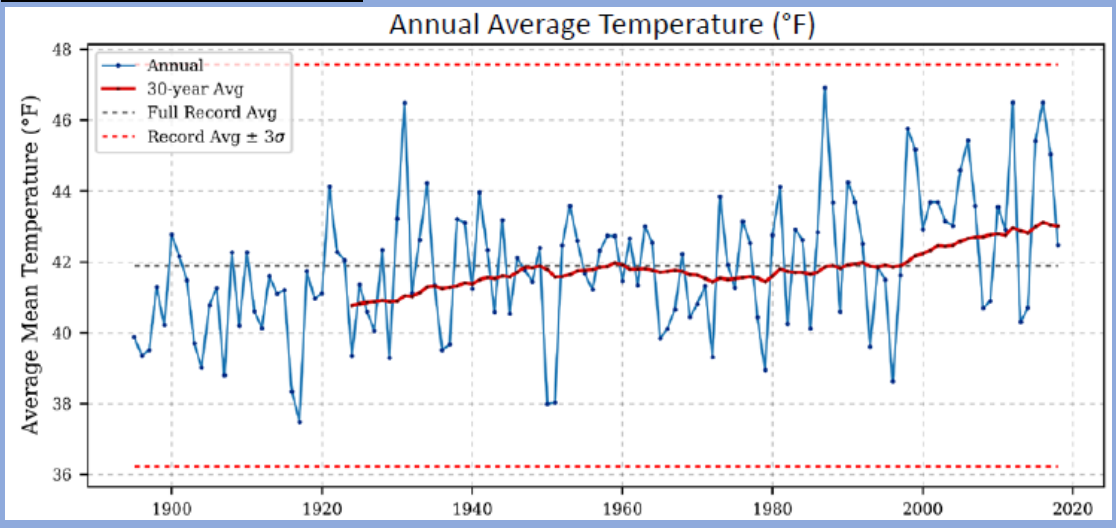
CLIMATE

How have annual average and long-term averages changed over the climate record? This figure provides annual average values (solid blue line) alongside the 30-year running average (solid red line), and the overall record average (dashed blue line). The figure allows us to compare values across three time periods and observe how recent observations compare to long-term trends.

BOIS DE SIOUX RIVER WATERSHED:



MUSTINKA RIVER WATERSHED:

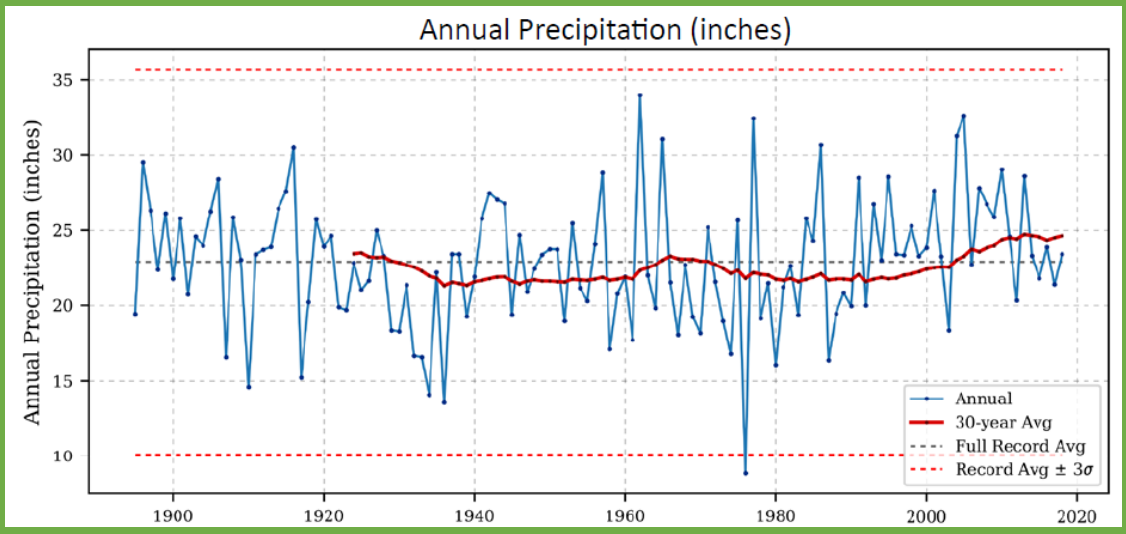


DNR Bois de Sioux River and Mustinka River Climate Summaries for Watersheds. June, 2019

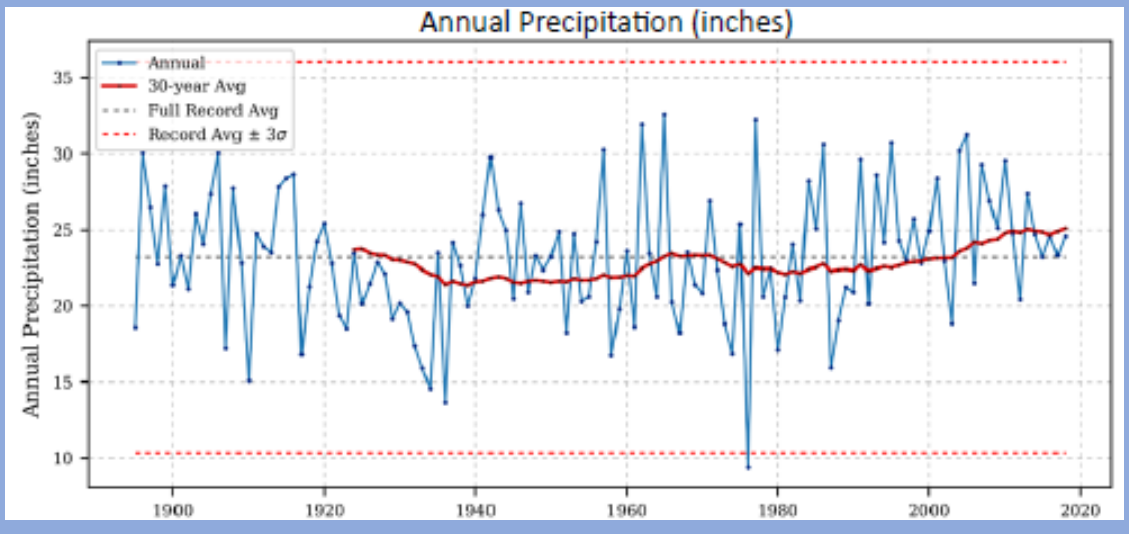
PRECIPITATION

How have annual average and long-term averages changed over the climate record? This figure provides annual average values (solid blue line) alongside the 30-year running average (solid red line) and the overall record average (dashed blue line). The figure allows us to compare values across three time periods and observe how recent observations compare to long-term trends.

BOIS DE SIOUX RIVER WATERSHED:



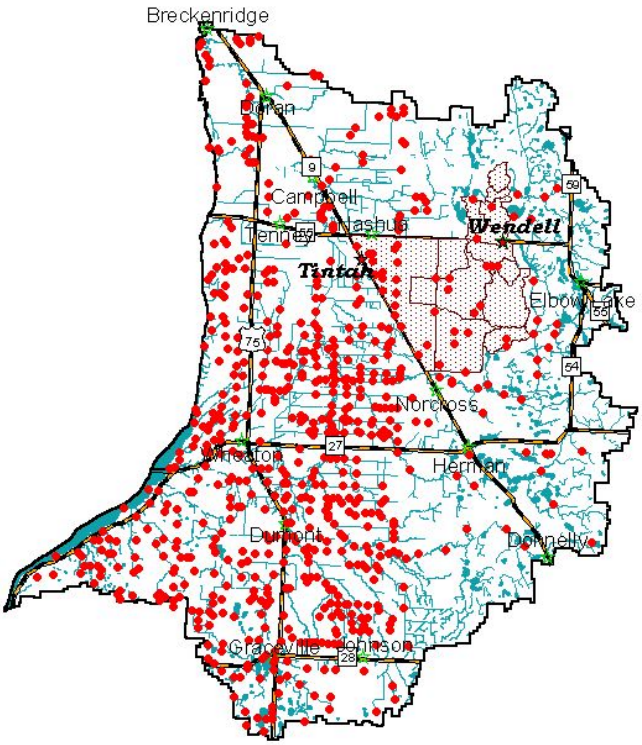
MUSTINKA RIVER WATERSHED:



DNR Bois de Sioux River and Mustinka River Climate Summaries for Watersheds. June, 2019

SNOWMELT & FLOODING

Historically there have been tremendous problems with spring and summer flood events in both the Bois de Sioux River and Mustinka River Watersheds, and there have also been periods of excessive precipitation in the fall. Flooding causes considerable damage to public infrastructure, homes, businesses, cropland, and at times, crops. Much of the flooding problem relates to geophysical and hydrological nature of the region and the difficulty in containment by natural and artificial drainage systems. It is of utmost importance to the citizens of both watersheds that solutions to flood damage reduction be developed and implemented within a reasonable timeframe. The cooperation of counties, watershed districts, state and federal agencies and other local agencies are critical in the reduction of flood damage.



FEMA Sites, Flood of 1997

Widespread Red River Basin flooding occurred in 1882, 1883, 1893, 1897, 1916, 1943, 1947, 1948, 1950, 1952, 1965, 1966, 1969, 1975, 1978, 1979, 1989, 1993, 1997, 2001, 2006, 2009, and 2011(page 1 Leitch Krenz 2013), and most recently in 2019. Flood events occurred in the spring and summer seasons. The most severe conditions were experienced in 1997. In A River Runs North, Leitch and Krenz emphasize the importance of the 1997 flood:

> *The 1997 flood established a water level mark in the Red River Valley unseen for generations…. The 1997 flood…was the largest recorded flood…. Increased development and population in 1997 resulted in greater economic losses than in previous years.*

Total damages for the Red River region were $3.5 billion. Many flood mitigation projects were initiated and developed in response to the 1997 flood. Stricter zoning compliance requirements and flood insurance policies were also implemented.

Each flood is different, as there are a number of extenuating circumstances. When evaluating the seriousness of spring flooding, considerations are made for pre-freeze soil saturation conditions, snow depth and density, and spring warming temperatures. Because these factors will result in various flooding possibilities, collecting data is vitally important to understanding the circumstances leading up-to and contributing to flood events. As an example of the importance of applying lessons of past floods towards the shape of goals and objectives to mitigate the damages of future floods, the Flood of 1997 shows us that both surface *and* groundwater caused damages:

> *As temperatures began to warm up towards the end of March, the near-record snow-pack across Big Stone and Traverse Counties began to melt and runoff, filling up ditches, lakes, creeks, streams, and low-lying areas. The extensive amount of water inundated many county and township roads (as well as some highways). Many road sections were broken-up or washed-out. Culverts were damaged or blown-out, and some bridges were damaged or washed-out by ice chunks and high water flows. Thus, road closures occurred with rerouting taking place for school*

buses, mail carriers, farmers, ranchers, etc. Many acres of farmland and pastureland were underwater. Due to the high groundwater level, some homes were flooded by water in their basements. Total damages for the Red River region were $3.5 billion.

The effect of snowmelt and excess precipitation is not only measured in the quantity of water in the Bois de Sioux and Mustinka River Watersheds, but also snowmelt and flooding impact water quality as well. Corriveau, Chambers, and Culp found that total phosphorus and nitrogen loads "showed more variability and larger values during winter and snowmelt." (Julie Corriveau, July 2013). Rattan, Blukacz-Richards, Yates, Culp, and Chambers write:

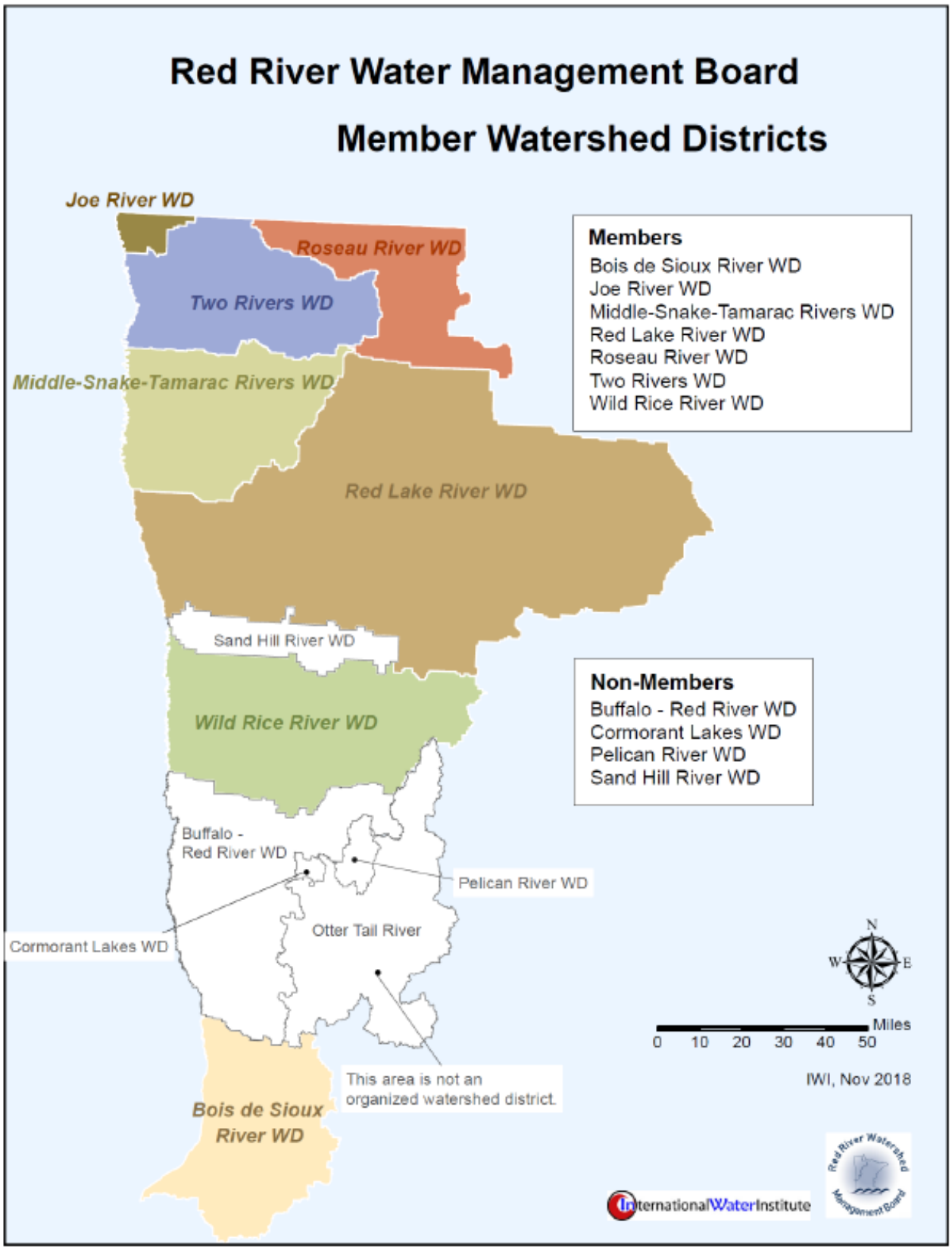
Our finding that nutrient concentrations, fractionation and export for prairie streams differs between years according to hydrological conditions has implications for water quality, particularly in response to climate change when reduced snowmelt and increased rain events are forecast to occur. During snowmelt dominated years, particulate nutrient concentrations and loads are greater and likely to result in increased water turbidity. In contrast, during years with reduced snowmelt runoff and greater rainfall, concentrations and loads of particulate N and P are lower in streams dissecting the Red River Valley." (K.J. Rattan, 2019)

RED RIVER WATER MANAGEMENT BOARD & RED RIVER BASIN MEDIATION AGREEMENT

The Bois de Sioux and Mustinka River Watersheds are part of the Red River Basin. In 1976, the Minnesota legislature created the Lower Red River Watershed Management Board (now renamed and known as the Red River Water Management Board RRWMB), an organization tasked with addressing basin-wide flooding. Prior to the formation of the Red River Water Management Board, flood control projects focused on a local scale. The RRWMB actively promotes a basin-wide perspective for water management.

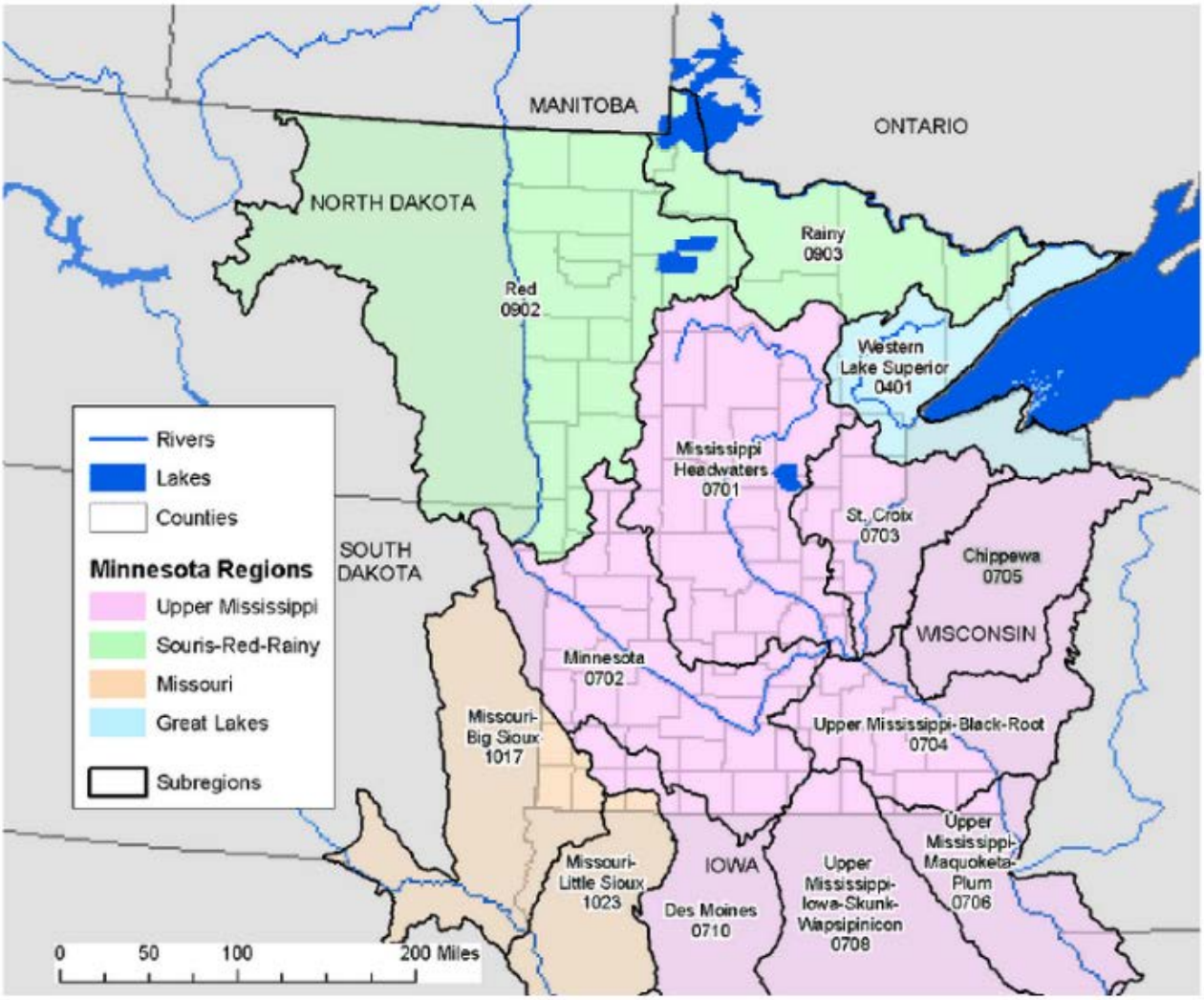
Even after the formation of the RRWMB, however, state permitting for flood control projects continued to present insurmountable barriers. As stated on page 1 of the December 9, 1998, Mediation Agreement, the Mediation Agreement fulfilled the Minnesota legislature's mandate to "resolve gridlock over state permitting of flood damage reduction projects in the Red River Basin." Stakeholders who signed the Mediation Agreement included representatives for MN Department of Natural Resources, Minnesota Board of Water and Soil Resources, Red River Watershed Management Board, National Audubon Society, Minnesota Center for Environmental Advocacy, US Army Corps of Engineers, US Fish and Wildlife, and Minnesota Pollution Control Agency.

Bois de Sioux and Mustinka River Watershed staff work within the guidelines and goals of the Mediation Agreement when developing flood damage reduction projects. Flood damage reduction strategies included in the Mediation Agreement include: wet dams, dry dams, on-stream water storage, off-stream water storage, flood storage wetlands, wetland restoration, river corridor restoration, setback levees, riparian buffer strips, dredging and channelization, flood storage easement, retirement of land, land use, best management practices, gating ditches, culvert sizing, and drainage.


Red River Water Management Board
Member Watershed Districts
Joe River WD
Roseau River WD
Two Rivers WD
Middle-Snake-Tamarac Rivers WD
Red Lake River WD
Sand Hill River WD
Wild Rice River WD
Buffalo - Red River WD
Pelican River WD
Cormorant Lakes WD
Otter Tail River
Bois de Sioux River WD
This area is not an organized watershed district.
Members
Bois de Sioux River WD
Joe River WD
Middle-Snake-Tamarac Rivers WD
Red Lake River WD
Roseau River WD
Two Rivers WD
Wild Rice River WD
Non-Members
Buffalo - Red River WD
Cormorant Lakes WD
Pelican River WD
Sand Hill River WD
N
W
E
S
Miles
0 10 20 30 40 50
IWI, Nov 2018
International Water Institute
Red River Watershed Management Board

3 - SURFACE WATER HYDROLOGY

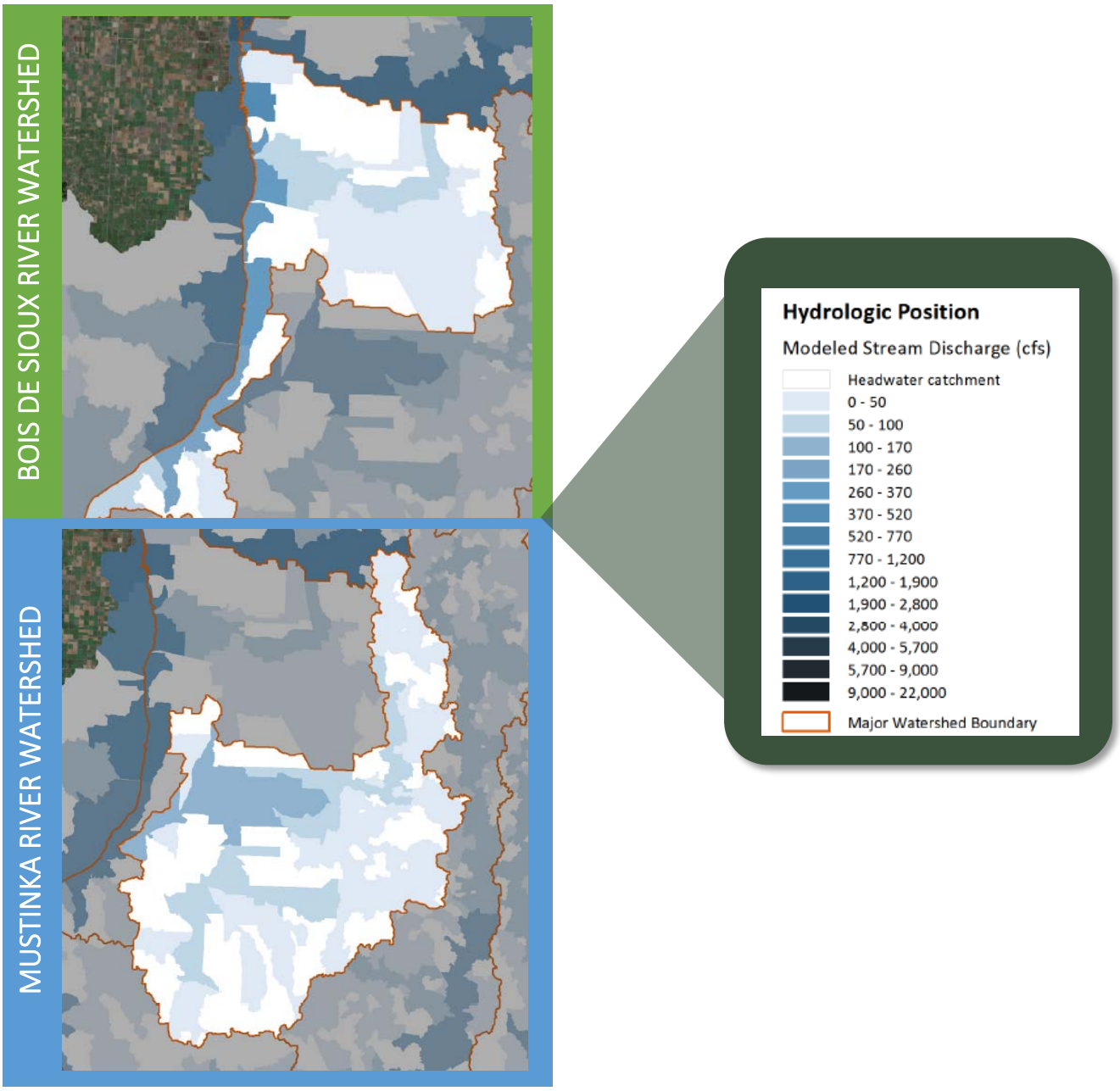
The Bois de Sioux and Mustinka River Watersheds are part of the Souris-Red-Rainy Hydrologic Subregion (4-Digit HUC) and the Upper Red Hydrologic Basin (6-Digit HUC).

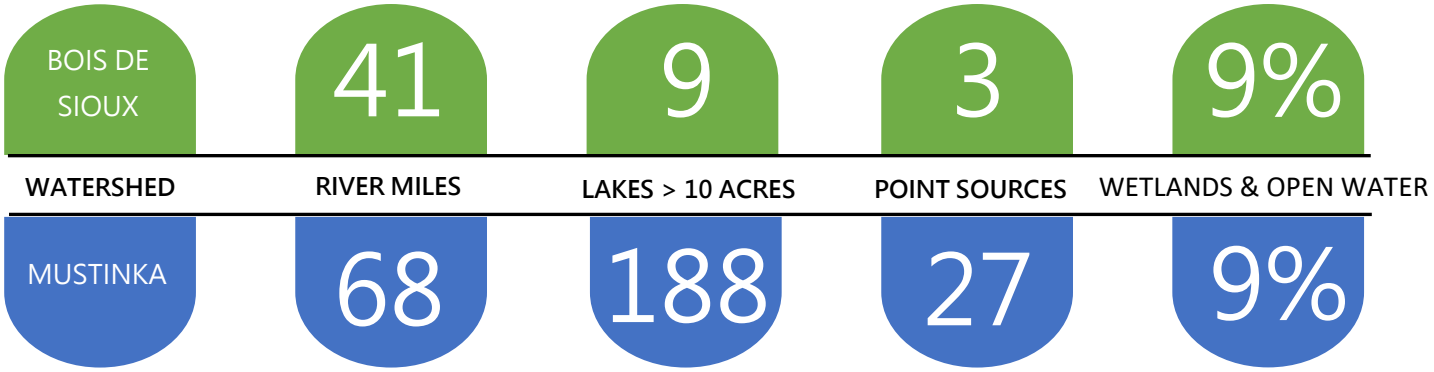


(https://www.dnr.state.mn.us/watersheds/subregions.html).

HYDROLOGIC POSITION

The figures below, provided by the DNR, indicates that the majority of the acreage in the Bois de Sioux and Mustinka River Watersheds act as headwater catchments; they collect the surface water and send the water downstream. The DNR adds this footnote: "The discharge amounts in cubic feet per second (cfs) are estimates based on modeling, not actual measurements of stream flow."





BOIS DE SIOUX RIVER WATERSHED

According to the MPCA's Bois de Sioux River Watershed Monitoring and Assessment and WRAPS Reports:

Rivers. *The Bois de Sioux River begins its 41 mile course at the dam on the north end of Lake Traverse. Rivers in this district are relatively shallow, and are prone to low- or no-flow during summer and fall. The river briefly flows north before entering Mud Lake. Roberts County, South Dakota lies on the west bank of the river and Traverse County, Minnesota on the east bank. The Bois de Sioux flows through White Rock Dam on the north end of Mud Lake and continues north. Eventually the river crosses into Richland County, North Dakota on its western side and Wilkin County, Minnesota on its eastern side. The Rabbit River, a major tributary, joins the Bois de Sioux River in Wilkin County. Originating near the source of the Mustinka River, the Rabbit River drains approximately 327 square miles of land and flows east to west within the Bois de Sioux River Watershed. The Bois de Sioux River continues north into the adjacent communities of Breckenridge, Minnesota and Wahpeton, North Dakota. At this location, the Otter Tail River joins with Bois de Sioux River to form the Red River of the North. Numerous small ditches and streams enter the Bois de Sioux at various locations throughout its entire course. Sections of the Bois de Sioux River have been channelized at various locations. There are four streams impaired: one impairment for Total Suspended Solids, one impairment for Low Fish-IBI Score, one impairment for mercury, two impairments for Low Dissolved Oxygen, and two impairments for E.coli. It is important to note that wildlife fecal runoff was identified as the likely dominant non-point pollutant source of bacteria to impaired streams.*

Lakes. *There are few major lakes in the watershed. The BdSRW has nine lakes with surface areas greater than ten acres. Lakes in this district have relatively shallow depths and large watersheds. Only three of these lakes has enough water quality data collected to conduct assessments (Ash, Upper Lightning, and Mud Lake, Traverse County). To be listed as impaired, a lake must not meet water quality standards for TP and either chl-a or secchi depth. Two of these lakes are considered impaired for aquatic recreation (Ash and Upper Lightning Lakes).*

Point Sources. *There are only three point sources in the watershed: Campbell Wastewater Treatment Facility (Municipal Wastewater), Hawes Piling Ground (Industrial Wastewater), Chad Hasbargen Farms (Animal Feeding Operation). All three discharge into the Rabbit River.*

Nonpoint Sources. *Nonpoint source pollution is caused by rainfall, snowmelt (moving over and through the ground), and wind erosion. Nonpoint sources are: overland runoff, wind erosion, near-stream/ditch erosion, wildlife fecal runoff, manure runoff, failing septic systems, internal loading, upstream lakes and streams. (MPCA, DRAFT Bois de Sioux River Watershed WRAPS, January 2019)*

Wetlands. *Wetlands and open water account for 9% of the Bois de Sioux River Watershed (MPCA, Bois de Sioux River Watershed Monitoring and Assessment Report, November 2013).*

Irrigation. *Surface water irrigation is currently non-existent. As of 2017, there are only 3 active permits for agricultural irrigation, and the last usage by any of the three permitees was in 1990 (DNR, Updated 09-05-2018).*

MUSTINKA RIVER WATERSHED

According to the MPCA's Mustinka River Watershed Monitoring and Assessment and WRAPS Reports:

Rivers. *Major rivers and streams include the Mustinka River, Twelve Mile Creek, Five Mile Creek and Eighteen Mile Creek. Numerous small unnamed creeks and ditches occur throughout the watershed. Rivers in this district are relatively shallow, and are prone to low- or no-flow during summer and fall. Beginning its 68 mile flow length in southwestern Ottertail County, the Mustinka River flows southward into Grant County through Lightning Lake and Stony Brook Lake (Waters 1977). The river maintains a southward course until turning west in southern Grant County. The river continues flowing west past Norcross and into Traverse County. In north-central Traverse County two main tributaries, Twelve Mile Creek and Five Mile Creek, feed into the Mustinka. Just west of the confluence of these tributaries the Mustinka River turns southwest and flows past Wheaton into Lake Traverse. There are eleven streams impaired: seven impairments for Total Suspended Solids, four impairments for Total Phosphorous, seven impairments for E. coli. It is important to note that there was a statistically significant decrease in average annual total suspended solid concentrations of 46% in the Mustinka River at Highway 75 near Wheaton from 2001 to 2011.*

Lakes. *There are 188 lakes greater than 10 acres within the Mustinka River Watershed. Lakes in this district have relatively shallow depths and large watersheds. Three of these lakes has enough water quality data collected to conduct assessments. To be listed as impaired, a lake must not meet water quality standards for TP and either chl-a or secchi depth. Three of these lakes are considered impaired for aquatic recreation (Lightning, East Toqua, and Lannon Lakes).*

Point Sources. *As of 2016, there are twenty-seven point sources in the watershed: 8 Municipal Wastewater Treatment Facilities (Big Stone Hutterite Colony, Donnelly, Dumont, Elbow Lake, Graceville, Herman, Wendell), 9 Industrial Stormwater Facilities (Aggregate Industries, City of Dumont, Elbow Lake Airport, Elbow Lake Gravel, Grant County Highway Garage, Grant County Highway Department, Grant County Norcross Highway Garage, Herman Airport, Herman Public Works).*

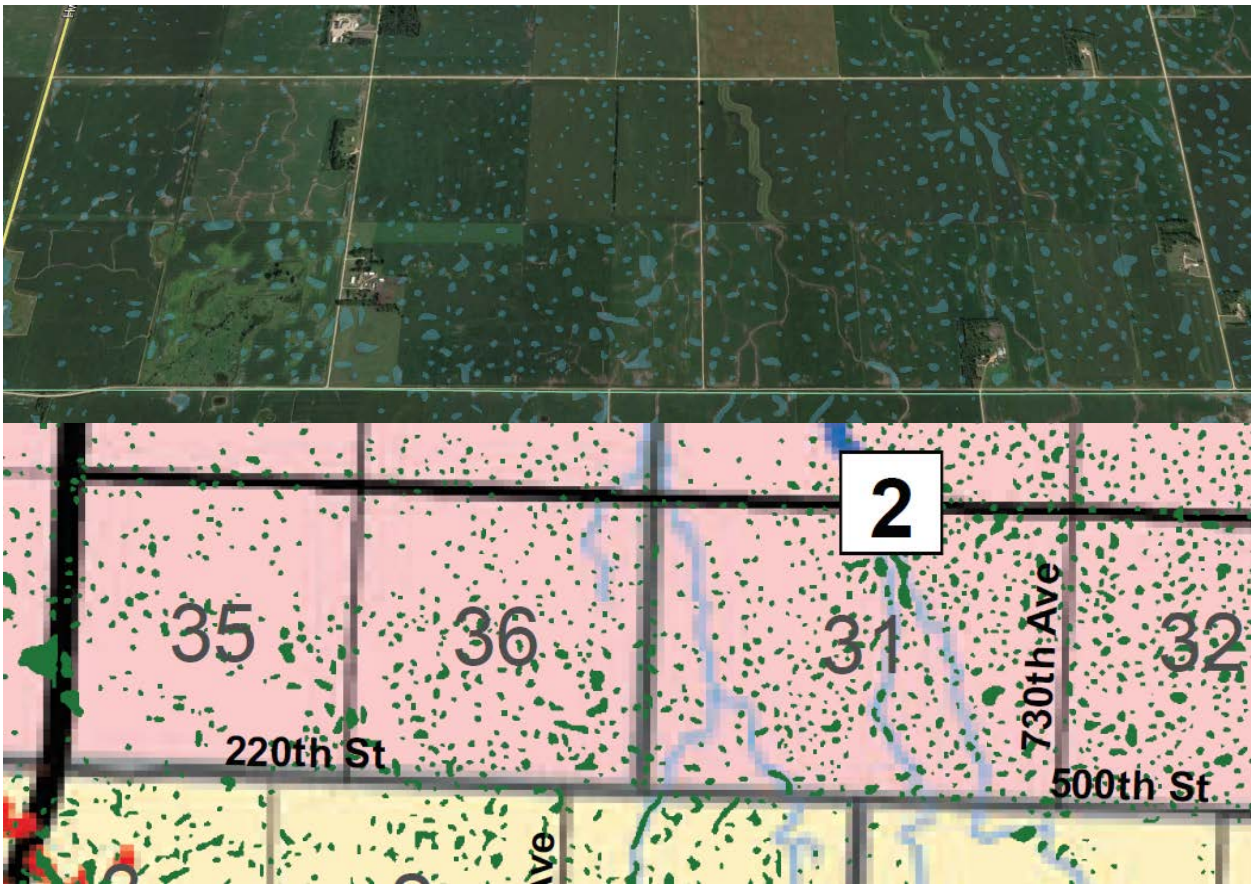
Nonpoint Sources. *Nonpoint source pollution is caused by rainfall, snowmelt (moving over and through the ground), and wind erosion. Nonpoint sources are: fertilizer and/or manure runoff, field and stream erosion, failing septic systems, internal loading, upstream lakes and streams, wildlife fecal runoff. (MPCA, Mustinka River Watershed Monitoring and Assessment Report, November 2013)*

Wetlands. *Wetlands and open water account for 9% of the Mustinka River Watershed (MPCA, Monitoring and Assessment Report, October 2016).*

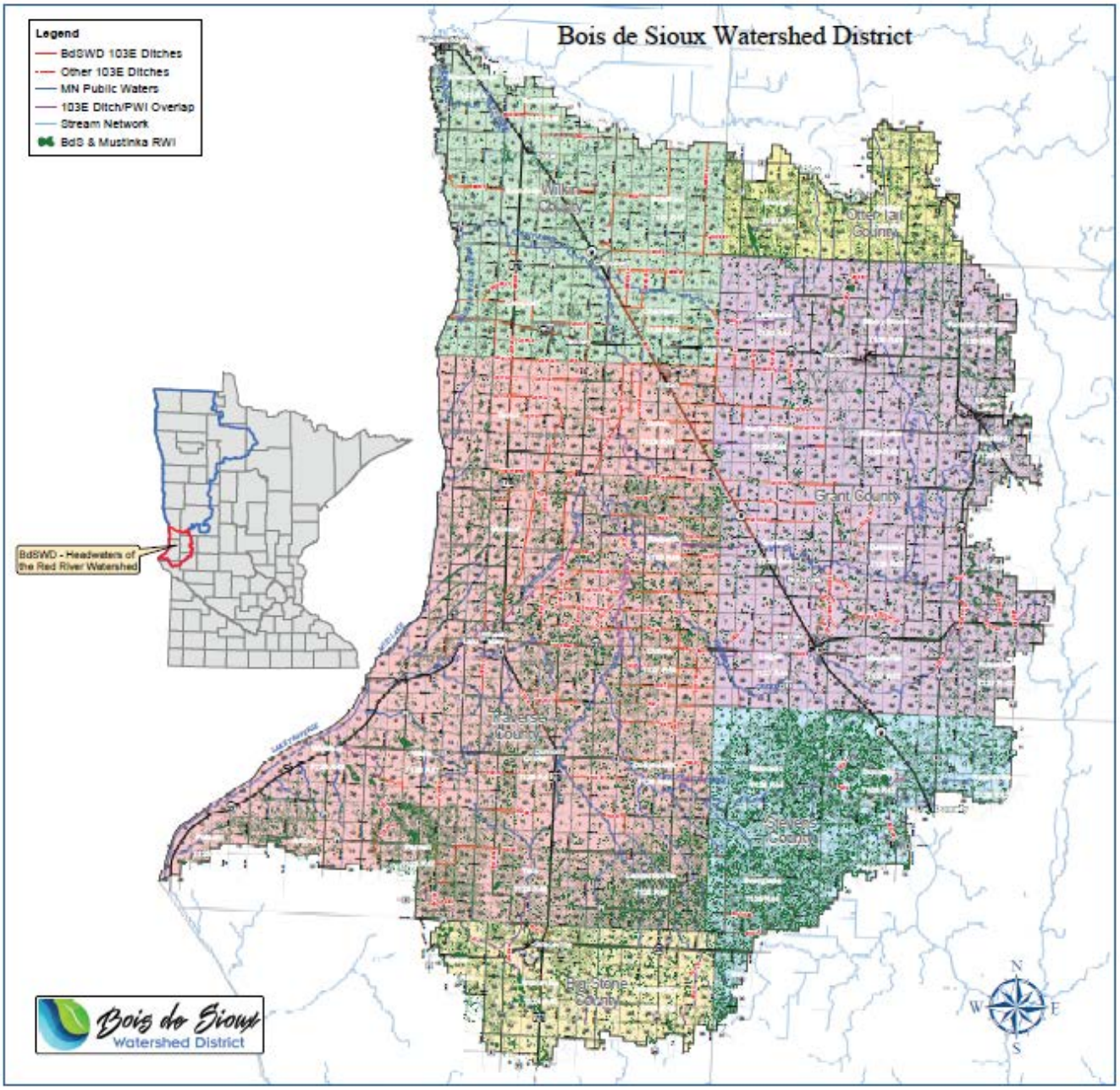
Irrigation. *Surface water irrigation is nearly non-existent. As of 2017, there are only 3 active permits for agricultural irrigation; two report no usage, and one permittee has irrigated intermittently between 1997 and 2017. The Wheaton Country Club Golf Course does utilize a Mustinka River Tributary for irrigation (DNR, Updated 09-05-2018).*

WETLANDS

The Minnesota Department of Natural Resource, using dollars from the Environment and Natural Resources Trust Funds contracted with Ducks Unlimited to inventory, map, and digitize drained restorable wetlands. This tool is used by soil and water conservation districts to evaluate potential wetland restoration sites. The map excerpts below are from Traverse County - Tara Township, Sections 35 and 36; Leonardsville Township, Sections 31 and 32.

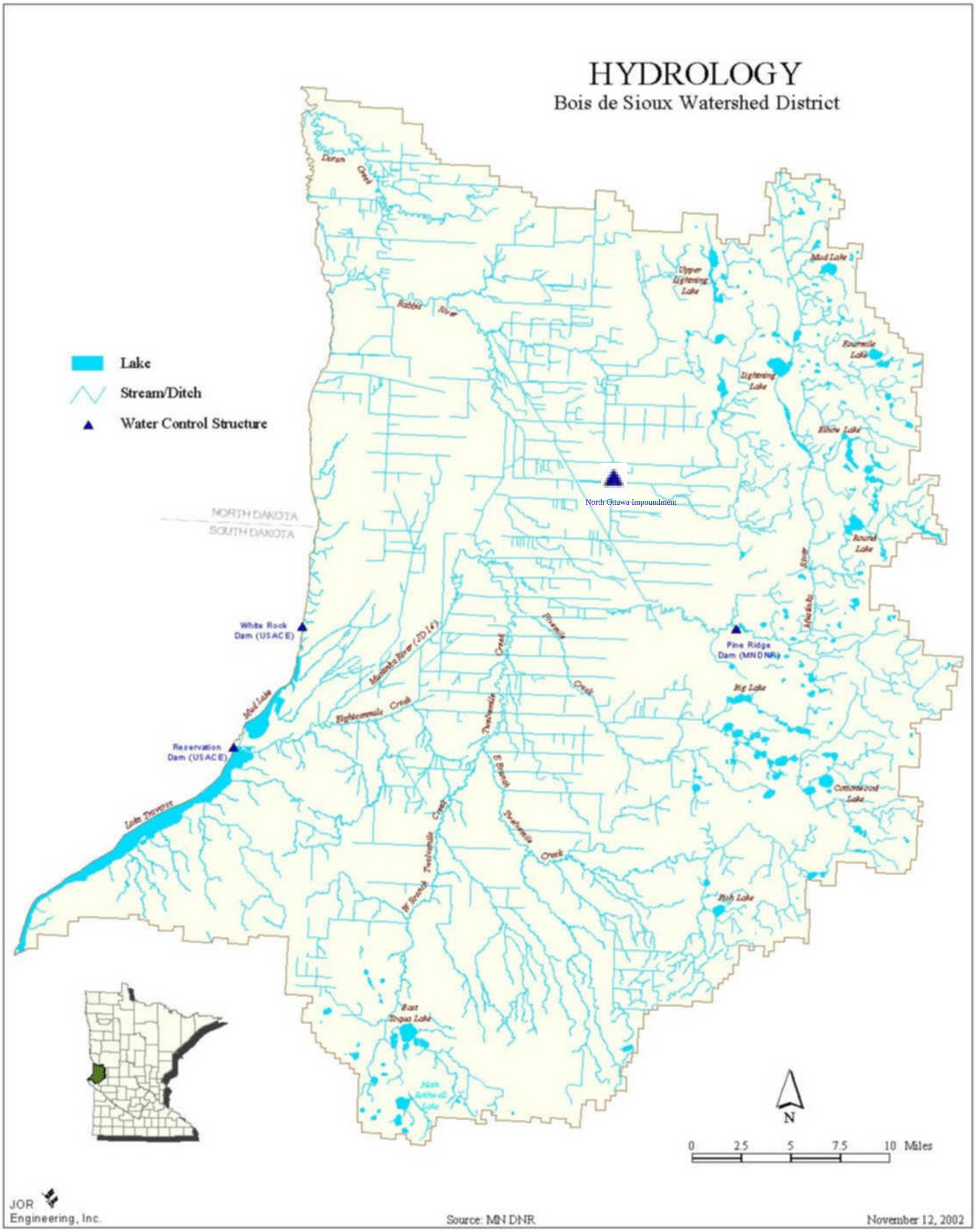


DNR-DU Restorable Wetland Inventory



WATER MANAGEMENT STRUCTURES

There are a wide variety of structures in the Bois de Sioux River and Mustinka River Watersheds – varying from large, complex systems (such as dams, drainage systems, and impoundments) to small, field-scale projects (such as ring dikes, grassed waterways, and terraces).


HYDROLOGY
Bois de Sioux Watershed District
Lake
Stream/Ditch
Water Control Structure
NORTH DAKOTA
SOUTH DAKOTA
North Ottawa Impoundment
White Rock Dam (USACE)
Reservation Dam (USACE)
Pine Ridge Dam (MNDNR)
N
0 2.5 5 7.5 10 Miles
JOR Engineering, Inc.
Source: MN DNR
November 12, 2002

BOIS DE SIOUX RIVER WATERSHED – LAKE TRAVERSE BOIS DE SIOUX RIVER PROJECT

The Lake Traverse Bois de Sioux River Project was constructed by the Corps of Engineers in 1941. The project consists of a flood control dam at the outlet of Mud Lake (White Rock Dam), a level control dam at the outlet of Lake Traverse (Reservation Dam), a levee at the south end of Lake Traverse (the Browns Valley Dike), and a channel improvement on the Bois de Sioux River extending 24 miles downstream. The project provides 128,520 acre-feet of flood control storage in addition to a conservation pool of 121,280 acre-feet. The flood storage capacity is equivalent to 2.2 inches of runoff from the upstream drainage area.

Normal operation of the dams is to control the level of Lake Traverse at about 976 feet above sea level and Mud Lake at about 972. During minor runoff events, Reservation Dam at the outlet of Lake Traverse is opened to keep the lake below 977. White Rock Dam at the outlet of Mud Lake will be closed if there is flooding potential downstream. During major floods, the level in Mud Lake will rise to equal that in Lake Traverse: the pools will rise together from 977 to 981. When the reservoir reaches 981, White Rock Dam is opened to match the inflow as best it can. In 1997, inflow was higher than outflow and pools raised to 982.25. The release of water at White Rock Dam may impact downstream drinking water due to the presence of high organic carbon, high sulfate and hardness.

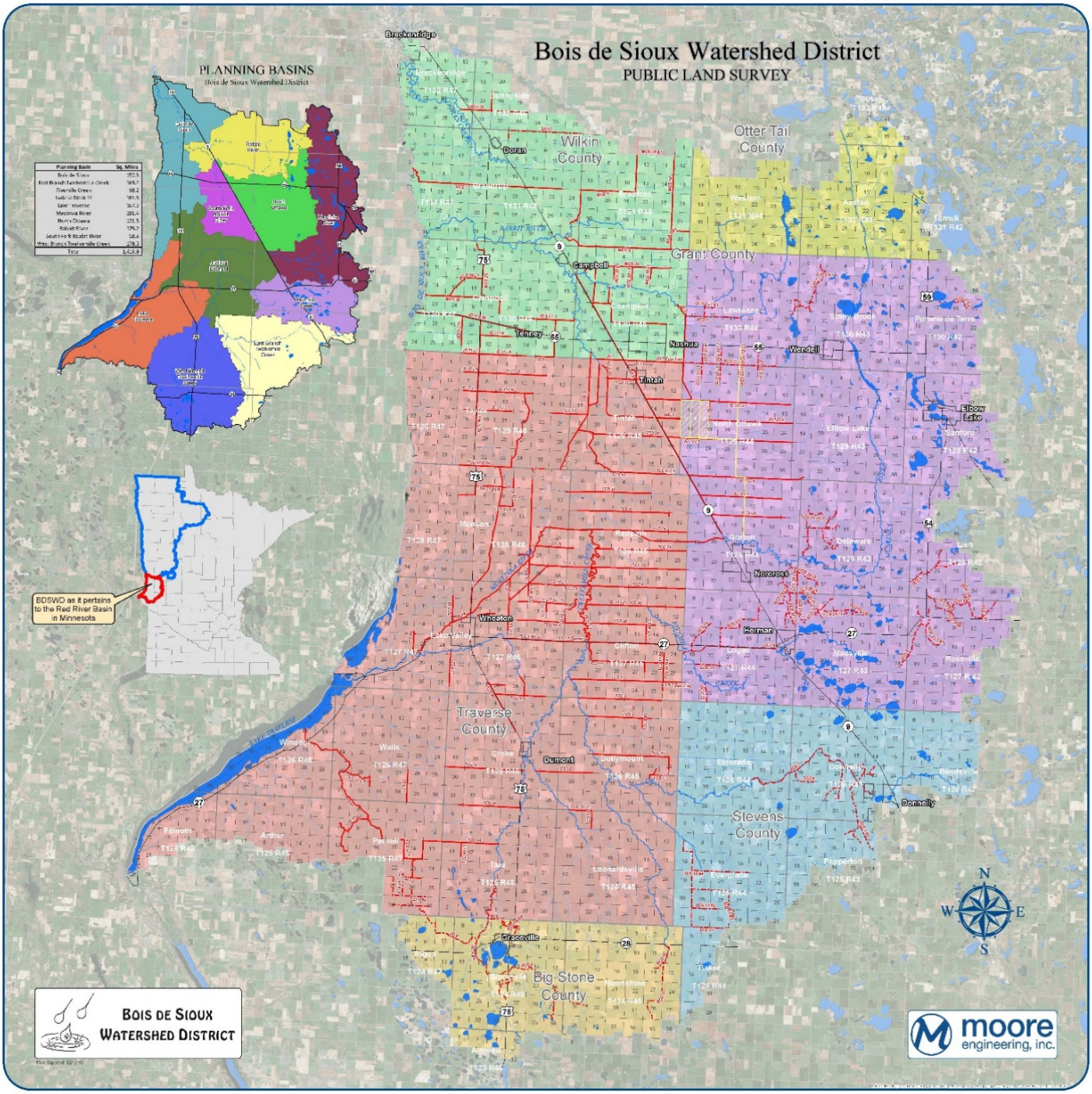
MUSTINKA RIVER WATERSHED – MUSTINKA RIVER PROJECT

The Mustinka River Project was constructed by the Corps of Engineers in 1957. It consists of 36.1 miles of channel improvement on the Mustinka River, Twelve Mile Creek, and County Ditch 42. This project was then turned over to the Local Government Unit (LGU)- Joint County Board to be managed as a Legal Drainage System under Minnesota Statute MS 103E.

DRAINAGE WATER MANAGEMENT SYSTEMS

Legal drainage ditches were constructed in 1870 and later; most of the existing ditch systems were established during the first quarter of this century. Ditches provide local relief from soil wetness conditions and minor flooding problems. The generally flat topography and predominantly heavy soils of both watersheds do not afford adequate natural drainage for efficient production of agricultural crops - however, when water is properly managed, the soils are highly productive. In addition to enhancing agricultural production, drainage ditch systems protect roads, highways, and property; landowners who deemed to receive benefit from the drainage systems were originally assessed drainage ditch construction costs. Subsequent repair, maintenance, and improvements are also assessed annually.

The public drainage systems within the Bois de Sioux and Mustinka River Watersheds that are managed by drainage authorities on behalf of the landowners receiving benefit from the drainage system. There are 581 miles of legal ditches as shown in the figure below. Of these, 414 miles are managed by the Bois de Sioux Watershed District. Big Stone, Grant, Otter Tail, Stevens and Wilkin Counties act as the drainage authority over specific drainage systems in their jurisdictions. Following the figure below is a list of local government units that serve as the drainage authority for the Bois de Sioux and Mustinka River Watershed public drainage systems.


Bois de Sioux Watershed District
PUBLIC LAND SURVEY
PLANNING BASINS
Bois de Sioux Watershed District
BDSWD as it pertains to the Red River Basin in Minnesota
Wilkin County
Otter Tail County
Grant County
Traverse County
Stevens County
Big Stone County
Wheaton
Tintah
Wendell
Herman
Norcross
Elbow Lake
Campbell
Breckenridge
Donnelly
Graceville
Dumont
Wahpeton
BOIS DE SIOUX WATERSHED DISTRICT
moore engineering, inc.

BENEFITTED LAND	DITCH SYSTEM NAME	DRAINAGE AUTHORITY
Wilkin County	BdSWD #3	Bois de Sioux Watershed District
Grant County	Big Stone County Ditch #10	Big Stone County
Grant County	Big Stone County Ditch #11	Big Stone County
Grant County	Big Stone County Ditch #16	Big Stone County
Grant County	Big Stone County Ditch #8	Big Stone County
Grant County	Big Stone County Judicial Ditch #4	Big Stone County
Grant County	Grant County Ditch #15	Grant County
Grant County	Grant County Ditch #21	Grant County
Grant County	Grant County Ditch #22	Grant County
Grant County	Grant County Ditch #29	Grant County
Grant County	Grant County Ditch #3	Grant County
Grant County	Grant County Ditch #32	Grant County
Grant County	Grant County Ditch #33	Grant County
Grant County	Grant County Ditch #5	Grant County
Grant County	Grant County Ditch #6	Grant County
Grant County	Grant County Ditch #8	Grant County
Grant County	Grant County Ditch #9	Grant County
Grant County	Grant County Judicial Ditch #2	Grant County
Stevens County	Stevens County Ditch #1	Stevens County
Stevens County	Stevens County Ditch #7	Stevens County
Stevens County	Stevens County Ditch #8	Stevens County
Stevens County	Stevens County Ditch #15	Stevens County
Traverse County	Traverse County Ditch #1	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #2	Bois de Sioux Watershed District
Traverse & Grant Counties	Traverse County Ditch #4	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #7	Bois de Sioux Watershed District
Traverse & Stevens Counties	Traverse County Ditch #8	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #9	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #10	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #11	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #13	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #15	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #16	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #17	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #18	Bois de Sioux Watershed District

BENEFITTED LAND	DITCH SYSTEM NAME	DRAINAGE AUTHORITY
Traverse County	Traverse County Ditch #19	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #20	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #22	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #23	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #24	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #26	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #27	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #28	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #29	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #30	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #31	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #32	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #33	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #35	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #36	Bois de Sioux Watershed District
Traverse & Stevens Counties	Traverse County Ditch #37	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #38	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #39	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #40	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #41	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #42	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #43	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #44	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #46	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #48	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #50	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #51	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #52	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #53	Bois de Sioux Watershed District
Traverse County	Traverse County Ditch #55	Bois de Sioux Watershed District
Traverse & Grant Counties	Traverse County Judicial County Ditch #2	Bois de Sioux Watershed District
Traverse County	Traverse County Judicial County Ditch #3	Bois de Sioux Watershed District
Traverse & Wilkin Counties	Traverse County Judicial County Ditch #6	Bois de Sioux Watershed District
Traverse & Wilkin Counties	Traverse County Judicial County Ditch #7	Bois de Sioux Watershed District
Traverse & Wilkin Counties	Traverse County Judicial County Ditch #11	Bois de Sioux Watershed District

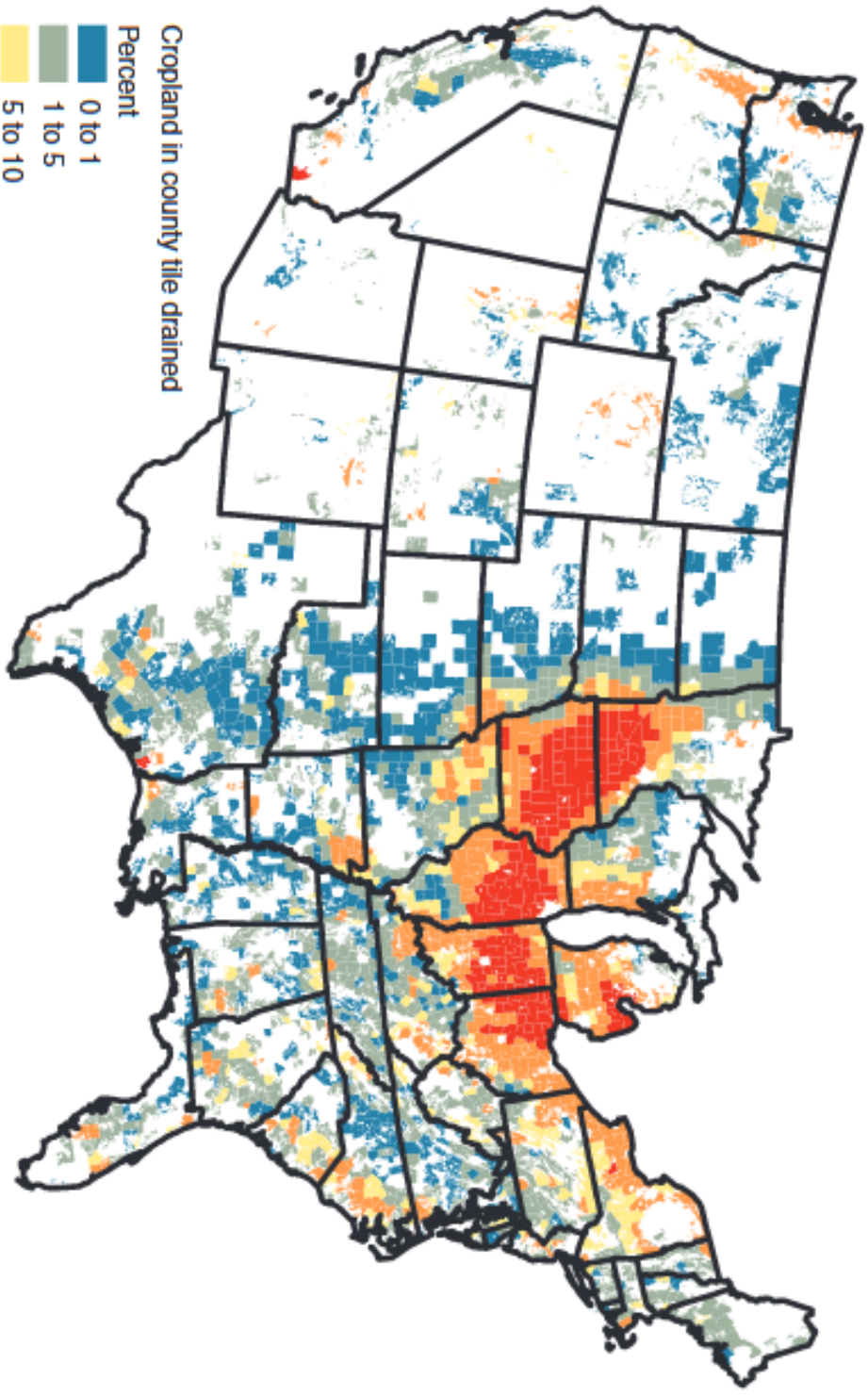
BENEFITTED LAND	DITCH SYSTEM NAME	DRAINAGE AUTHORITY
Grant, Traverse & Wilkin Counties	Traverse County Judicial County Ditch #12	Bois de Sioux Watershed District
Grant & Traverse Counties	Traverse County Judicial County Ditch #14	Bois de Sioux Watershed District
Traverse & Grant Counties	Bois de Sioux Ditch #3	Bois de Sioux Watershed District
Wilkin County	Wilkin County Ditch #Sub-1	Bois de Sioux Watershed District
Wilkin County	Wilkin County Ditch #8	Bois de Sioux Watershed District
Wilkin, Grant & Otter Tail Counties	Wilkin County Ditch #9	Bois de Sioux Watershed District
Wilkin County	Wilkin County Ditch #18	Bois de Sioux Watershed District
Wilkin County	Wilkin County Ditch #20	Bois de Sioux Watershed District
Wilkin County	Wilkin County Ditch #25	Bois de Sioux Watershed District
Wilkin County	Wilkin County Ditch #35	Bois de Sioux Watershed District
Wilkin County	Wilkin County Ditch #39	Bois de Sioux Watershed District

Public drainage systems may also act as an outlet for subsurface tile drainage, used to manage soil water levels. The Minnesota Department of Agriculture states (https://extension.umn.edu/agricultural-drainage/impact-agricultural-drainage-minnesota#drainage-water-management-1360360):

Poorly drained soils increase risks to agricultural production from excess water and high-water tables. Proper soil drainage improves agricultural production by:

> *Ensuring timely planting and field operations.*
> *Minimizing soil compaction and salt buildup.*
> *Promoting conditions for good seedbed establishment and germination.*
> *Minimizing high water table stresses to growing crops.*
> *Outyielding poorly drained soils*
> *Offering less year-to-year yield variability.*
> *Improving the opportunity to employ other conservation practices such as minimum tillage.*

Figure 3.16.4
Tile drainage is most common in regions that typically lack irrigation, 2012



Note: County boundaries are clipped to show only cropland to illustrate the relative extent of irrigation in different regions and the spatial concentration within the Western counties.
Source: USDA, Economic Research Service calculations based on data from USDA, National Agricultural Statistics Service, 2013 Census of Agriculture.

https://www.ers.usda.gov/webdocs/publications/93026/eib-208.pdf?v=9435.6

IMPOUNDMENTS

In 2012, the Bois de Sioux Watershed District Office completed a 20% Flow Reduction Strategy for the watershed. This study focused on placing seasonal flood water storage within the Bois de Sioux Watershed District. A total of 26 sites or potential projects were identified within the District. The water storage was placed in the Lake Traverse and Rabbit River basins. Site selection was based primarily on the need for local flood control as flooding problems are widespread in the Bois de Sioux Watershed District.

The Bois de Sioux Watershed District prioritizes development of specific impoundment projects based on need, local support, budget, and importance of other watershed projects and programs that require the time of district staff.

BOIS DE SIOUX RIVER WATERSHED – NORTH OTTAWA IMPOUNDMENT

The North Ottawa Impoundment is located within the Bois de Sioux Watershed District. The impoundment is southeast of Tintah, Minnesota in Sections 17, 18, 19, and 20 of North Ottawa Township in Grant County. The contributing drainage area includes about 60% of the watersheds of Judicial Ditch 2 and Judicial Ditch 12 in Grant and Ottertail Counties, which outlet into the Rabbit River about 5 miles and 10 miles downstream, respectively. The areas immediately downstream that receive local flood damage reductions are in Grant, Traverse, and Wilkin Counties. The diversion system collects water and conveys it safely to the impoundment. The primary function is to collect as much water as practical. A secondary consideration is to improve conditions within the upstream and downstream watershed areas. The existing ditches in this area are found to be inadequate. In many areas, ditches overflow on an annual basis – and, when water leaves the ditches, it flows over cultivated land which can cause severe erosion and downstream sedimentation.

An ac-ft is defined as one acre of land covered by one foot of water. There are 325,851 gallons in one ac-ft of water. Three ac-ft of water is about 1,000,000 gallons.

This project effectively controls the precipitation runoff from the 74 square mile drainage area, which is about 23% of the Rabbit River and 4% of Bois de Sioux drainage areas, respectively. The gate-controlled flood storage of 16,000 acre-feet is equivalent to 75% of the estimated 100-year spring runoff. The available summer flood storage of 12,000 acre-feet is sufficient to store all the runoff from a 100-year, 24-hour rainfall event. Floods exceeding the gate-controlled water storage capacity can also be effectively controlled with only minor discharges relative to inflows.

The North Ottawa Impoundment also provides numerous natural resource enhancements, including stream augmentation, reduction of Total Suspended Solids, and wildlife habitat. Once spring floodwaters have receded, agriculture is used in many of the interior cells. According to a study published in 2017 by the University of Minnesota conducted in the North Ottawa Impoundment, growing and harvesting a crop is a means to improve subsequent water quality – the harvested crop pulls excess phosphorous and nitrates out of the system (Guzner).

MUSTINKA RIVER WATERSHED – REDPATH IMPOUNDMENT PROJECT

The Redpath Impoundment Project, located in Redpath Twp. of Traverse County and Gorton Twp. of Grant County is a proposed floodwater impoundment facility that will bring flood risk reduction, water quality improvements, and natural resource enhancements to the Mustinka River Watershed, Rabbit River Watershed, Lake Traverse, Bois de Sioux River, and Red River of the North. This project also rehabilitates a significant reach (approximately 5 miles) of the Mustinka River which was channelized by the United States Army Corps of Engineers (USACE) in about 1950.

The project has an approximate footprint of 4 square miles, a contributing watershed of 212 square miles, a floodwater storage volume of 24,000 Ac-Ft (2.1 inches of runoff), and includes about 5 miles of rehabilitation of the Mustinka River.

FIELD-SCALE PROJECTS

There are many field-scale projects that affect the flow or quantity of surface water, or protect the quality of surface water. These improvements may be installed in-field, edge-of-field, or beyond the field. Although they may require permitting, field-scale projects may be installed and maintained by private landowners or public entities, with or without the help of soil and water conservation districts, county offices, and the watershed district office and include:

- *Bridges*
- *Buffers*
- *Channel Bank Vegetation*
- *Clearing and Snagging*
- *Cover Crops*
- *Constructed Wetlands*
- *Culverts & Culvert Traps*
- *Diversions*
- *Fencing*
- *Field Borders*
- *Field Windbreaks*
- *Filter Strips*
- *Grade Stabilization*
- *Grass Waterways*
- *Levees*
- *Lined Waterway or Outlet*
- *Mulching*
- *Obstruction Removal*
- *Pasture and Hayland Planting*
- *Pipelines*
- *Ponds*
- *Private Ditches*
- *Ring Dikes*
- *Runoff Management System*
- *Sediment Basins*
- *Shelterbelts*
- *Streambank and Shoreland Protection*
- *Stripcropping*
- *Subsurface Drains & Tile*
- *Terraces*
- *Tree/Shrub Establishment*
- *Underground Outlets*
- *Wastewater and Feedlot Runoff Controls*
- *Zoning/Ordinances*

PUBLIC WATER BUFFERS

For both the Bois de Sioux River and Mustinka River Watersheds, 50' riparian buffers were made mandatory and permanent on or before November 1, 2017 by state law. Some buffers were converted from agricultural production prior to the deadline, and some were legally required by shoreland zoning ordinances implemented at the county-level.

Engineer's Estimate of Public Waters Buffers		
	Bois de Sioux River Watershed	**Mustinka River Watershed**
Public Waters (Not Next to Roads)		
Miles	128.83	315
Width	100'	100'
Acres	1,561.6	3,821.8
Perimeter of Ponds, Lakes, Reservoirs		
Miles	378.7	69.6
Width	50'	50'
Acres	2,295.2	421.8
North Ottawa Impoundment		
Grassland Acres	484	
Wetland Acres – Sediment Sink	608	
Total Acres	**4,948.8**	**4,243.6**

PUBLIC DITCH BUFFERS

For both the Bois de Sioux River and Mustinka River Watersheds, 16.5' riparian buffers were made mandatory and permanent by state law on or before November 1, 2018 by state law. Some buffers were converted from agricultural production prior to the deadline, and some were acquired by legal drainage authorities under the legal requirements of benefit redetermination.

Engineer's Estimate of Public Ditch Buffers		
	Bois de Sioux River Watershed	**Mustinka River Watershed**
Public Ditch Buffers (Not Next to Roads)		
Miles	41.4	118.1
Width	33'	33'
Acres	165.6	472.4
Public Ditch Buffers (Next to Roads)		
Miles	185.3	183.9
Width	16.5'	16.5'
Acres	370.6	367.8
Total Acres	**536.2**	**840.2**

4 - HYDROGEOLOGY & GROUNDWATER

SURFICIAL AND BEDROCK GEOLOGY

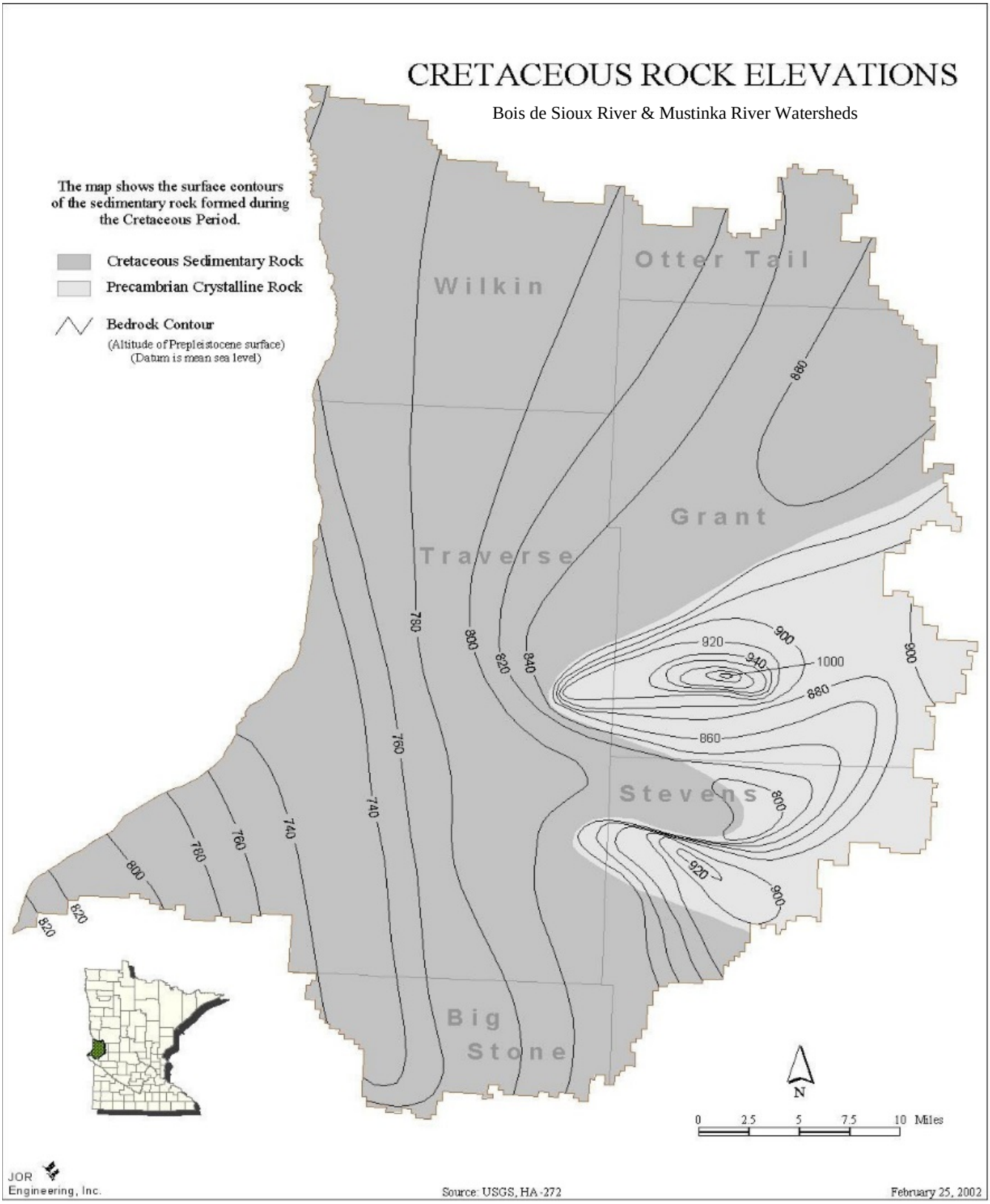
The County Geologic Atlas Program is a collaboration between MnDNR and Minnesota Geological Survey. This program will develop geology and hydrogeology maps and reports for Minnesota Counties. Atlas' have not been completed for the counties in the Bois de Sioux River or Mustinka Watersheds (with the exception of Otter Tail, who started the multi-year development process in 2019).

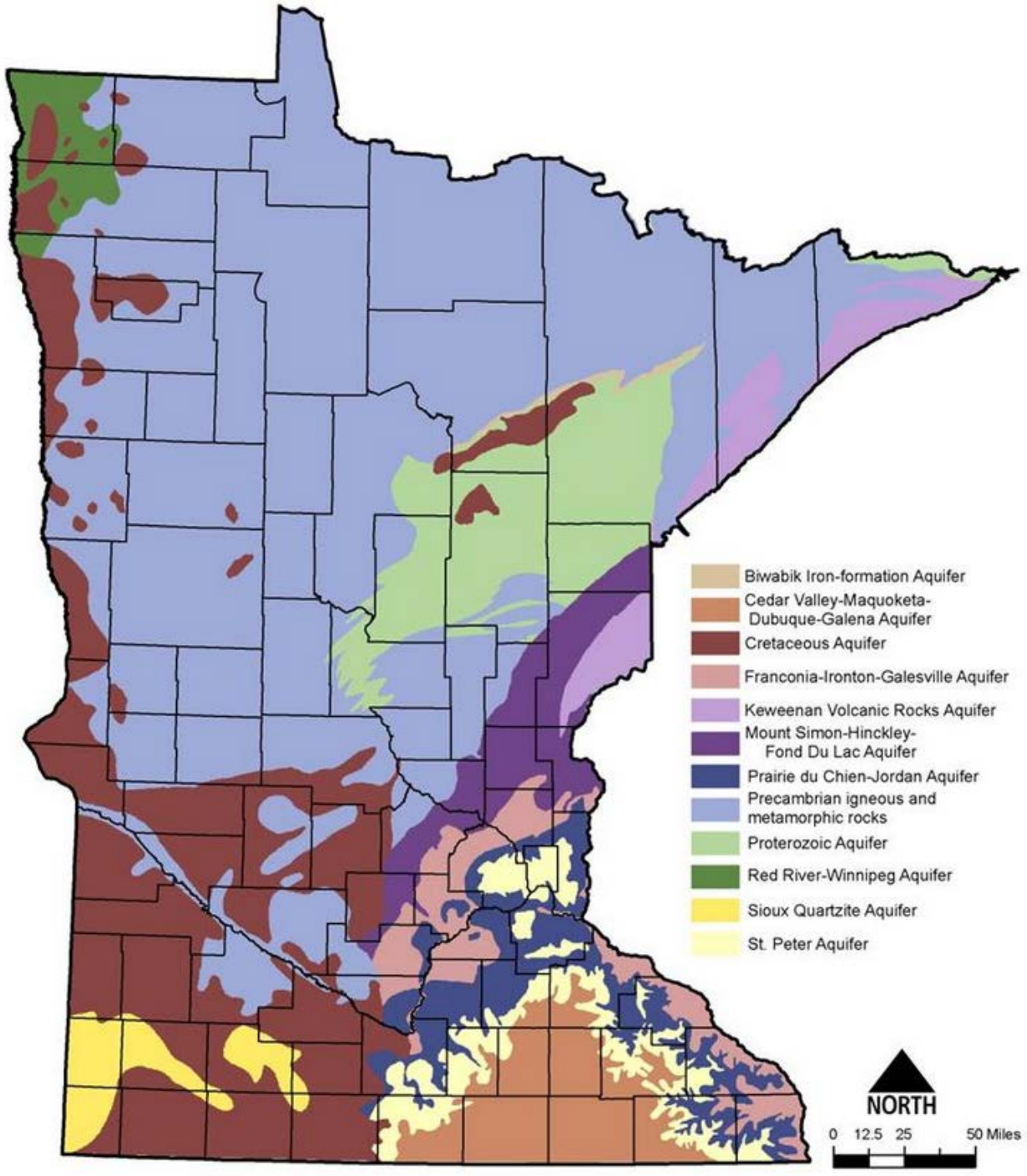
AQUIFERS & GROUNDWATER PROVINCES

Groundwater is an extremely important resource. All domestic water supplies, public and private, are drawn from groundwater, with the exception of the Breckenridge municipal water supply that uses the Otter Tail River as a backup. Groundwater has provided a reliable and relatively high-quality source of water for both domestic and livestock consumption. Irrigation has not been a major factor and significant development of irrigation is not anticipated.

Both watersheds are classified as Western Province, with a cretaceous bedrock. In a map of Minnesota Ground Water Provinces, the DNR states:

> *Western Province: Clayey glacial drift overlying Cretaceous and Precambrian bedrock. Glacial drift and Cretaceous bedrock contain limited extent sand and sandstone aquifers, respectively.*
>
> *Cretaceous Bedrock: Sandstone layers that are interbedded with thick layers of shale are used locally as water sources. Occurs beneath glacial drift but above older bedrock.*


CRETACEOUS ROCK ELEVATIONS
Bois de Sioux River & Mustinka River Watersheds
The map shows the surface contours of the sedimentary rock formed during the Cretaceous Period.
Cretaceous Sedimentary Rock
Precambrian Crystalline Rock
Bedrock Contour
(Altitude of Prepleistocene surface)
(Datum is mean sea level)
Wilkin
Otter Tail
Grant
Traverse
Stevens
Big Stone
880
900
920
940
1000
860
840
820
800
780
760
740
N
0 2.5 5 7.5 10 Miles
JOR Engineering, Inc.
Source: USGS, HA-272
February 25, 2002

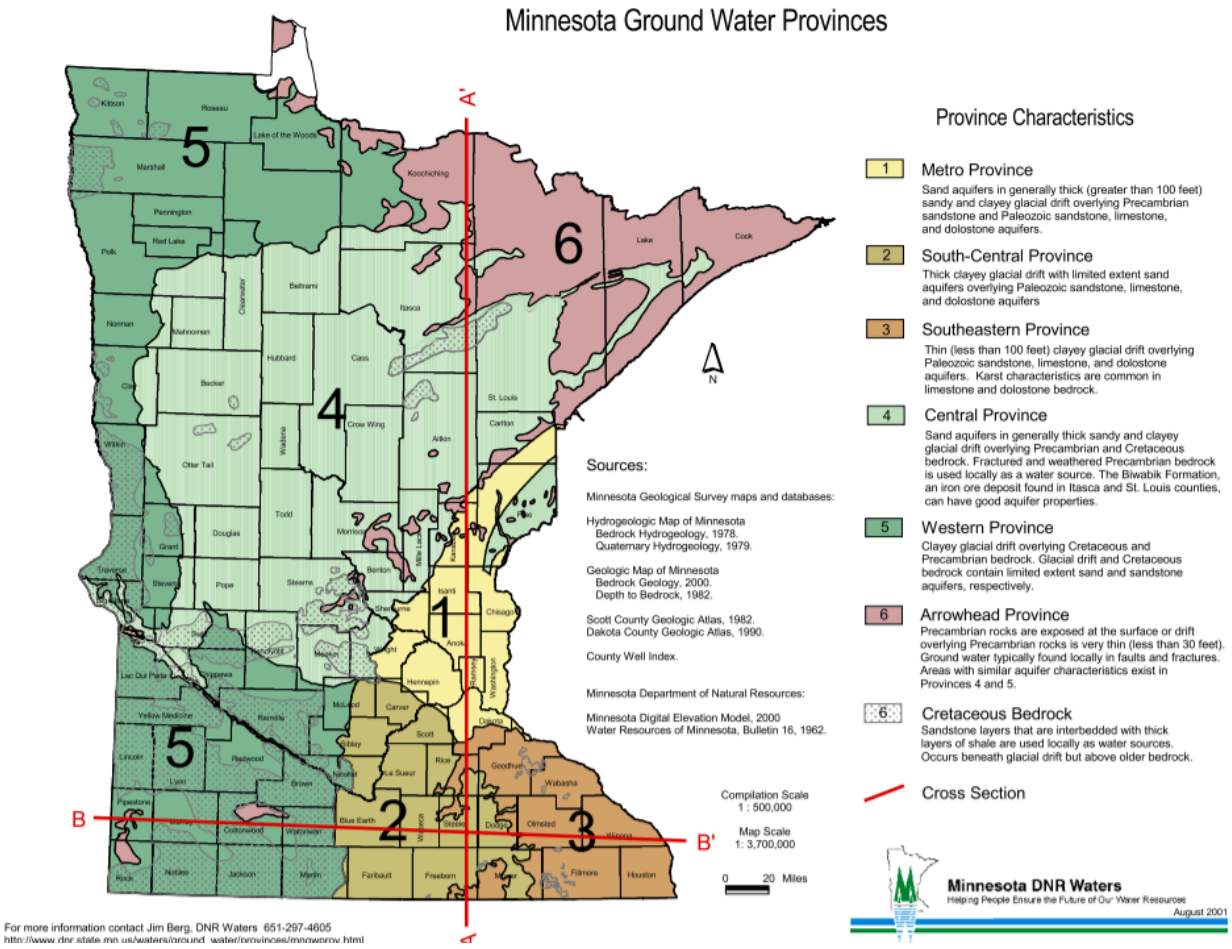


October, 2005

Sources: MGS (major aquifers from Minnesota's Bedrock Hydrogeology by Roman Kanivetsky, 1979; GIS data available at http://www.lmic.state.mn.us/chouse/metadata/hydqgeo.html), DNR (GIS data available at http://deli.dnr.state.mn.us/)

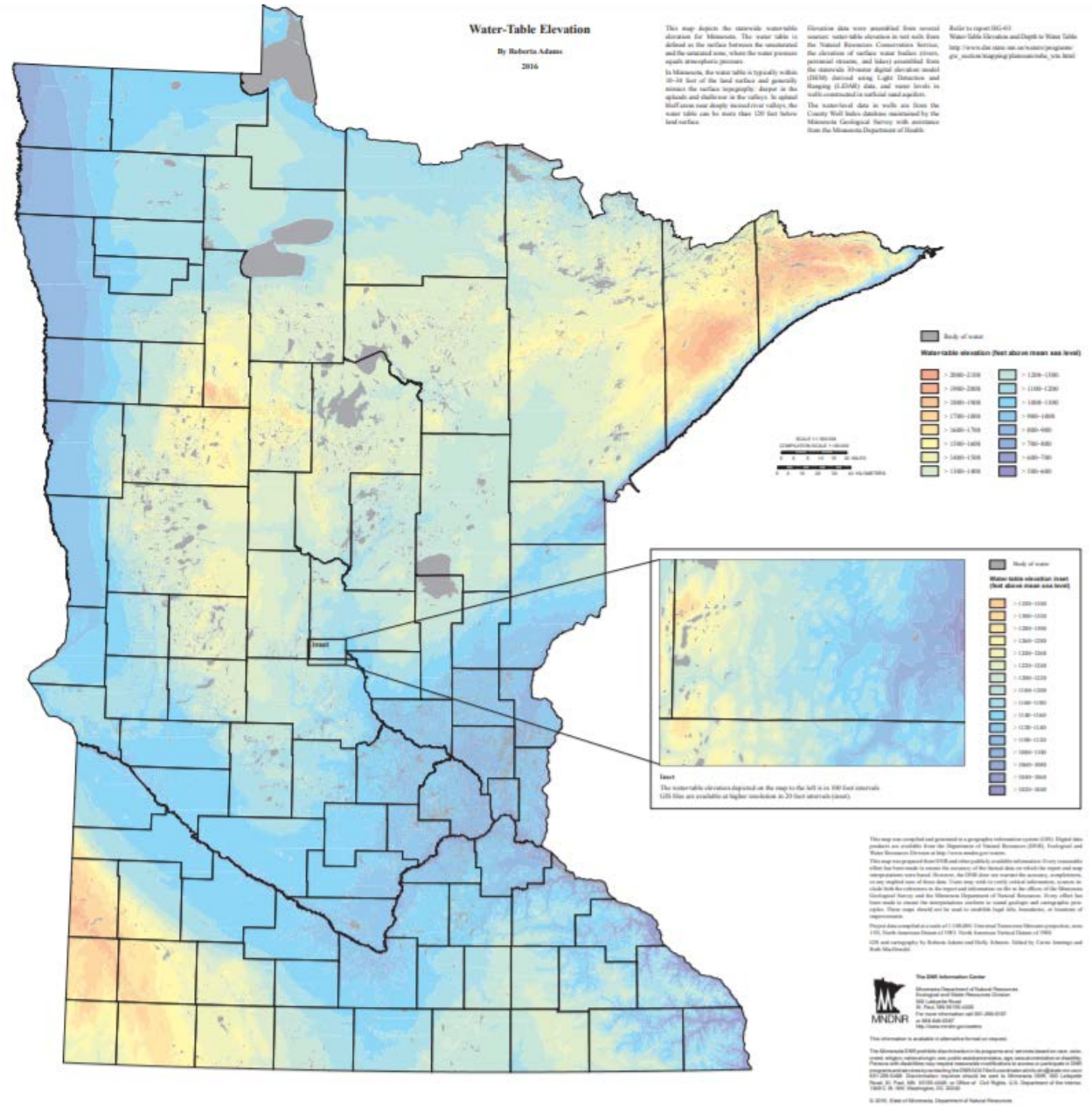
GROUNDWATER QUALITY & QUANTITY

Overall, the Western Province has moderate groundwater available in superficial sands and limited groundwater available in buried sands and bedrock.



https://www.dnr.state.mn.us/groundwater/provinces/index.html

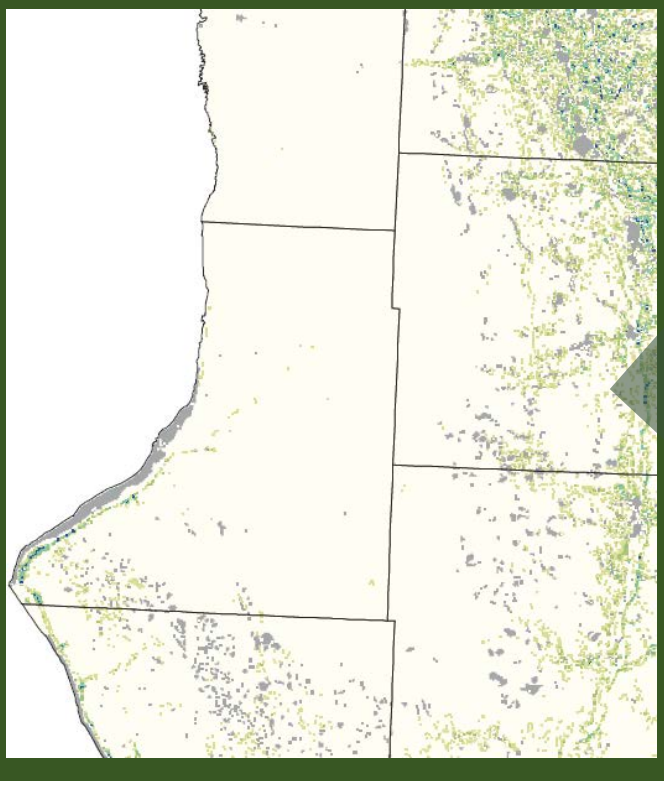
The Bois de Sioux River and Mustinka River Watersheds vary in water-table elevation from 1,100 – 1,200 feet above mean sea level. Per the DNR, "The water table is defined as the surface between the unsaturated and the saturated zone, where the water pressure equals atmospheric pressure."

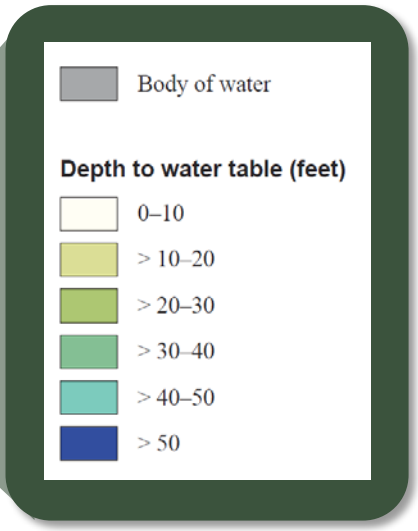


MINNESOTA HYDROGEOLOGY ATLAS

https://files.dnr.state.mn.us/waters/groundwater_section/mapping/mha/hg03_plate1.pdf

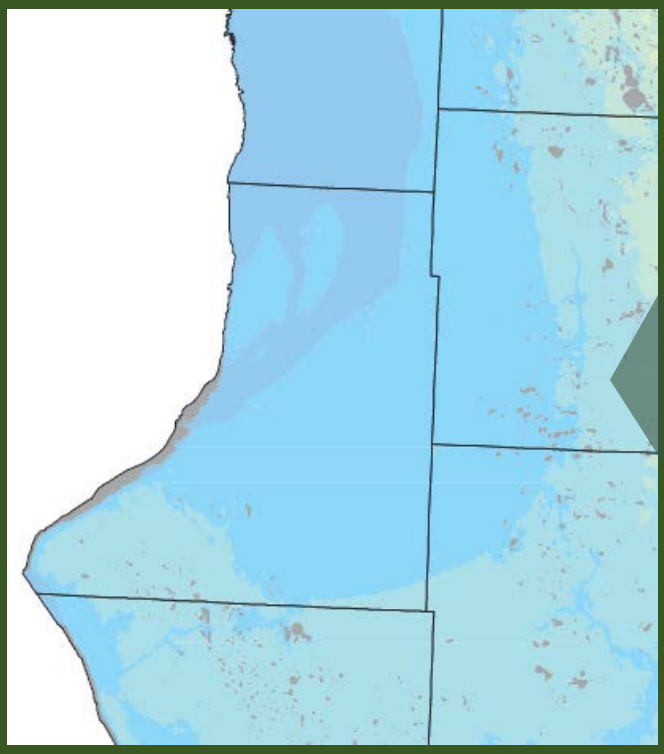
DEPTH TO WATER TABLE

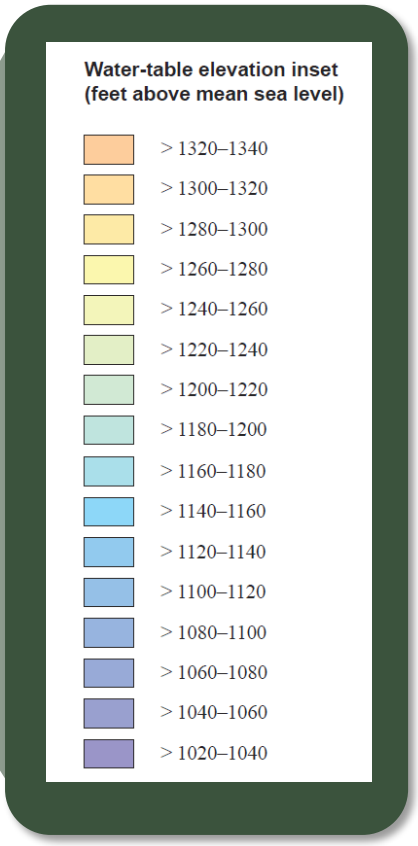




https://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/mha_wt.html

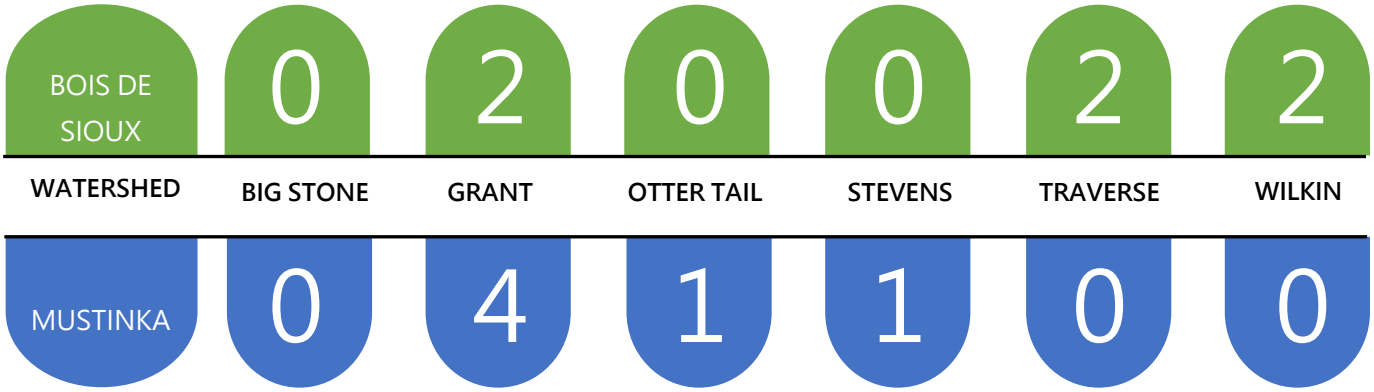
WATER TABLE ELEVATION





https://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/mha_wt.html

Since 1944, DNR Waters has managed a statewide network of water level observation wells. Data from these wells are used to assess ground water resources, determine long term trends, interpret impacts of pumping and climate, plan for water conservation, evaluate water conflicts, and otherwise manage water resources. Number of observation wells within each watershed is shown below. Locations, reports, and current activity can be found at: https://www.dnr.state.mn.us/waters/cgm/index.html

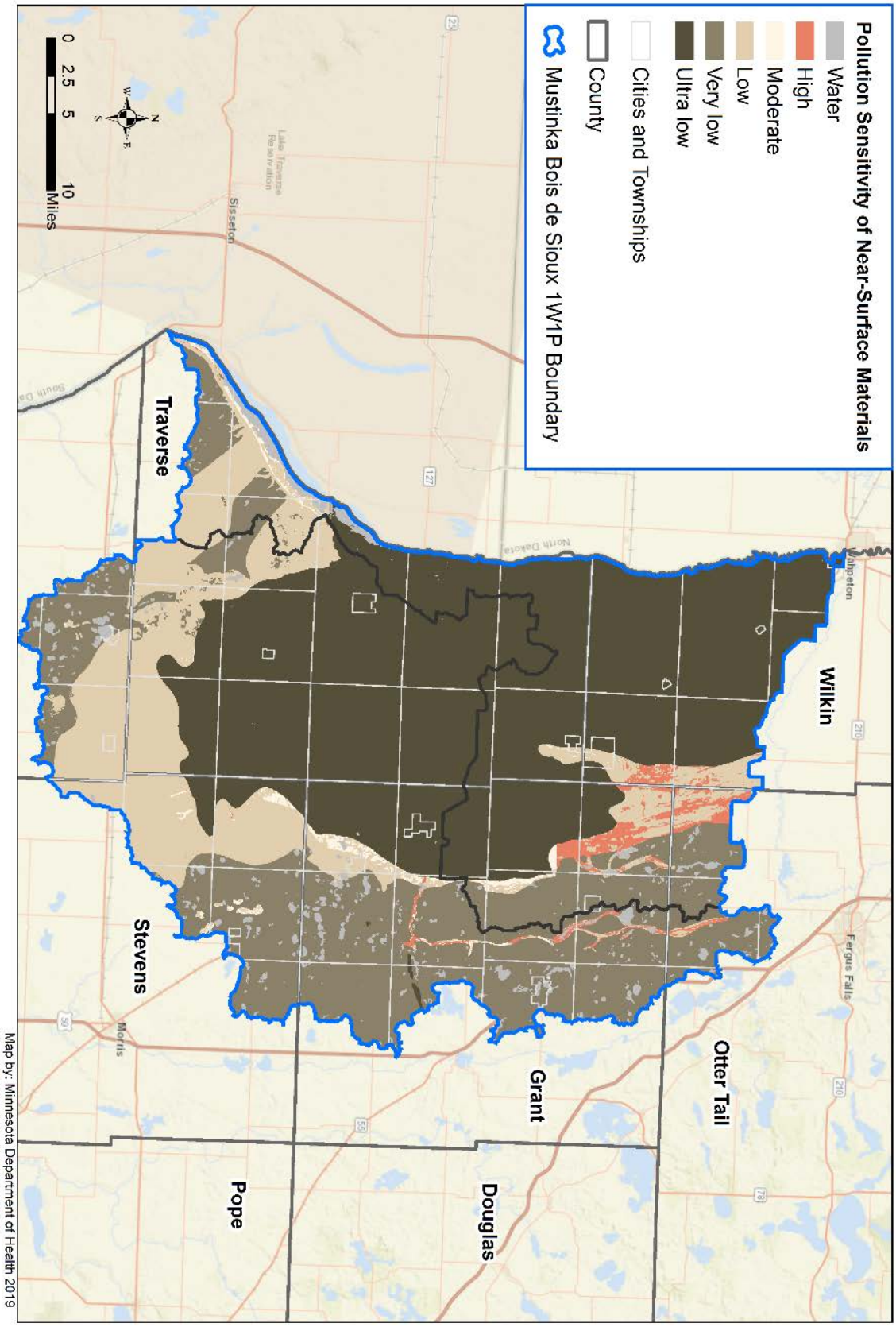


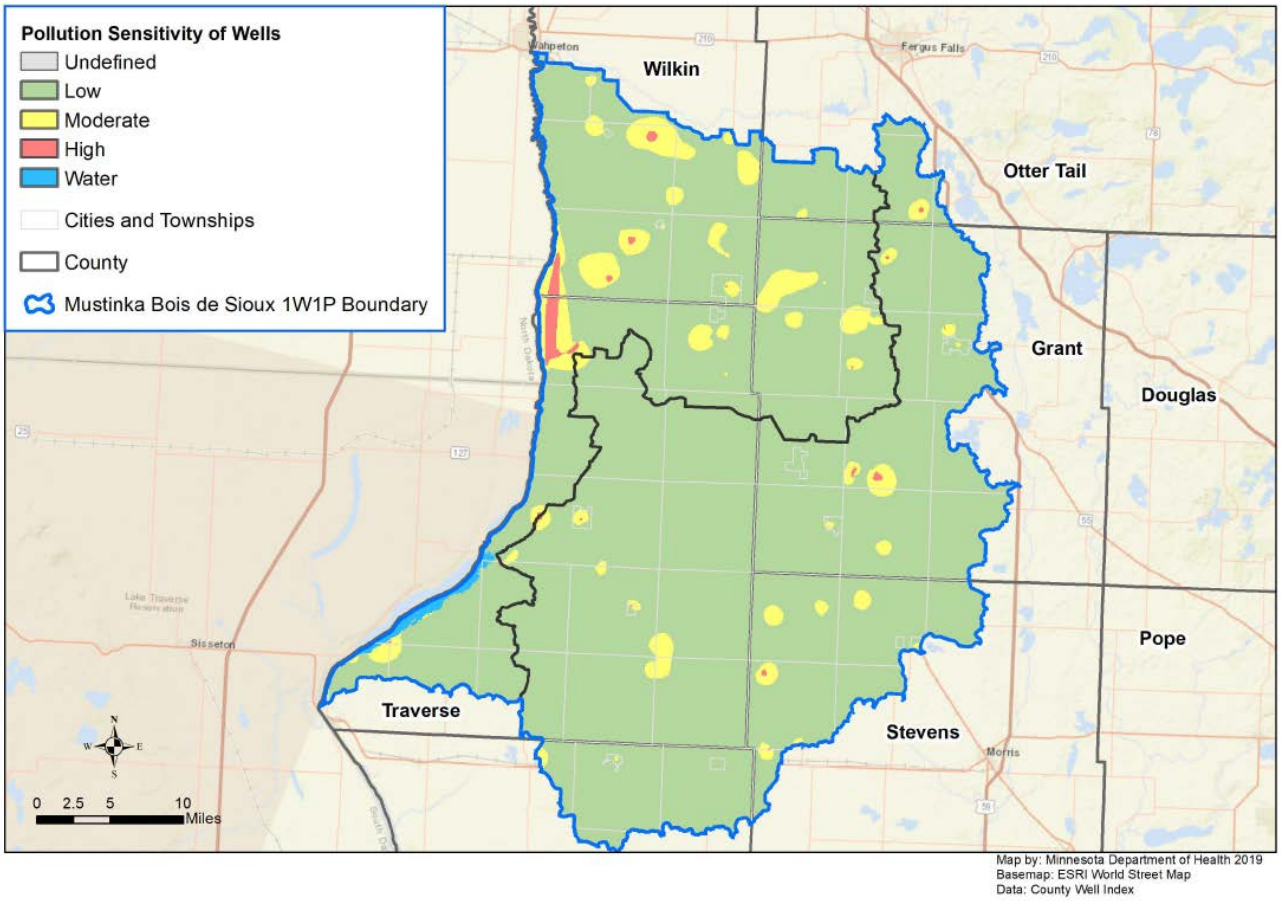
The Minnesota Department of Health monitors groundwater for arsenic levels. In a letter to the Bois de Sioux Watershed District dated March 26, 2019, the Minnesota Department of Health reported:

> *Approximately thirty percent of the 106 arsenic samples taken from wells in the Bois de Sioux-Mustinka Watershed have levels of arsenic higher than the Safe Drinking Water Act (SDWA) standard of 10 micrograms per liter (µg/L). Arsenic occurs naturally in rocks and soil and can dissolve into groundwater. Consuming water with low levels of arsenic over a long time (chronic exposure) is associated with diabetes and increased risk of cancers of the bladder, lungs, liver and other organs. The SDWA standard for arsenic in drinking water is 10 µg/L; however, drinking water with arsenic at levels lower than the SDWA standard over many years can still increase the risk of cancer. The EPA has set a goal of 0 µg/L for arsenic in drinking water because there is no safe level of arsenic in drinking water.*

PRIVATE WELLS - ARSENIC (2008 - 2018) – (includes areas outside of Bois de Sioux and Mustinka Watersheds)						
COUNTY	**# OF WELLS TESTED**	**# OF WELLS > 2ug/L**	**% OF WELLS > 2ug/L**	**# OF WELLS > 10ug/L**	**% OF WELLS > 10ug/L**	**MEDIAN ARSENIC VALUE**
BIG STONE	116	38	32.8	17	14.7	≤ 2.0
GRANT	187	138	73.8	64	34.2	5.9
OTTER TAIL	3368	1990	59.1	692	20.5	3
STEVENS	162	119	73.5	55	34	5.5
TRAVERSE	84	48	57.1	25	29.8	4.7
WILKIN	129	68	52.7	32	24.8	2.2

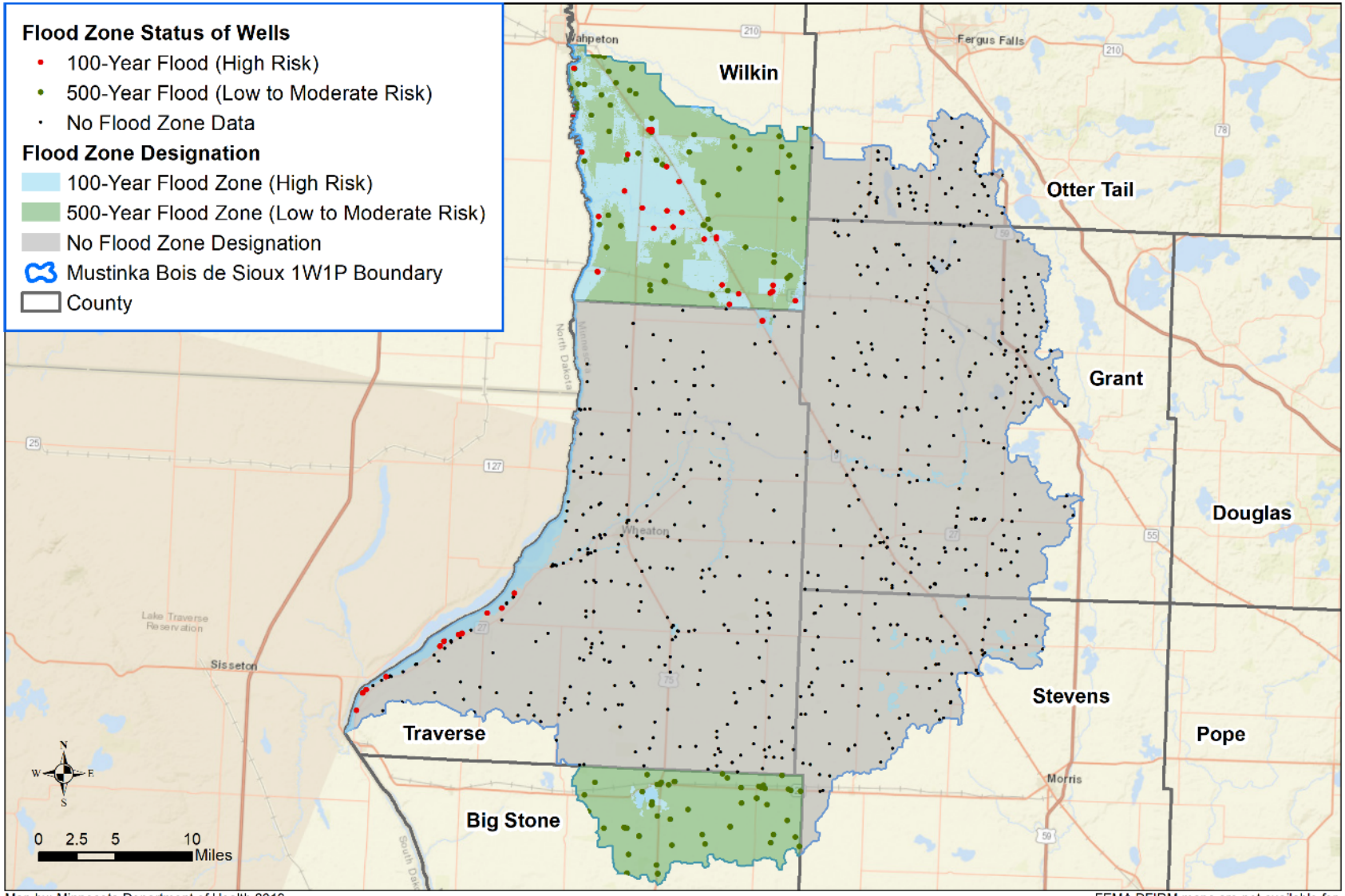
https://mndatamaps.web.health.state.mn.us/interactive/wells.html


Pollution Sensitivity of Near-Surface Materials
Water
High
Moderate
Low
Very low
Ultra low
Cities and Townships
County
Mustinka Bois de Sioux 1W1P Boundary
Traverse
Wilkin
Otter Tail
Grant
Douglas
Pope
Stevens
0 2.5 5 10 Miles
Map by: Minnesota Department of Health 2019
Basemap: ESRI World Street Map
Data: MNDNR Pollution Sensitivity



For a significant portion of the Bois de Sioux River and Mustinka Watersheds, the estimated vertical travel time of near-surface materials is more than a year, and could be a decade or more, due to thick, glacial Lake Agassiz sediment deposits. The DNR classifies groundwater pollution sensitivity for the Bois de Sioux River and Mustinka River Watersheds as “ultra low.” The clay-rich soil types protect groundwater resources from surface-level activities.

There are two primary concerns for groundwater contamination: abandoned and unsealed wells, and failing individual sewage treatment systems. Unsealed wells can act as a direct route to deep aquifers. Contaminants can also enter an aquifer through a buried well casing. The average cost of sealing an abandoned well is around $500.00. Failing sewage systems have the potential to transport harmful contaminants to shallow wells. Landowners are able to participate in cost-share opportunities to seal abandoned and unsealed wells.



Map by: Minnesota Department of Health 2019
Basemap: ESRI World Street Map
Data: County Well Index, FEMA Digital Flood Insurance Rate Map (DFIRM) Database

FEMA DFIRM maps are not available for Otter Tail, Grant, Stevens, and Traverse Counties. Any flood zone designations for these areas are based on unmodernized data.

The Minnesota Department of Health's assessment of drinking water wells and flood risk is limited by completed flood zone designations.

The Minnesota Department of Health oversees the protection of municipal drinking water resources, and has determined that the Drinking Water Supply Management Areas (DWSMAs) in both the Bois de Sioux River and Mustinka River Watersheds are at low vulnerability. Two jurisdictions (Graceville and Johnson) will begin their Well Head Protection Plan process after 2020.

DRINKING WATER SUPPLY MANAGEMENT AREAS					
NAME	COUNTY	WATERSHED	SUBWATERSHED	WELL HEAD PROTECTION PLAN?	VULNERABILITY
CAMPBELL	WILKIN	BOIS DE SIOUX RIVER	RABBIT RIVER	YES	LOW
TINTAH	TRAVERSE	BOIS DE SIOUX RIVER	JD 12	YES	LOW
WENDELL	GRANT	BOIS DE SIOUX RIVER	ASH LAKE	YES	LOW
DONNELLY*	STEVENS	MUSTINKA RIVER	UPPER E BRANCH TWELVE MILE CREEK	YES	LOW
DUMONT	TRAVERSE	MUSTINKA RIVER	W BRANCH TWELVE MILE CREEK	YES	LOW
GRACEVILLE	BIG STONE	MUSTINKA RIVER	CO DITCH 44 & W BRANCH TWELVE MILE CREEK	AFTER 2020	LOW
HERMAN	GRANT	MUSTINKA RIVER	NIEMACKL LAKES	YES	LOW
JOHNSON	BIG STONE	MUSTINKA RIVER	COUNTY DITCH 38	AFTER 2020	LOW
NORCROSS	GRANT	MUSTINKA RIVER	MUSTINKA RIVER DITCH	YES	LOW
WHEATON	TRAVERSE	MUSTINKA RIVER	EIGHTEEN MILE CREEK	YES	LOW

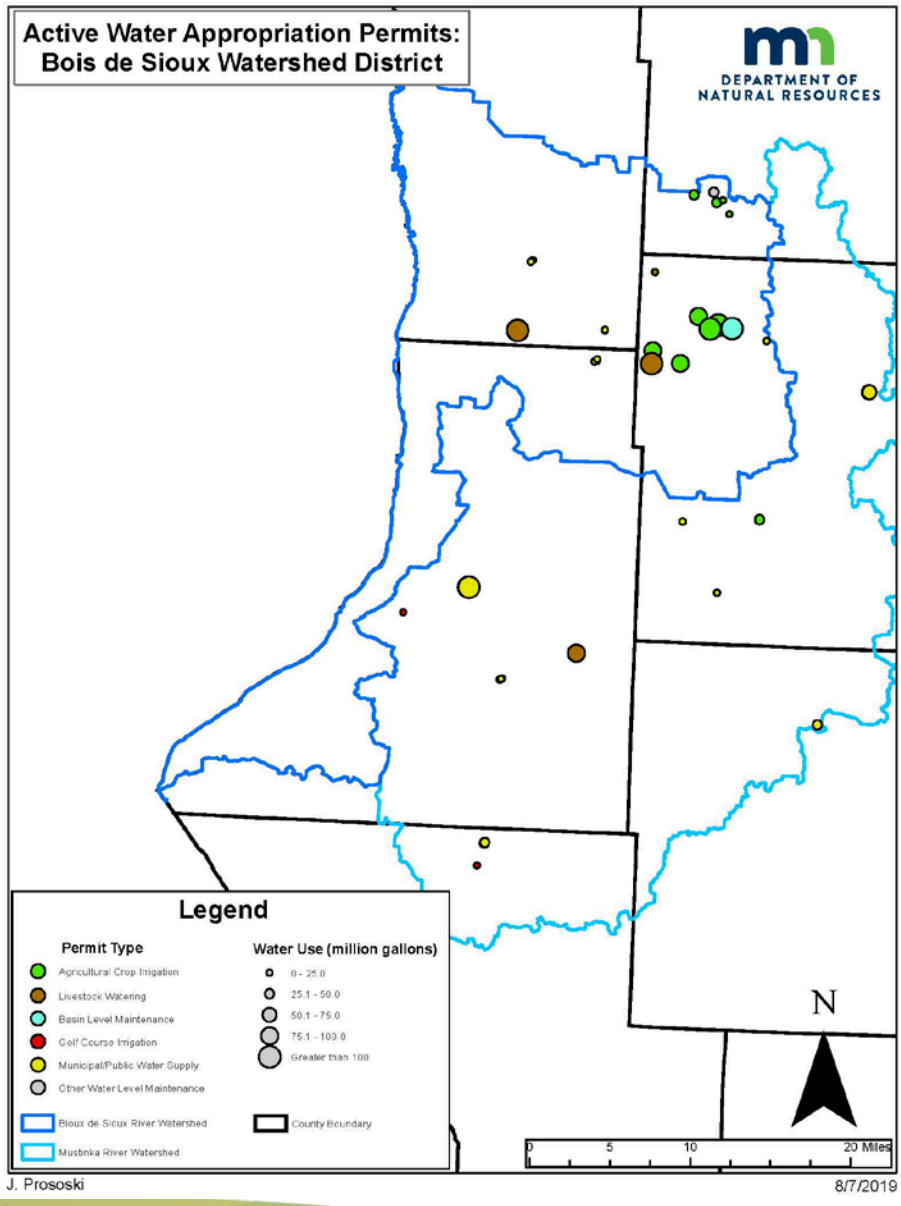
*PARTIALLY OUTSIDE WATERSHED

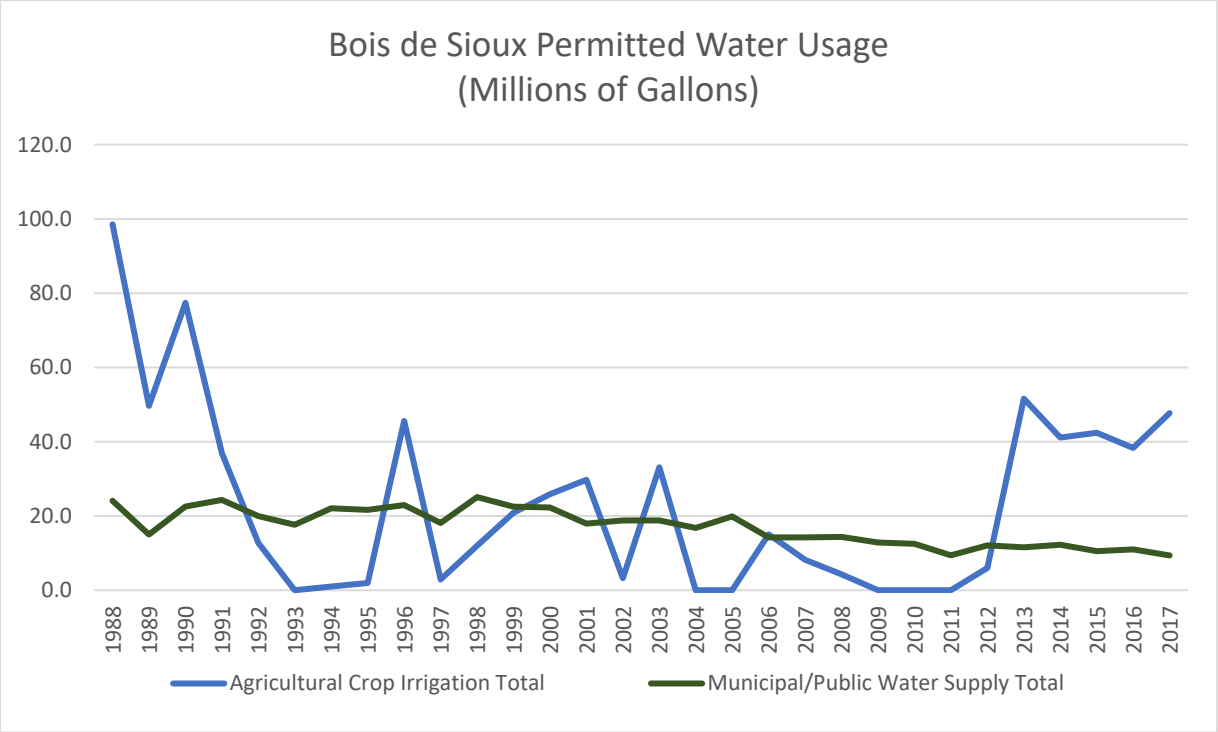
GROUNDWATER RECHARGE

In general, groundwater recharge occurs normally in the morainal areas and discharge occurs in the lake plain area. This is evidenced by a number of flowing wells in the lake plain and by the numerous springs that feed Lake Traverse.

Prepared in cooperation with MPCA, USGS developed a report entitled, "Potential Groundwater Recharge for the State of Minnesota Using the Soil-Water-Balance Model, 1996–2010." Continuous streamflow data was used from thirty-four Minnesota watersheds for the time period 1996−2010; this data was used for calibration of the Soil-Water-Balance (SWB) model. None of the thirty-four watersheds were located on the Red River. Authors evaluating the simulation state that:

> *Some of the lowest potential recharge rates for the simulation period (generally between 1.0 and 1.5 in/yr) were in the Red River of the North Basin of northwestern Minnesota. Not only is this the driest part of the State based on mean annual gross precipitation, but this area also has thick, clayey soils that are restrictive to infiltration… (Westenbroek, 2015).*



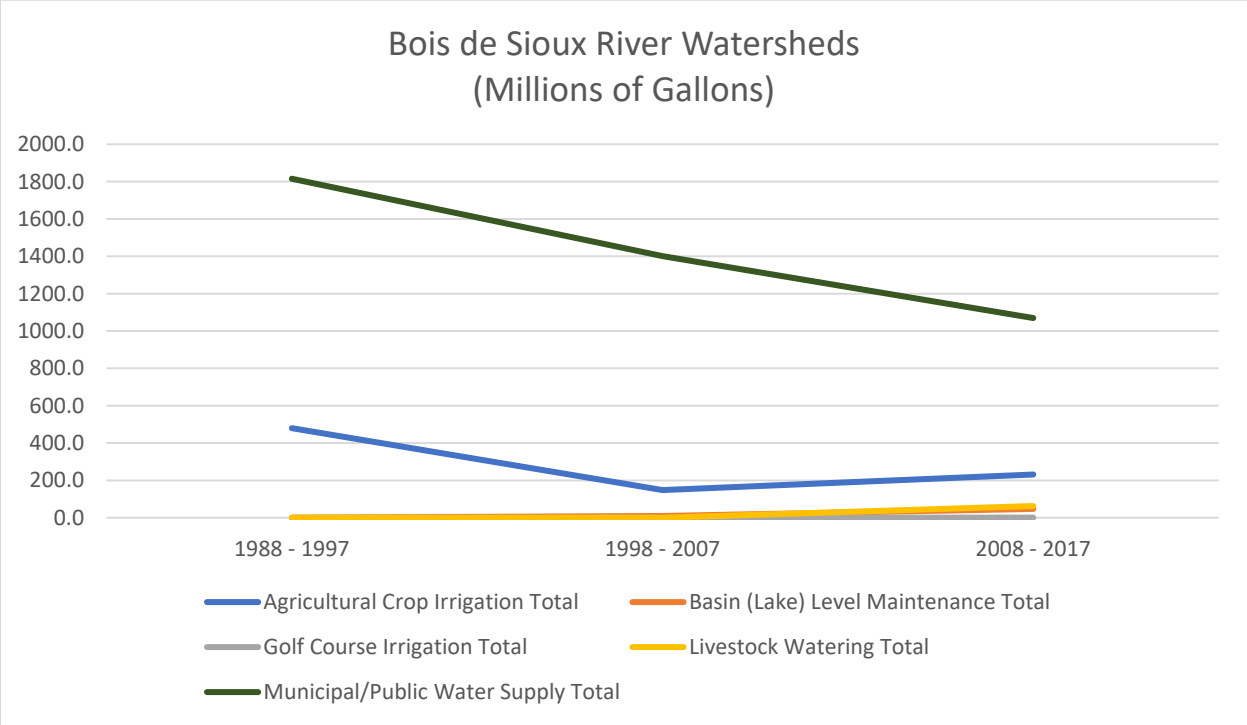


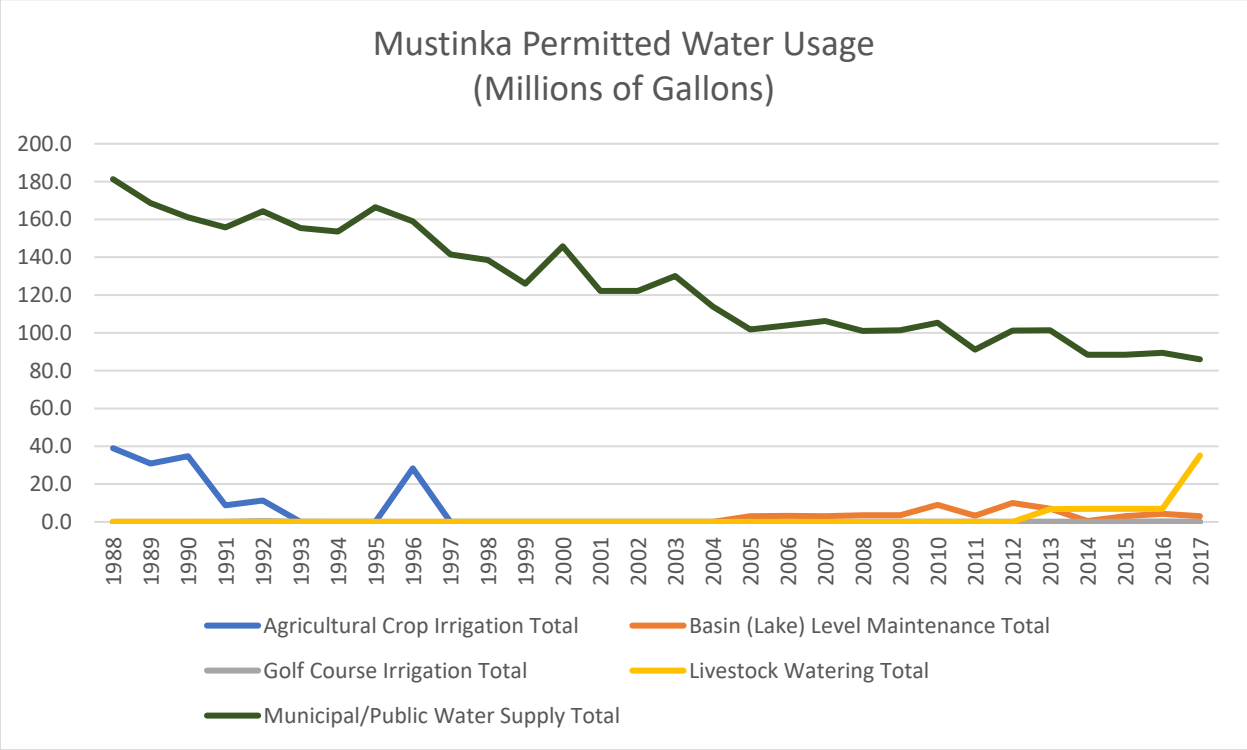
https://files.dnr.state.mn.us/waters/watermgmt_section/appropriations/mpars_index_permits_installations.xlsx, September 5, 2018

USE TYPE IN MILLIONS OF GALLONS	1988 – 1997	1998 - 2007	2008 - 2017
Agricultural Crop Irrigation	479.7	148.1	231.4
Basin (Lake) Level Maintenance	0.0	9.2	47.1
Golf Course Irrigation	0.5	0.0	0.7
Livestock Watering	0.0	0.0	62.6
Municipal/Public Water Supply	1,815.3	1,401.1	1,069.4

For both watersheds, based on DNR Groundwater Appropriations data:

> *Municipal/Public Water Supply water use has decreased 41%. Municipal systems include: Campbell, Nashua, Tintah, Wendell (Bois de Sioux River Watershed); Donnelly, Elbow Lake, Wheaton, Dumont, Herman, Graceville, Norcross (Mustinka River Watershed).*
> *Agricultural Crop Irrigation water use has decreased 52%.*
> *For 2017, there was only one livestock permit, granted in 2013.*


Bois de Sioux River Watersheds
(Millions of Gallons)
2000.0
1800.0
1600.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
1988 - 1997
1998 - 2007
2008 - 2017
Agricultural Crop Irrigation Total
Basin (Lake) Level Maintenance Total
Golf Course Irrigation Total
Livestock Watering Total
Municipal/Public Water Supply Total


Mustinka Permitted Water Usage
(Millions of Gallons)
200.0
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Agricultural Crop Irrigation Total
Basin (Lake) Level Maintenance Total
Golf Course Irrigation Total
Livestock Watering Total
Municipal/Public Water Supply Total

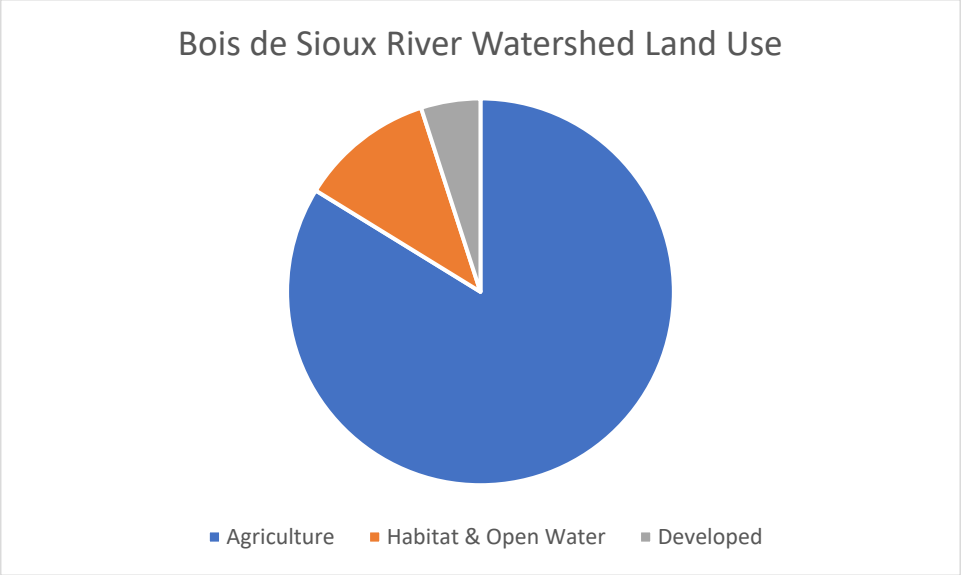
5 - LAND & OCCUPANTS

LAND USE

Land in the Bois de Sioux River and Mustinka River Watersheds is primarily used for agricultural purposes; economies are centered around agricultural products and services. The two watersheds are similar in cropping systems and land use mixes.

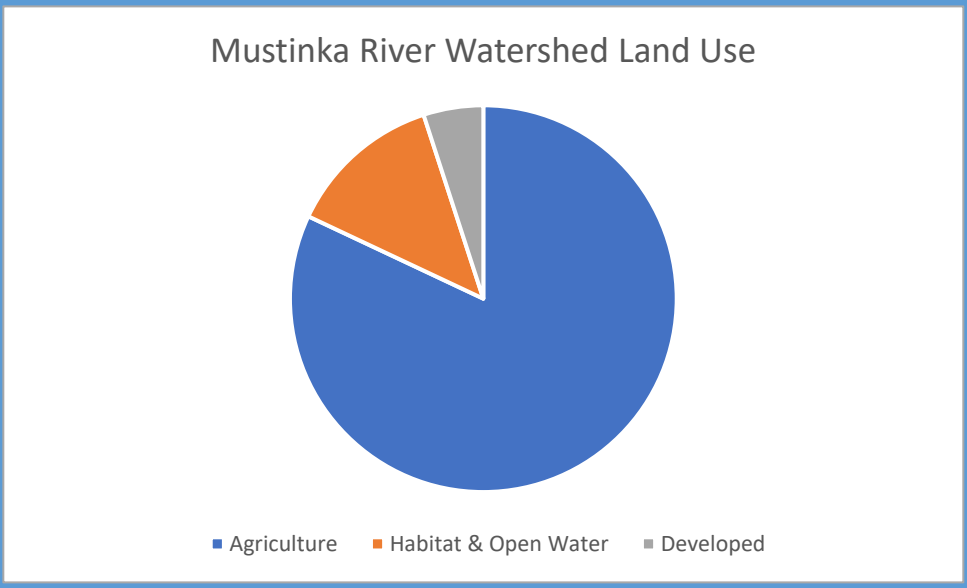
BOIS DE SIOUX RIVER WATERSHED

For 2015 - 2018, 84% of the Bois de Sioux River Watershed land was used for agricultural purposes (297,956 acres); urban development accounted for 5% of land use (17,683 acres); wetlands, grasslands, forests, and open water composed the remaining 11% (40,018 acres) (Service, 2019).



MUSTINKA RIVER WATERSHED

For 2015 - 2018, 82% of the Mustinka River Watershed land was used for agricultural purposes (451,226 acres); urban development accounted for 5% of land use (26,987 acres); wetlands, grasslands, forests, and open water composed the remaining 13% (72,217 acres). (Service, 2019).



AGRICULTURAL CROPS BY WATERSHED

BOIS DE SIOUX RIVER WATERSHED

The USDA provides annual crop data that can be narrowed to a specific region. Using the boundaries of the Bois de Sioux River Watershed resulted in data shown in the following pages; however, data was only available beginning 2006 (Service, 2019).

NOTEWORTHY:

> *Field corn production increased to 105,747 acres in 2013, and from that point through 2018, has remained above the average of 84,471 acres for years 2006 – 2012.*
>
> *Wheat production has decreased from 61,382 acres in 2006 to 33,928 acres in 2018.*
>
> *Sugarbeet production was down to 19,577 acres in 2017 & 19,020 acres in 2018 from a high of 29,578 acres during 2006 - 2018. No information for 2019 is available yet.*
>
> *"Grass/Pasture" decreased by 16,590 acres in 2011, but "Herbaceous Wetlands" increased by 15,302 acres.*

MUSTINKA RIVER WATERSHED

The USDA provides annual crop data that can be narrowed to a specific region. Using the boundaries of the Mustinka River Watershed resulted in data shown in the following pages; however, data was only available beginning 2006 (Service, 2019).

NOTEWORTHY:

> *Wheat production has decreased from 33,609 acres in 2006 to 18,501 acres in 2018.*
>
> *Sugarbeet production was down 2017 & 2018. No information for 2019 is available yet.*
>
> *"Grass/Pasture" decreased by 30,989 acres in 2011, but "Herbaceous Wetlands" increased by 28,402 acres.*

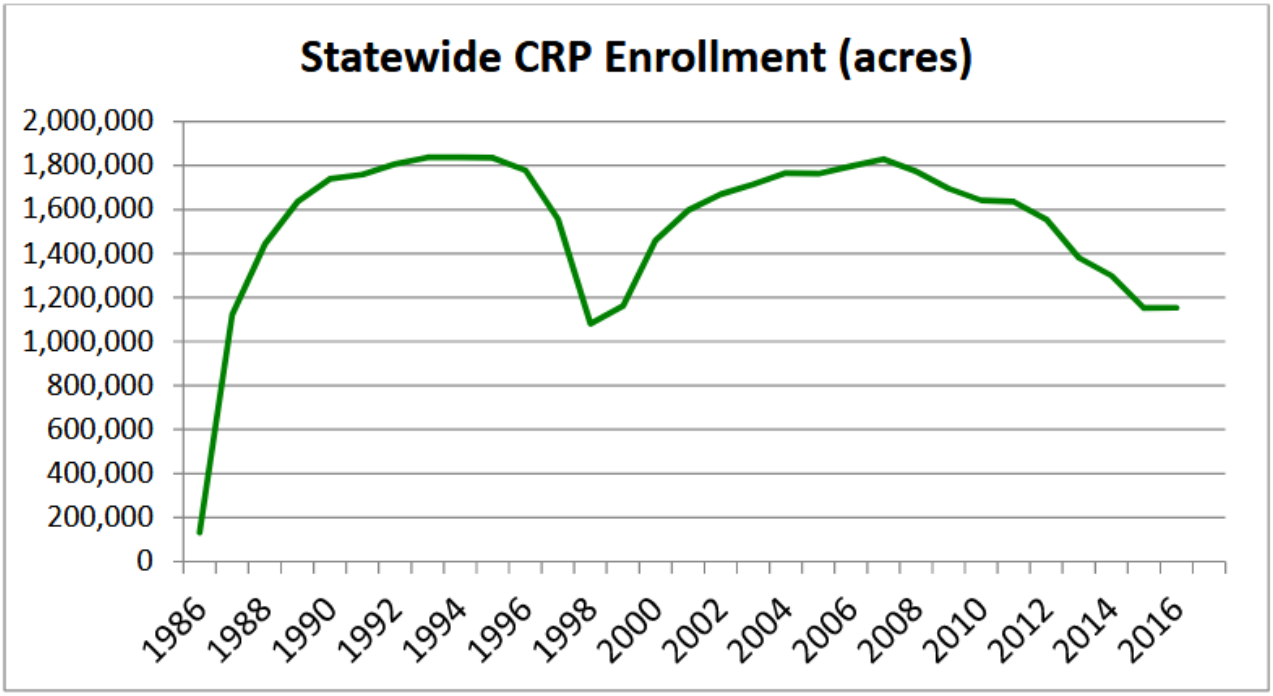
	BOIS DE SIOUX WATERSHED												
	2006 Acreage	2007 Acreage	2008 Acreage	2009 Acreage	2010 Acreage	2011 Acreage	2012 Acreage	2013 Acreage	2014 Acreage	2015 Acreage	2016 Acreage	2017 Acreage	2018 Acreage
1 - Corn	75,718.4	92,858.9	84,833.3	72,877.4	82,081.2	83,199.4	99,732.0	105,747.1	85,819.9	90,645.2	110,858.8	105,070.8	104,472.1
5 - Soybeans	122,197.4	114,738.0	120,165.8	128,708.9	128,821.0	136,490.0	119,077.7	122,276.4	145,689.8	135,618.7	120,753.2	136,663.7	136,621.0
6 - Sunflowers	578.1	265.0	1,184.9	3,333.5	2,337.8	214.6	273.1	346.0	231.1	1,387.3	1,202.0	1,762.5	1,796.9
21 - Barley	219.3	85.2	577.3	1,052.8	706.1		36.7	710.8	24.9	1,963.7	1,299.0	616.7	45.8
12, 21 - Sweet Corn	0.0	0.0	0.0	144.6	0.0	378.3	383.0	108.3	0.0	0.0	0.0	0.0	0.0
22, 23, 24 - Durum, Spring & Winter Wheat	61,382.4	55,090.7	62,873.5	54,325.7	48,834.4	49,227.1	44,400.4	34,499.8	35,764.2	39,096.8	34,853.0	31,109.2	33,928.1
27 - Rye		0.8	1.8	1.3	3.3			0.9		4.0	515.3	2.4	29.4
28 - Oats	7.7	9.3	11.3	15.6	16.7	6.9	14.2	7.6	2.7	221.7	13.6	22.0	70.1
29 - Millet	0.8						0.2			15.8		1.3	0.2
31 - Canola	5.4	1.5				0.2					2.7	0.7	53.8
32 - Flaxseed		0.8	0.2			0.2	0.9						0.2
36, 37 - Alfalfa & Other Hay/Non Alfalfa	1,374.7	1,127.5	999.6	1,022.4	962.0	1,383.9	1,372.6	1,073.2	1,628.6	1,139.8	2,103.2	2,150.1	1,774.5
39 - Buckwheat				28.5			0.9				1.6	10.0	4.2
4 - Sorghum		0.8	0.2	1.6			4.2		0.4				
41 - Sugarbeets	25,560.0	20,643.9	25,373.0	27,709.3	27,306.3	22,753.0	26,769.9	29,578.7	25,830.0	27,162.2	25,429.7	19,577.4	19,020.3
42 - Dry Beans	359.6	95.3	388.3	1,019.7	825.1	158.3	1,978.0	249.3	126.5	79.6	383.0	612.3	101.0
43 - Potatoes			0.4	3.6			1.6	1.3		0.4	0.9	0.2	
44 - Other Crops	0.8			8.0	2.2	0.4		0.7	0.2			11.3	13.3
53 - Peas	3.9	7.7						0.2	139.0	190.4	199.3	122.3	25.1
241 - Dbl Crop Corn/Soybeans			4.4		0.2								
TOTAL CROPPED ACRES	287,408.5	284,925.4	296,414.0	290,252.9	291,896.3	293,812.3	294,045.4	294,600.3	295,257.3	297,525.6	297,615.3	297,732.9	297,956.0
PERCENTAGE CROPPED	81%	80%	83%	82%	82%	83%	83%	83%	83%	84%	84%	84%	84%
58 - Clover/Wildflowers		0.8	0.2		0.2		23.8		0.2				0.9
59 - Sod/Grass Seed			2.7	19.1	0.2	1.6		10.7	4.9	0.2	7.1	6.0	2.7
60 - Switchgrass								0.2				12.0	0.9
61 - Fallow/Idle Cropland		229.4	499.5	3,713.3	95.9	4.7	16.7	7.1	159.2	81.8	19.3	336.7	138.3
63 - Forest		0.8			9.8								
70 - Christmas Trees		0.8											
87 - Wetlands	533.9	674.2			667.2								
111 - Open Water	10,810.9	10,845.8	10,502.8	10,723.0	11,057.9	10,931.8	11,060.1	11,193.3	11,347.2	11,238.5	10,855.7	10,424.3	10,901.1
131 - Barren	21.7	124.8	12.0	75.8	38.5	20.2	87.4	65.2	42.0	25.8	24.9	16.2	74.5
141 - Deciduous Forest	2,892.0	3,755.3	2,727.9	2,769.9	2,827.7	2,696.8	2,656.1	2,535.1	3,283.2	3,612.6	3,778.0	3,966.2	2,458.1
142 - Evergreen Forest	7.7	2.3	10.7	2.4	7.8	12.2	1.3	10.5	9.1	0.2	22.9	4.0	20.2
143 - Mixed Forest	0.8	0.8		0.7									0.7
152 - Shrubland	3.1	7.0	7.8	4.2	1.1	2.9	7.3	0.4	10.7	2.0	0.2	1.1	30.7
176 - Grass/Pasture	11,123.2	3,591.0	12,093.6	13,551.2	19,311.9	2,721.7	2,327.4	1,768.3	2,607.1	3,351.3	3,360.8	2,968.5	3,674.2
190 - Woody Wetlands	1,215.1	779.6	800.4	768.6	768.8	920.0	1,027.9	1,094.4	941.4	1,219.2	722.8	854.7	1,027.0
195 - Herbaceous Wetlands	15,696.0	23,488.7	14,571.3	16,073.4	11,293.4	26,595.5	26,328.0	26,191.0	23,771.3	20,656.5	21,428.6	21,810.5	21,689.0
TOTAL HABITAT ACRES	42,304.4	43,501.3	41,228.9	47,701.6	46,080.4	43,907.4	43,536.0	42,876.2	42,176.3	40,188.1	40,220.3	40,400.2	40,018.3
PERCENTAGE HABITAT	12%	12%	12%	13%	13%	12%	12%	12%	12%	11%	11%	11%	11%
82 - Developed	1.5												
121 - Developed/Open Space	23,578.5	24,893.6	15,689.3	15,337.7	15,240.7	15,984.8	15,750.7	16,114.9	15,787.6	15,938.1	15,523.6	15,333.7	15,326.8
122 - Developed/Low Intensity	2,162.8	2,048.1	2,013.8	2,028.2	2,137.7	1,667.3	2,010.4	1,774.9	2,016.0	1,651.1	1,915.0	1,781.2	1,993.3
123 - Developed/Medium Intensity	218.5	291.4	270.7	297.8	268.7	256.6	284.2	260.4	373.0	299.1	320.2	373.2	306.0
124 - Developed/High Intensity	8.5	23.2	36.0	34.9	33.4	28.5	30.5	30.2	46.7	55.2	62.5	35.8	56.5
TOTAL DEVELOPED ACRES	25,969.8	27,256.3	18,009.8	17,698.6	17,680.5	17,937.2	18,075.8	18,180.4	18,223.3	17,943.5	17,821.3	17,523.9	17,682.6
PERCENTAGE DEVELOPED	7%	8%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
TOTAL ACRES	355,682.7	355,683.0	355,652.7	355,653.1	355,657.2	355,656.9	355,657.2	355,656.9	355,656.9	355,657.2	355,656.9	355,657.0	355,656.9

	MUSTINKA WATERSHED												
	2006 Acreage	2007 Acreage	2008 Acreage	2009 Acreage	2010 Acreage	2011 Acreage	2012 Acreage	2013 Acreage	2014 Acreage	2015 Acreage	2016 Acreage	2017 Acreage	2018 Acreage
1 - Corn	185,125.4	225,134.2	185,618.4	188,848.4	185,092.2	192,972.5	216,997.1	284,915.7	187,361.7	199,382.8	210,629.1	204,380.2	195,477.3
4 - Sorghum				2.0			0.2	1.3	4.0				1.1
5 - Soybeans	206,734.4	166,474.1	216,416.0	195,452.4	207,403.5	220,159.1	190,750.6	185,701.1	229,044.2	213,115.5	203,740.0	215,827.1	220,982.9
6 - Sunflowers	990.4	698.2	1,478.9	4,938.1	6,878.0	142.1	1,937.9	1,259.9	1,795.2	3,895.7	3,922.8	1,778.9	1,095.3
12 - Sweet Corn			0.2	0.7	0.2	13.6	5.6	2.0	0.7	12.5			
21 - Barley	115.5	0.8	16.7	168.8	117.4	106.7	707.7	9.8	58.5	72.9	133.0	77.6	85.7
22, 23, 24 - Durum, Spring & Winter Wheat	33,609.9	28,661.3	35,175.0	37,840.2	29,052.9	23,734.0	17,850.2	11,999.7	17,026.8	19,401.2	17,730.5	14,211.2	18,501.0
27 - Rye	2.3	2.3	0.2	2.2	0.9		5.8		0.4		47.4	21.8	188.4
28 - Oats	33.3	23.2	20.7	50.3	28.5	6.9	19.3	5.1	174.8	147.0	38.7	66.5	100.1
29 - Millet										0.2		18.9	0.7
31 - Canola	1.5	0.8			0.7		5.3				3.3		28.2
32 - Flaxseed							29.8						
36, 37 - Alfalfa & Other Hay/Non Alfalfa	3,683.2	3,439.9	3,318.5	3,171.8	2,437.2	3,673.3	2,349.6	2,626.0	3,216.8	2,639.1	3,819.0	4,578.5	4,733.7
39 - Buckwheat			0.9	13.8			0.2	0.4	3.6		4.2	18.0	8.7
41 - Sugarbeets	9,152.6	7,041.7	6,831.7	8,129.6	7,144.2	4,351.2	10,375.6	8,155.0	7,374.4	9,235.8	8,586.7	7,180.2	8,554.4
42 - Dry Beans	1,499.5	619.9	1,732.7	2,064.7	3,101.5	443.9	3,293.0	1,578.3	1,362.4	2,351.8	2,684.3	2,764.4	1,388.9
43 - Potatoes		24.0	0.9	10.9			1.3	1.8	1.3	5.8		0.7	
44 - Other Crops			2.0	21.8	2.2	0.4	1.3	4.4	0.2	1.3		1.8	62.9
47 - Misc Vegs & Fruits	1.5	2.3											
53 - Peas	12.4	9.3	0.2				16.0	2.7	281.1	6.4	17.3	3.3	6.4
241 - Dbl Crop Corn/Soybeans			20.7		64.5								
205 - Triticale (Hybrid of Wheat & Rye)													8.9
TOTAL CROPPED ACRES	441,961.9	432,132.0	450,638.7	440,715.7	441,328.9	445,603.7	444,352.5	446,263.2	447,706.1	450,218.0	451,356.3	450,929.1	451,225.6
PERCENTAGE CROPPED	80%	79%	82%	80%	80%	81%	81%	81%	81%	82%	82%	82%	82%
57 - Herbs						0.7							
58 - Clover/Wildflowers	0.8						3.8	2.7					2.7
59 - Sod/Grass Seed			3.6	4.4	0.4	1.1	2.2	0.9		0.2	0.7	2.4	2.9
60 - Switchgrass									4.9			11.8	1.3
61 - Fallow/Idle Cropland		128.6	18.2	871.8	265.3	13.8	65.2	64.3	108.3	459.0	4.4	1,015.2	870.5
63 - Forest		11.6			89.6								
70 - Christmas Trees	3.3	3.1											
87 - Wetlands	544.8	1,151.5			2,398.7								
111 - Open Water	17,372.2	17,944.9	16,987.6	17,039.2	17,334.8	17,685.7	17,177.3	17,077.0	17,843.6	18,314.2	17,322.1	17,172.4	17,660.6
131 - Barren	22.5	97.6	74.1	102.7	79.0	38.7	164.1	157.0	84.5	91.4	65.2	56.5	109.2
141 - Deciduous Forest	5,054.0	6,421.0	4,977.0	4,895.1	5,122.6	5,028.1	5,129.3	4,930.0	5,153.1	5,424.0	5,459.6	5,673.1	4,708.8
142 - Evergreen Forest	26.3	10.8	24.5	21.8	19.8	7.3	14.5	31.6	10.9	1.8	6.7	3.6	42.5
143 - Mixed Forest	4.6	2.3			1.1	0.2	2.4	0.7	6.0		0.2		0.2
152 - Shrubland	10.8	13.2	5.3	14.7	2.0	6.4	9.3	3.8	2.9	17.3	2.4	1.8	21.8
176 - Grass/Pasture	19,320.4	5,827.4	20,042.7	24,442.5	35,195.3	4,206.1	4,346.5	3,539.9	4,911.6	4,399.9	3,899.9	3,862.1	4,773.7
190 - Woody Wetlands	882.6	431.6	317.1	419.2	342.3	431.0	375.2	452.6	330.0	420.5	406.1	315.8	431.0
195 - Herbaceous Wetlands	25,636.7	44,789.7	29,977.2	36,027.2	21,461.1	49,863.3	51,254.2	50,334.4	46,517.0	43,695.7	44,730.7	44,613.0	43,601.4
TOTAL HABITAT ACRES	68,947.0	76,833.3	72,427.3	82,838.6	82,312.0	77,282.4	78,544.0	76,594.3	74,972.8	72,824.0	71,898.0	72,727.7	72,216.6
PERCENTAGE HABITAT	13%	14%	13%	15%	15%	14%	14%	14%	14%	13%	13%	13%	13%
121 - Developed/Open Space	36,385.7	38,435.3	24,709.4	24,143.6	23,805.1	25,091.2	24,897.1	25,001.2	24,741.2	24,838.4	24,350.4	23,971.3	24,152.9
122 - Developed/Low Intensity	2,625.4	2,362.0	1,906.8	2,013.1	2,320.0	1,894.4	2,005.6	1,956.2	2,171.2	1,837.9	2,089.6	1,975.8	2,045.6
123 - Developed/Medium Intensity	424.7	533.9	638.9	644.9	546.9	450.3	520.6	507.9	703.2	590.7	610.0	700.1	652.5
124 - Developed/High Intensity	68.2	116.2	115.6	75.8	121.4	107.2	109.4	106.1	135.0	120.3	145.2	125.4	136.3
TOTAL DEVELOPED ACRES	39,504.0	41,447.4	27,370.7	26,877.4	26,793.4	27,543.1	27,532.7	27,571.4	27,750.6	27,387.3	27,175.2	26,772.6	26,987.3
PERCENTAGE DEVELOPED	7%	8%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
TOTAL ACRES	550,412.9	550,412.7	550,431.7	550,431.7	550,429.3	550,429.2	550,429.2	550,429.5	550,429.5	550,429.3	550,429.5	550,429.4	550,429.5

FEDERAL CONSERVATION PROGRAMS

The USDA offers a variety of voluntary conservation programs, focusing on agricultural lands and practices. The programs are described in the 2019 Agricultural Resources and Environmental Indicators Report:

The **Conservation Reserve Program (CRP)** generally provides 10- to 15-year contracts to remove land from agricultural production. The latest acreage cap under the 2014 Farm Act for this program is 24 million acres. Most of the land enrolled in the CRP was in crop production prior to CRP enrollment and is now planted to grass or trees. Historically, a large majority of CRP contracts enrolled whole fields or whole farms. Increasingly, however, CRP contracts fund high-priority, partial-field practices such as filter strips and grass waterways, rather than whole-field or whole-farm enrollments. Up to 2 million acres of the 24 million acre CRP cap can be used for a specific grasslands enrollment where each landowner agrees to keep the land in grazing use rather than tilling it for crop production or converting it to any other use.



http://www.mncorn.org/wp-content/uploads/2018/02/Corn_History_BMPs_report-Final.pdf

The **Agricultural Conservation Easement Program (ACEP)** provides long-term or permanent easements for preservation of wetlands and the protection of agricultural land (cropland, grazing land, etc.) from commercial or residential development.

The **Environmental Quality Incentives Program (EQIP)** provides financial assistance to farmers who adopt or install conservation practices on land in agricultural production. Common practices include nutrient management, cover crops, conservation tillage, field-edge filter strips, and fences to exclude live-stock from streams. Sixty percent of program funds are targeted to livestock-related practices and at least 5 percent are targeted to wildlife-related practices.

The **Conservation Stewardship Program (CSP)** supports ongoing and new conservation efforts for producers who meet stewardship requirements on working agricultural and forest lands. Farmers and ranchers must demonstrate a high level of stewardship to be eligible for the program and must agree to further improve environment performance over the life of the CSP contract (up to 10 years). Participants receive financial assistance for adopting new conservation practices and for stewardship, based on previously adopted practices and the ongoing maintenance of those practices.

The **Regional Conservation Partnership Program (RCPP)** is designed to coordinate conservation program assistance with partners to solve problems on a regional or watershed scale. Financial assistance is coordinated through RCPP but provided to producers largely through "covered" programs: EQIP, CSP, ACEP, and the Healthy Forests Reserve Program. Up to 7 percent of the dollars or acres available/eligible under each of these programs is allocated through RCPP.

Finally, through **Conservation Technical Assistance (CTA),** USDA provides ongoing technical assistance to agricultural producers who seek to improve the environmental performance of their farms.

MINNESOTA STATE CONSERVATION PROGRAMS

Re-Invest in Minnesota (RIM) Easement Program began in 1986, is intended to protect water quality, help fund the restoration of land and the retirement of land from agricultural production, and enhance critical habitats of fish and wildlife. The program matches private donations of land and money with state funds. The program has many arms that are administered through the Department of Natural Resources (DNR) and Board of Water and Soil Resources (BWSR). Eligible lands include riparian lands, sensitive groundwater areas, wetlands, marginal croplands, and snow fence lands. Below is a list of the different arms involved in conservation easements.

Conservation Reserve Enhancement Program (CREP) is an offshoot of the Conservation Reserve Program (CRP), the country's largest private-land conservation program. Administered by the Farm Service Agency (FSA), CREP targets high-priority conservation issues identified by local, state, or tribal governments or non-governmental organizations. In exchange for removing environmentally sensitive land from production and introducing conservation practices, farmers, ranchers, and agricultural land owners are paid an annual rental rate. Participation is voluntary, and the contract period is typically 10–15 years, along with other federal and state incentives as applicable per each CREP agreement.

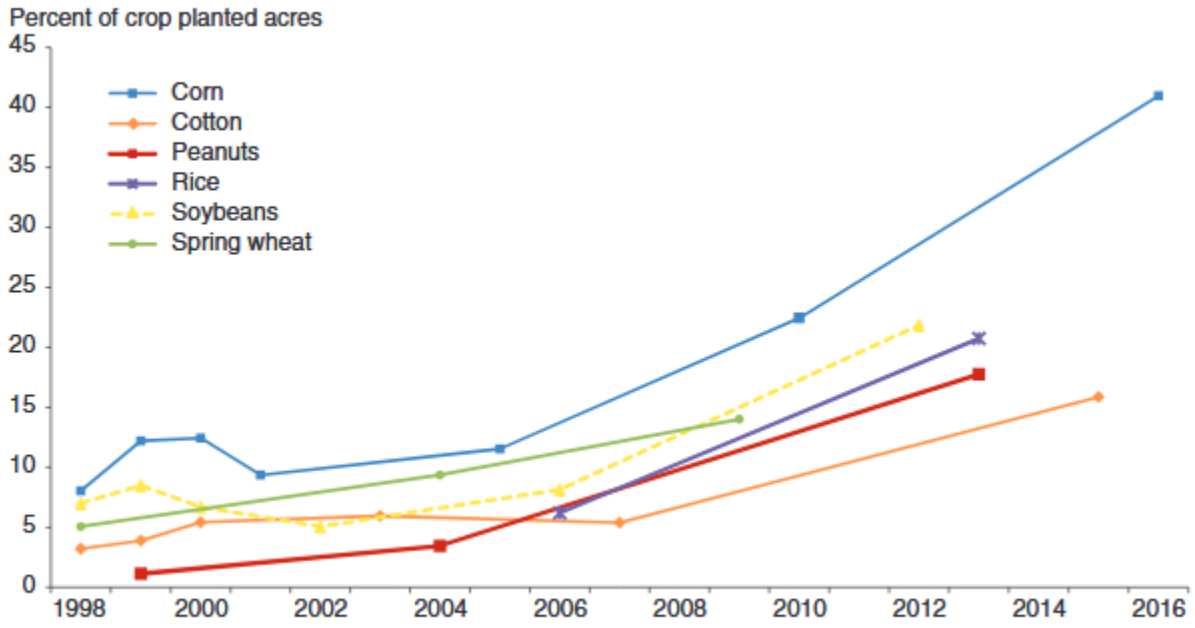
Conservation Easements involve the acquisition of limited rights in land for conservation purposes. Landowners who offer the state a conservation easement receive a payment to stop cropping and/or grazing the land, and in turn the landowners establish conservation practices such as native grass and forbs, trees or wetland restorations. The easement is recorded on the land title with the county recorder and transfers with the land when the parcel is sold.

EVOLVING AGRICULTURAL PRACTICES

Since the mid-1990's, precision agriculture has become mainstream, implemented by individual growers and by regional agricultural service co-operatives and agribusinesses. Precision agriculture uses digital mapping, global positioning systems (GPS), and sensors integrated with a variety of farm implements to collect data and vary seed planting populations and crop fertilizer and herbicide treatments. Specific technologies include yield monitors, yield maps, soil GPS maps, guidance systems, and variable rate technology. "Precision technologies are associated with increased use of soil conservation tillage, erosion reduction, and nutrient control practices." (https://www.ers.usda.gov/webdocs/publications/93026/eib-208.pdf?v=9435.6)

Variable rate technology is one agricultural development that notably reduces environmental risk to water quality. Fertilizer and pesticide applications can be increased or decreased on a 1' x 1' scale – rather than set at one setting, broadcast on an entire field. More closely matching plant needs with fertilizer and pesticide applications reduces possibilities for excess nutrients and runoff.

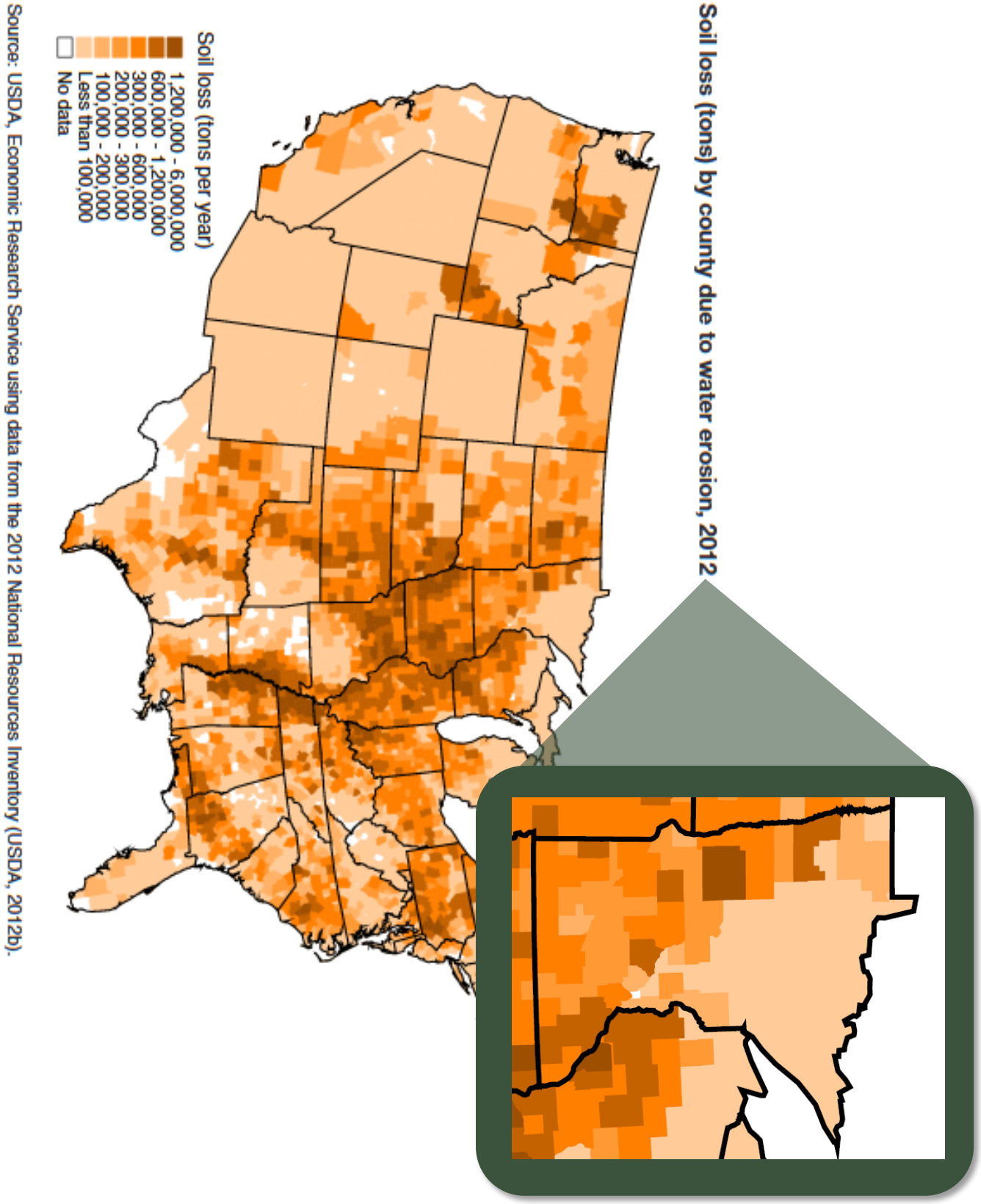
Adoption of variable-rate technology (VRT) by crop, 1998-2016



Note: Line markers indicate survey years for each crop.
Source: USDA, Economic Research Service (ERS) estimates using data from ERS and USDA, National Agricultural Statistics Service, Agricultural Resource Management Survey, Phase II.

AGRICULTURAL PRACTICES AFFECT SEDIMENT

Sediment is a source of watershed water quality impairments. Erosion has declined due to improved cropping practices (such as conservation tillage), implemented in the 1980's and 1990's (Daniel Hellerstein, 2019).


Soil loss (tons) by county due to water erosion, 2012
Soil loss (tons per year)
1,200,000 - 6,000,000
600,000 - 1,200,000
300,000 - 600,000
200,000 - 300,000
100,000 - 200,000
Less than 100,000
No data
Source: USDA, Economic Research Service using data from the 2012 National Resources Inventory (USDA, 2012b).

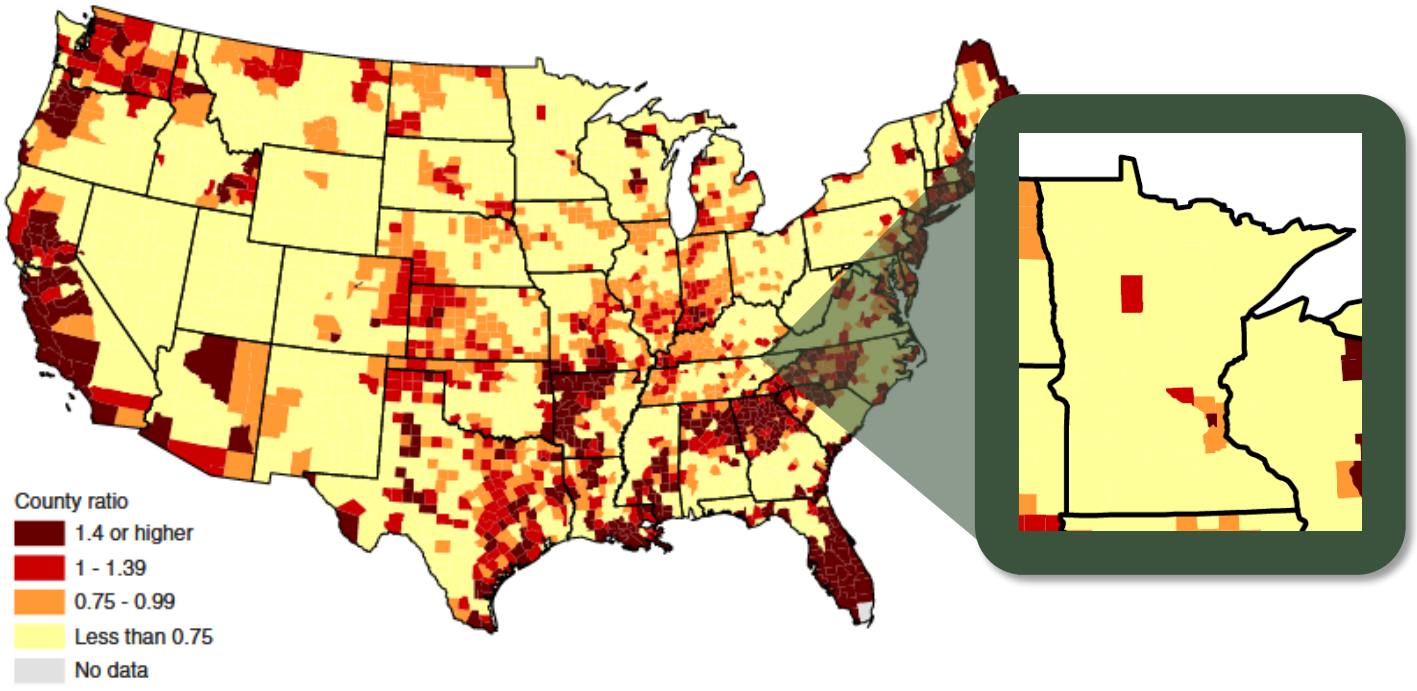
Nitrates are not a primary concern in either the Bois de Sioux or Mustinka River Watersheds, but there are both nonpoint and point sources of nitrates in both the Bois de Sioux and Mustinka River Watersheds. With regard to nonpoint agricultural sources, fall application of nitrogen fertilizer is an uncommon practice, and data from the USDA suggests that the ratio of commercial fertilizers applied in watershed counties is below the amount required by county crops.

One of the considerations for an aquatic recreation impairment for lakes is total phosphorus. Phosphorus, which does not have a toxic effect, is used by Minnesota Pollution Control Agency as an indicator; elevated phosphorus levels lead to eutrophication, which results in reduced oxygen concentrations. There are both nonpoint and point sources of phosphorous in both the Bois de Sioux and Mustinka River Watersheds. With regard to nonpoint agricultural sources, phosphorous loss is influenced by tillage systems, application details (rate, time and method), and field-specific soil chemistry (https://extension.umn.edu/phosphorus-and-potassium/agronomic-and-environmental-management-phosphorus#tillage-systems-572911)

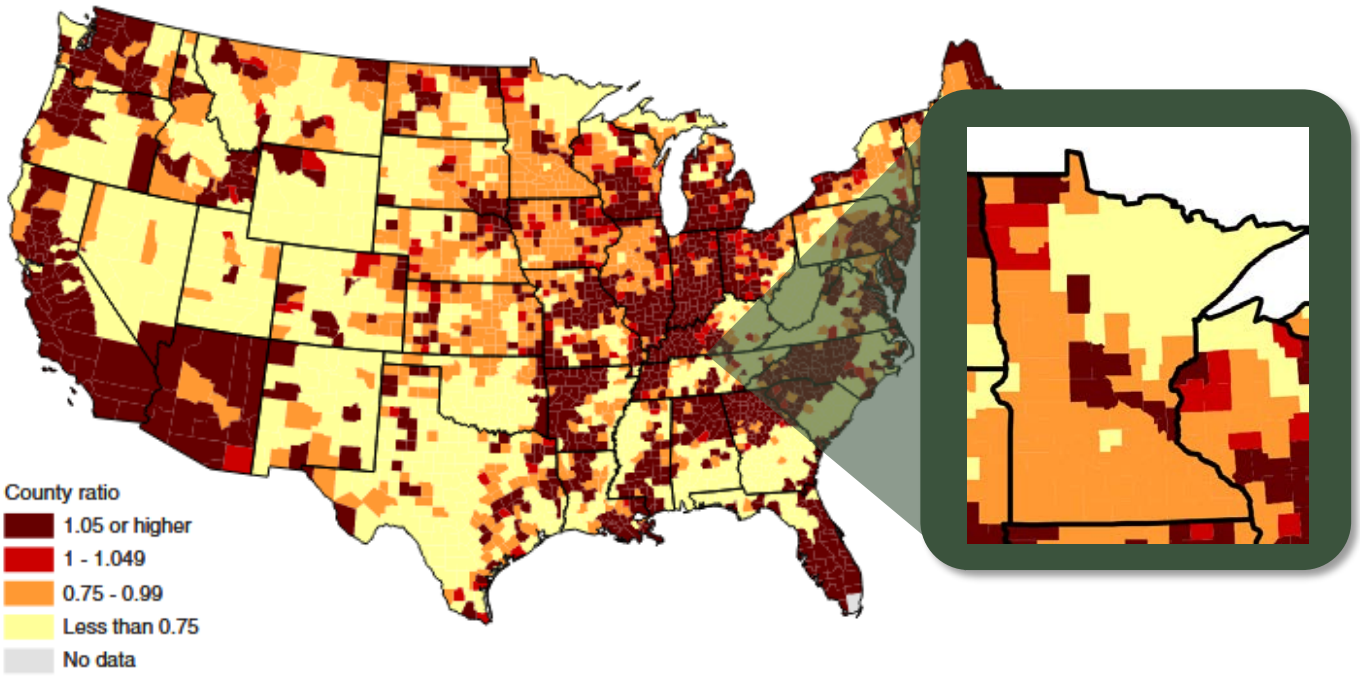
In their 2019 Agricultural Resources and Environmental Indicators Report, the USDA writes that the maps below show:

> *…the ratio of the county-wide amount of available nutrients to the agronomically appropriate nutrient requirements for crops and pasture. Available nutrients include the amount of manure nutrients recoverable for later application to crops and pasture plus purchased commercial fertilizer. Values of the ratio greater than one suggest that farms within that county use more manure and fertilizer nutrients than are being taking up by crops and pastures, and therefore these counties exhibit a higher risk of nutrient runoff or leaching.*

Ratio of nitrogen from commercial fertilizer and manure to crop/pasture uptake by county, 2012



Ratio of phosphorus from commercial fertilizer and manure to crop/pasture uptake by county, 2012

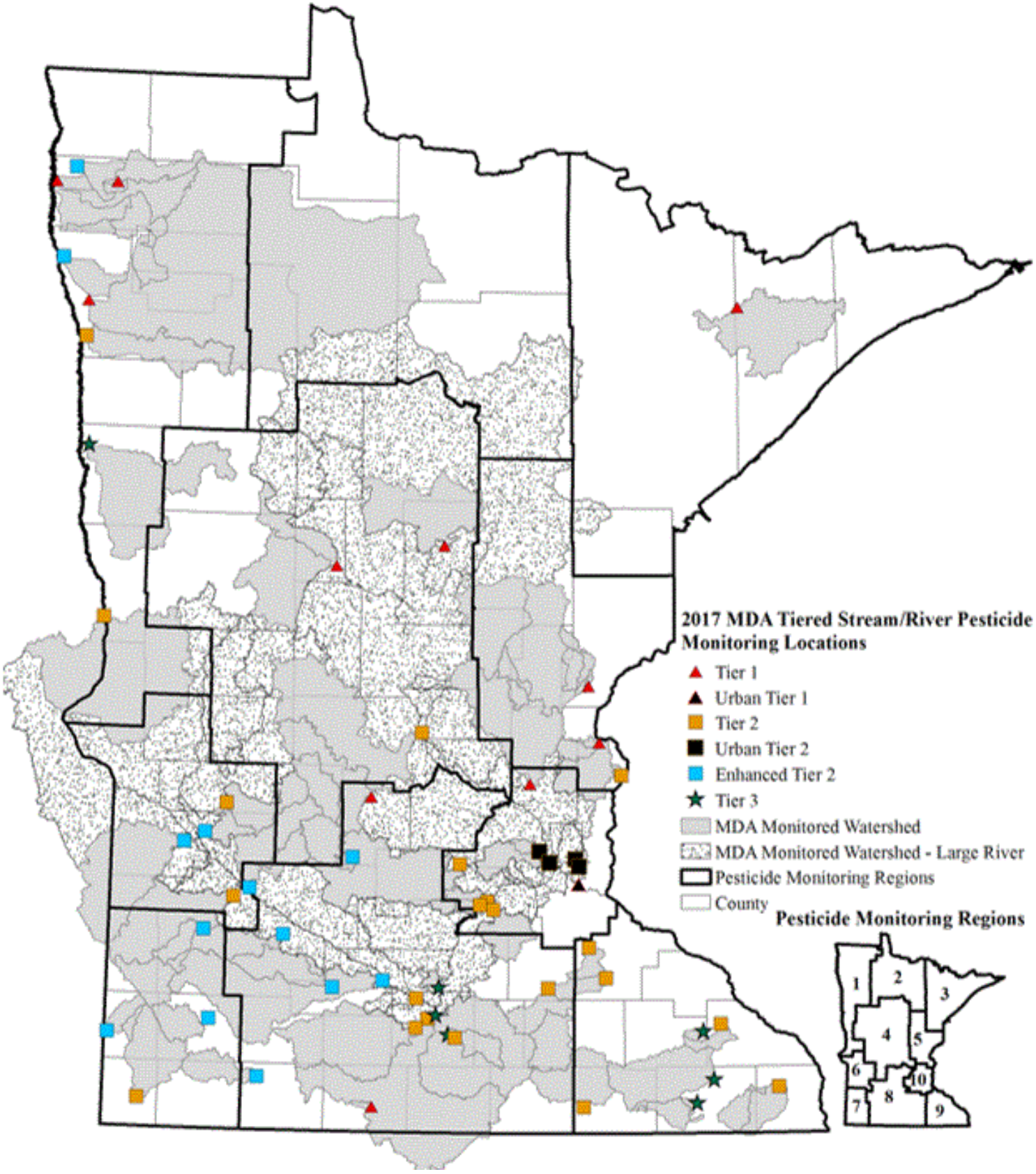


AGRICULTURAL PRACTICES AFFECT PESTICIDES

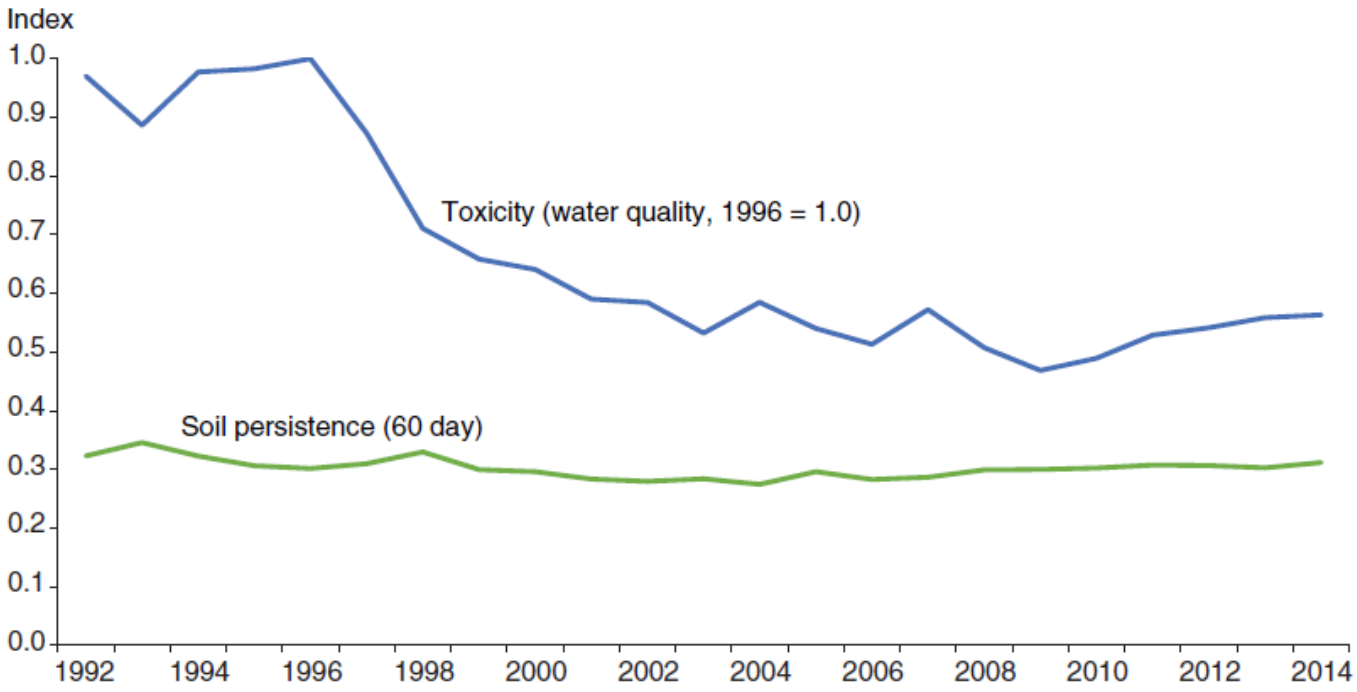
Farmers apply pesticides primarily to control insects, weeds, and fungus. The Minnesota Department of Agriculture monitors surface and groundwater exposure to pesticides. Bois de Sioux and Mustinka River farmers apply pesticides primarily to control insects, weeds, and fungus. The Minnesota Department of Agriculture monitors surface and groundwater exposure to pesticides. The Bois de Sioux and Mustinka River Watersheds do not have a designated or proposed impairment for currently registered pesticides.

The USDA states:

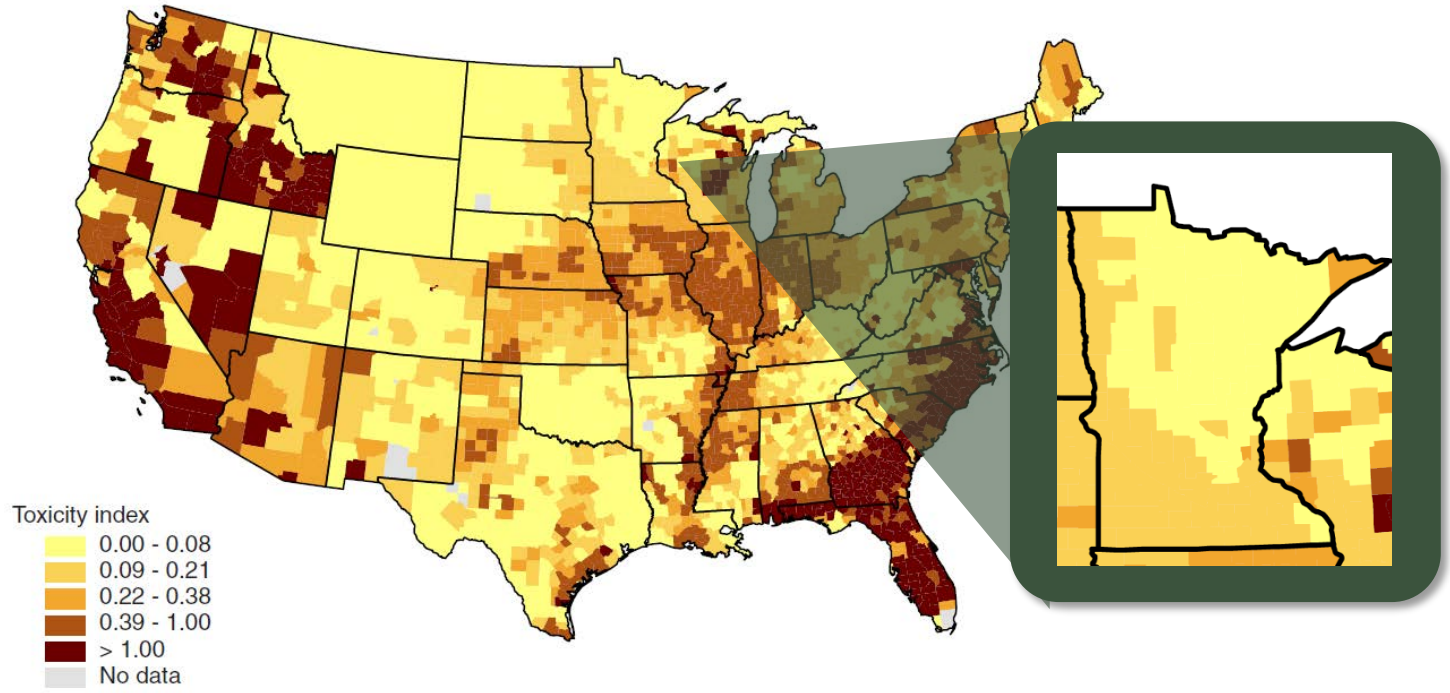
> *Once applied, pesticides can remain in the soil for weeks, months, or years. On average about 30 percent of the pesticides applied remain in the soil after 60 days (figure below). Persistent pesticides, with long half-lives, can travel off the field and into waterways where they may harm fish and other aquatic life. Pesticides may also contaminate ground water and well water.*


2017 MDA Tiered Stream/River Pesticide Monitoring Locations
Tier 1
Urban Tier 1
Tier 2
Urban Tier 2
Enhanced Tier 2
Tier 3
MDA Monitored Watershed
MDA Monitored Watershed - Large River
Pesticide Monitoring Regions
County
Pesticide Monitoring Regions
1
2
3
4
5
6
10
7
8
9

Agricultural pesticide toxicity indexes using water quality thresholds and 60-day soil persistence, 1992-2014



Agricultural pesticide toxicity index using water quality thresholds by county, 2014



Although the predominant land use in both the Bois de Sioux and Mustinka River Watersheds is agriculture, it is important to remember that agricultural impacts to water quality are affected by natural, weather-related events:

> *The difference in nutrient export between snowmelt versus snow + rain dominated years may require changes or adaptations to current BMPs in order to control nutrient losses under a future climate change scenario. While measures to reduce nutrient loss such as crop rotation (Liu et al., 2013) and placement and timing of fertilizer application (Flaten, 2011) have been implemented, additional actions may be needed to address the variability in nutrient (particularly P) loss between snowmelt-dominated and snowmelt + rain dominated years. In particular, actions may be need to address the difference in seasonality of nutrient loss between snowmelt-dominated years (when snowmelt and spring losses predominate) compared to snowmelt + rain dominated year (when losses occur during snowmelt, spring and summer).*

AGRICULTURAL LIVESTOCK BY WATERSHED

Livestock operations are sparsely located in parts of each watershed, but animal units are increasing. Since 2013, three new dairies have been constructed (two in the Bois de Sioux and one in the Mustinka River Watersheds). Operators are able to participate in trough/tank water facility and wastewater/feedlot runoff cost-share opportunities through soil and water conservation districts.

BOIS DE SIOUX RIVER WATERSHED								
HUC-12	**Issued Active Registered Sites/Permitted Sites**	**Bovine**	**Goat/Sheep**	**Horses**	**Swine**	**Geese/Ducks**	**Chicken**	**Totals by HUC-12**
LAKE TRAVERSE & BOIS DE SIOUX RIVER PLANNING REGION								
County Ditch No 52	3	87.7	3.0					90.7
Doran Creek (no animal units)	1							0.0
Lower Lake Traverse	1	180.0						180.0
Mud Lake	8	122.4		7.0	390.0	0.1		519.5
Clubhouse Lake-Bois de Sioux River	4	721.0						721.0
County Ditch No 26-Bois de Sioux River	1				10.0		0.5	10.5
Upper Lake Traverse	3	96.5			3.0			99.5
RABBIT RIVER PLANNING REGION								
Ash Lake	1	58.0						58.0
County Ditch No 20-Rabbit River	4	226.0			2,880.0			3,106.0
Judicial Ditch No 12	2	42.0						42.0
Judicial Ditch No 2	1	11,000.0						11,000.0
N. Fork Rabbit River (no animal units)	1							0.0
Upper Lightning Lake	1				1,440.0			1,440.0
BOIS DE SIOUX RIVER WATERSHED TOTAL	**31**	**12,533.6**	**3**	**7**	**4,723**	**0.12**	**0.45**	**17,267.17**

MUSTINKA RIVER WATERSHED										
HUC-12	Issued Active Registered Sites/Permitted Sites	Bovine	Deer /Elk	Goat /Sheep	Horses	Swine	Geese /Ducks	Chicken	Turkey	Totals by HUC-12
LOWER MUSTINKA AND TWELVEMILE CREEK PLANNING REGION										
County Drain No 27	1					3,073.4				3,073.4
Eighteen Mile Creek	6	474.0		6.5						480.5
Lower East Branch Twelvemile Creek	7	9,482.0			2.0	1,275.0				10,759.0
Mustinka River (no animal units)	0									0.0
Old Channel-Mustinka River	2	1,450.0		26.5						1,476.5
Twelvemile Creek	5	510.0		80.0		781.8		150.1		1,521.9
West Branch Twelvemile Creek	2	44.2								44.2
TWELVEMILE CREEK PLANNING REGION										
County Ditch No 38	12	100.0				2,115.0				2,215.0
County Ditch No 44-West Branch Twelvemil	4	939.0		35.0	3.0	900.0		0.1		1,877.1
East Fork Twelvemile Creek	4	16.2				1,370.0				1,386.2
Fivemile Creek	5	493.0		500.0	16.0	80.0				1,089.0
Middle East Branch Twelvemile Creek	2	33.0				300.0				333.0
Niemackl Lakes	7	737.8		4.8				0.3		742.9
South Fork Rabbit River	3	9,710.0		40.0	3.0	3,030.0				12,783.0
Toqua Lakes	4	10.2		0.9		4,176.1	5.0	12.8	1,469.4	5,674.4
Town of Collis-West Branch Twelvemile Cr	3	99.0	3.5		2.0					104.5
Upper East Branch Twelvemile Creek	8	1,177.4		52.5		1,027.2		1.3		2,258.4
West Fork Twelvemile Creek	6	823.9		0.6		1,764.3		0.6		2,589.4
UPPER MUSTINKA PLANNING REGION										
Elbow Lake-Mustinka River (no animal units)	1									0.0
Fridhem Cemetery*	1	44.5				900.0				944.5
Headwaters Mustinka River	3	113.0			2.0					115.0
Mustinka Flowage-Mustinka River	4	250.0								250.0
Round Lake	1			6.0						6.0
MUSTINKA RIVER WATERSHED TOTAL	**153**	**26,507.2**	**3.5**	**752.8**	**28.0**	**20,792.8**	**5.0**	**165.2**	**1,469.4**	**49,723.9**

Active Registered and Permitted Sites Animal Units, per MPCA on July 18, 2019

PRAIRIE HABITAT

The DNR classifies all, or portions, of 50 of 87 Minnesota counties as part of their "Prairie Planning Section." Based on the Minnesota Prairie Conservation Plan, authored and mapped by The Nature Conservancy, the DNR further specifies a permanent prairie goal, in acres, for each watershed.

For the Bois de Sioux River Watershed, the DNR calculates a shortage of 9,302 acres of permanent prairie; for the Mustinka River Watershed, the DNR calculates a goal shortage of 12,496 acres of permanent prairie. In its calculations, the DNR does not recognize additional habitat acres including: DNR-mapped permanent drainage system buffers, DNR-mapped permanent public waters buffers, or grassland areas of DNR-permitted flood impoundments, or road right-of-ways.

CALCEROUS FENS

Two calcerous fens have been identified by the Minnesota DNR, at following locations, in the Mustinka River Watershed (*https://files.dnr.state.mn.us/eco/wetlands/calcareous_fen_list.pdf*):

Fen ID # 28155: Aastad Township, Section 25. T131N-R43W-SENE25 (Erlandson WMA)
Fen ID #28156: Aastad Township, Section 23. T131N-R43W-SWSW23

According to a fact sheet from the Board of Water and Soil Resources, "Calcareous fens are rare and distinctive wetlands characterized by a substrate of non-acidic peat and dependent on a constant supply of cold, oxygen-poor groundwater rich in calcium and magnesium bicarbonates. This calcium-rich environment supports a plant community dominated by "calciphiles," or calcium-loving species" (*http://www.bwsr.state.mn.us/wetlands/Calc_fen-factsheet.pdf).* BWSR highlights the following plant species, stating that the species indicated with an (*) are exclusively found in calcerous fens:

*Carex sterilis**	*Sterile sedge*	*State threatened*
*Cladium mariscoides**	*Twig-rush*	*State special concern*
*Rhynchospora capillacea**	*Fen beak-rush*	*State threatened*
*Fimbristylis puberula**	*Hairy fimbristylis*	*State endangered*
Scleria verticillate	*Nut-rush*	*State threatened*
Eleocharis rostellata	*Beaked spike-rush*	*State threatened*
Valeriana edulis	*Valerian*	*State threatened*
Cypripedium candidum	*Small white lady's slipper*	*State special concern*

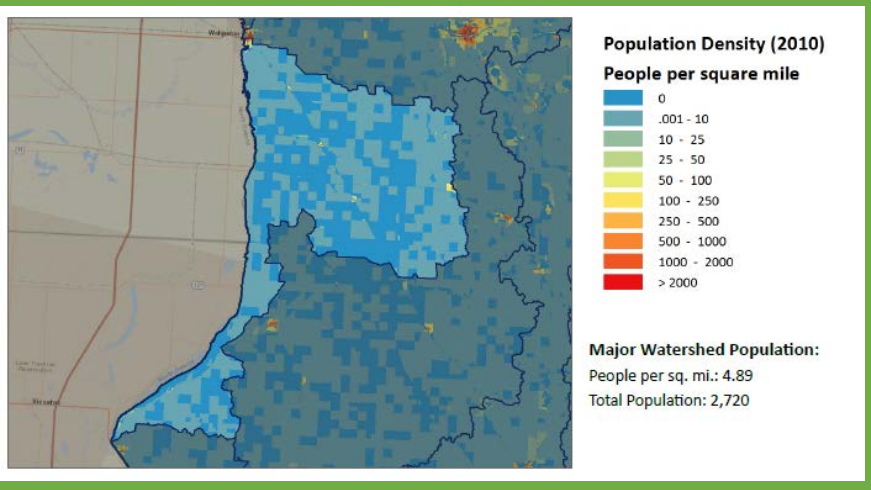
RECREATIONAL AREAS

The DNR maintains a list of statewide Wildlife Management Areas that provide recreation for hunters and trappers, and wildlife watching opportunities (*https://www.dnr.state.mn.us/wmas/index.html*).

6 - PEOPLE

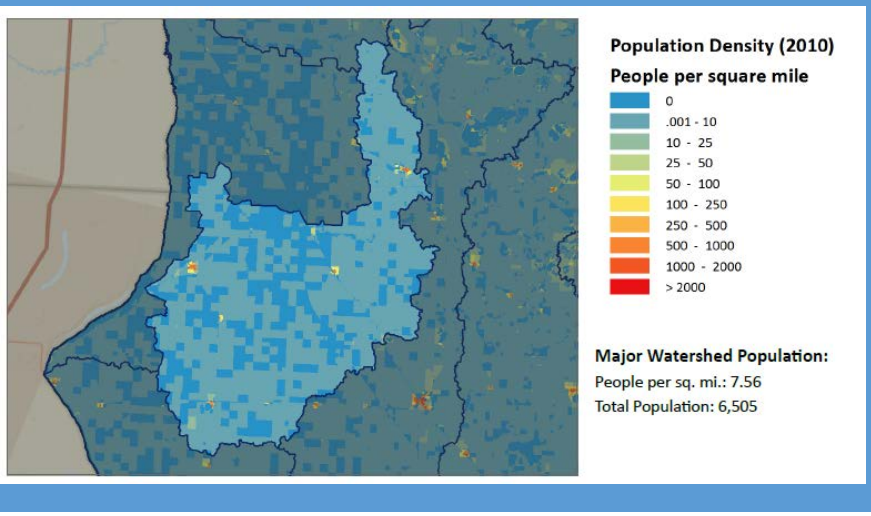
BOIS DE SIOUX RIVER WATERSHED: POPULATION ESTIMATE 2,720

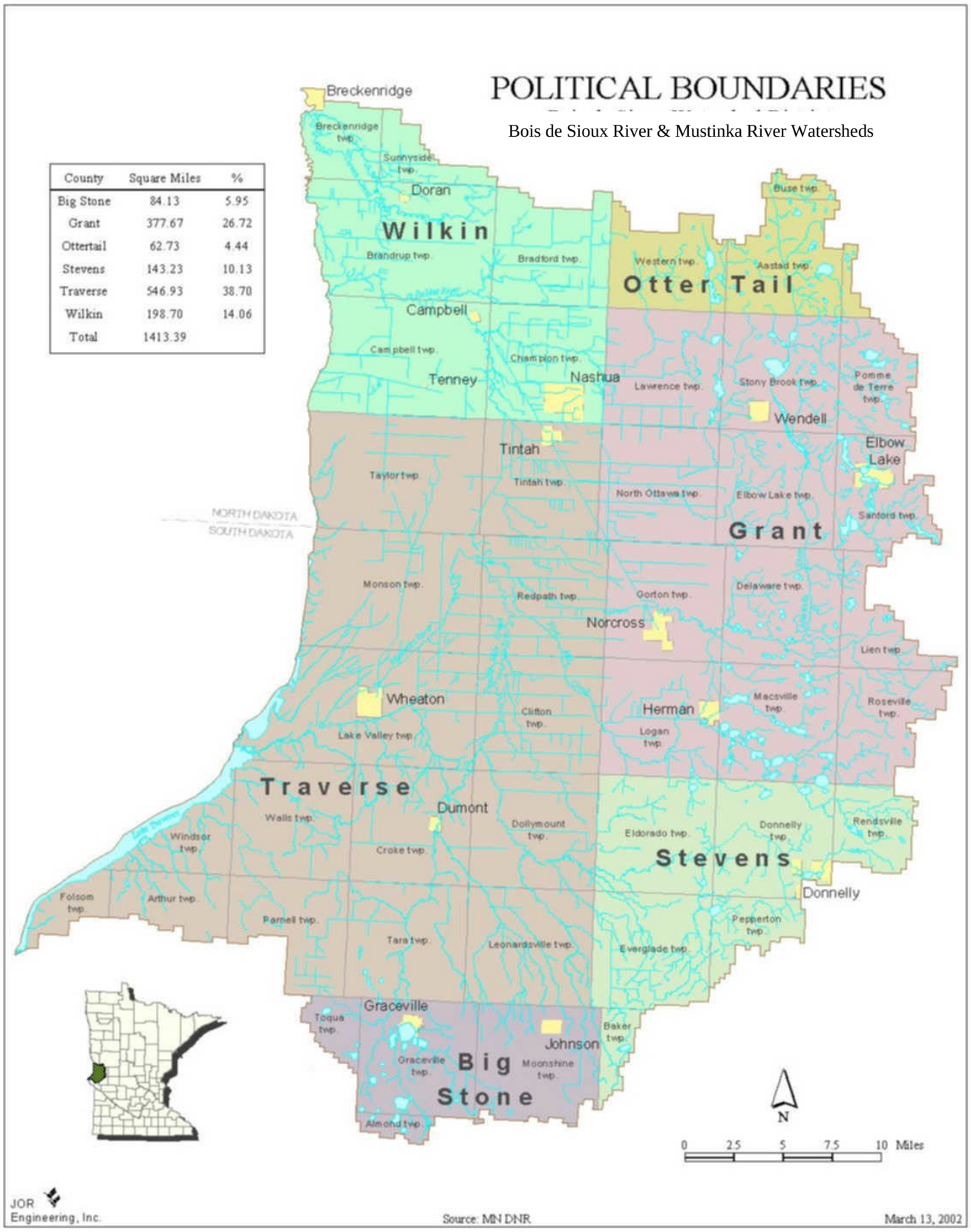
Cities and towns within the Bois de Sioux River Watershed in Minnesota include Breckenridge (the portion of town south of the railroad tracks and east of the Bois de Sioux River), Campbell, Nashua, Tintah, and Wendell. Cities and towns within the Bois de Sioux River Watershed in North and South Dakota include: Blackmer, Fairmount, LaMars, New Effington, Rosholt, and Tyler.



MUSTINKA RIVER WATERSHED: POPULATION ESTIMATE 6,505

Cities and towns within the Mustinka River Watershed include: Donnelly, Elbow Lake, Graceville, Herman, Norcross, Wendell, and Wheaton.




POLITICAL BOUNDARIES
Bois de Sioux River & Mustinka River Watersheds
County | Square Miles | %
Big Stone | 84.13 | 5.95
Grant | 377.67 | 26.72
Ottertail | 62.73 | 4.44
Stevens | 143.23 | 10.13
Traverse | 546.93 | 38.70
Wilkin | 198.70 | 14.06
Total | 1413.39
Breckenridge
Wilkin
Otter Tail
Campbell
Tenney
Nashua
Wendell
Tintah
Elbow Lake
Grant
NORTH DAKOTA
SOUTH DAKOTA
Norcross
Wheaton
Herman
Traverse
Dumont
Stevens
Donnelly
Graceville
Johnson
Big Stone
N
0 2.5 5 7.5 10 Miles
JOR Engineering, Inc.
Source: MN DNR
March 13, 2002

RURAL POPULATIONS

Comparing overall data from the 2000 & 2010 Census, populations in the Bois de Sioux River and Mustinka River Watersheds have declined. In their "Reclamation, Managing Water in the West. Final Report on Red River Valley Water Needs and Options," the US Department of the Interior includes information that compared 2050 projections for three counties with portions in the Bois de Sioux River & Mustinka Watersheds. The data projects a decline for Wilkin and Traverse Counties, and an increase for Otter Tail County, although it is impossible to tell if these changes will happen within parts of the counties inside or outside of the Bois de Sioux and Mustinka River Watersheds.

COUNTY	2000 CENSUS DATA	RECLAMATION 2050 POPULATION PROJECTION	NORTHWEST 2050 POPULATION PROJECTION
Otter Tail	57,222	81,700	69,845
Traverse	4,119	2,800	3,180
Wilkin	7,133	4,900	6,587

https://www.usbr.gov/gp/dkao/redriver/rrvwsp/Report/Report.pdf

POPULATION TRENDS

The 2000 & 2010 U.S. Census data is collected by county, township, and city. Looking at population by township, most townships have declined in population for both the Bois de Sioux River and Mustinka River watersheds from 2000 to 2010.

TOWNSHIP	2000 POPULATION	2010 POPULATION	CHANGE
Aastad township	187	213	14%
Almond township*	190	110	-42%
Arthur township*	109	81	-26%
Baker township*	114	265	132%
Bradford township*	119	91	-24%
Brandrup township	172	158	-8%
Breckenridge township*	234	255	9%
Buse township*	690	491	-29%
Campbell township	99	57	-42%
Champion township	73	53	-27%
Clifton township	92	75	-18%
Croke township	84	75	-11%
Delaware township	119	102	-14%
Dollymount township	83	77	-7%
Donnelly township*	113	100	-12%
Elbow Lake township	157	141	-10%
Eldorado township	109	94	-14%
Everglade township*	128	108	-16%
Folsom township*	149	128	-14%
Gorton township	64	49	-23%
Graceville township	205	197	-4%
Lake Valley township	276	237	-14%
Lawrence township	96	84	-13%
Leonardsville township	150	107	-29%

TOWNSHIP	2000 POPULATION	2010 POPULATION	CHANGE
Lien township*	117	111	-5%
Logan township	115	93	-19%
Macsville township	128	114	-11%
Monson township	162	133	-18%
Moonshine township*	150	131	-13%
North Ottawa township	69	50	-28%
Parnell township*	62	60	-3%
Pepperton township*	148	134	-9%
Pomme de Terre townsh	165	133	-19%
Redpath township	35	48	37%
Rendsville township*	177	161	-9%
Roseville township*	154	124	-19%
Sanford township*	169	153	-9%
Stony Brook township	164	133	-19%
Sunnyside township*	143	136	-5%
Tara township	126	92	-27%
Taylor township	108	105	-3%
Tintah township	53	33	-38%
Toqua township*	87	53	-39%
Tumuli township*	434	449	3%
Walls township	81	65	-20%
Western township*	142	129	-9%
Windsor township	54	66	22%

*These townships have portions located outside of the Bois de Sioux and Mustinka River Watersheds.

Looking at population by city, it can be noted that most cities in the Bois de Sioux River and Mustinka River Watersheds have declined from 2000 to 2010. Because Wendell is split between the two watersheds, and Breckenridge is only partially included in the Bois de Sioux River Watershed, it is not possible to decipher the total population change for urban residents in each watershed.

Mustinka River Watershed	2000 Population	2010 Population	Change
Donnelly city, Stevens County	254	241	-5%
Elbow Lake city, Grant County	1,275	1,176	-8%
Graceville city, Big Stone County	605	577	-5%
Herman city, Grant County	452	437	-3%
Norcross city, Grant County	59	70	19%
Wendell city, Grant County**	177	167	-6%
Wheaton city, Traverse County	1,619	1,424	-12%

Bois de Sioux River Watershed	2000 Population	2010 Population	Change
Breckenridge city, Wilkin County*	3,559	3,386	-5%
Campbell city, Wilkin County	241	158	-34%
Nashua city, Wilkin County	69	68	-1%
Tintah city, Traverse County	79	63	-20%
Wendell city, Grant County**	177	167	-6%

*Wendell should be split between watersheds
**Only a portion of Breckenridge is within the Bois de Sioux Watershed

7 - FISH & WILDLIFE

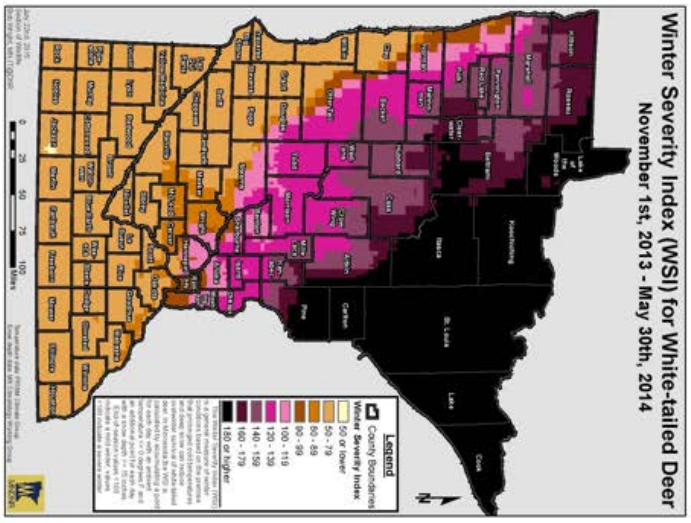
Fish and wildlife are important natural resources of the area. Fishing and hunting provide recreation for residents and are also significant to the local economy. Duck, goose, pheasant, Hungarian partridge, fox, and whitetail deer are commonly hunted species. Walleye, northern pike, panfish, bullhead, and roughfish species are fished, both for recreation and commercially.

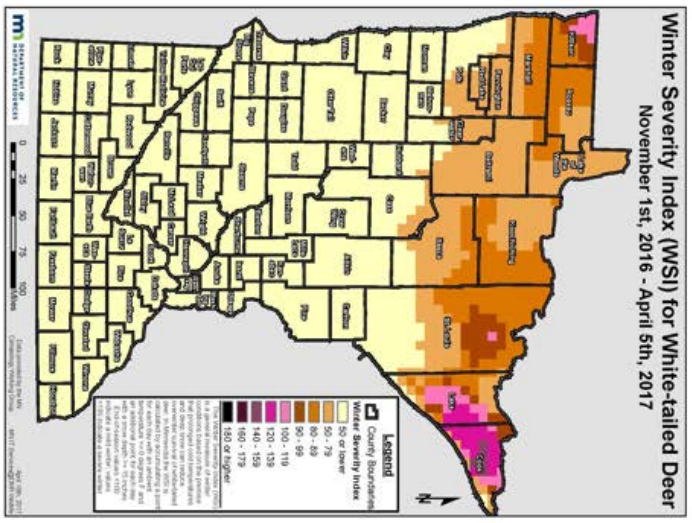
The watersheds lay along a major flyway for migratory birds. Species that migrate through the area include the bald eagle and peregrine falcon both of which are on the endangered species list.

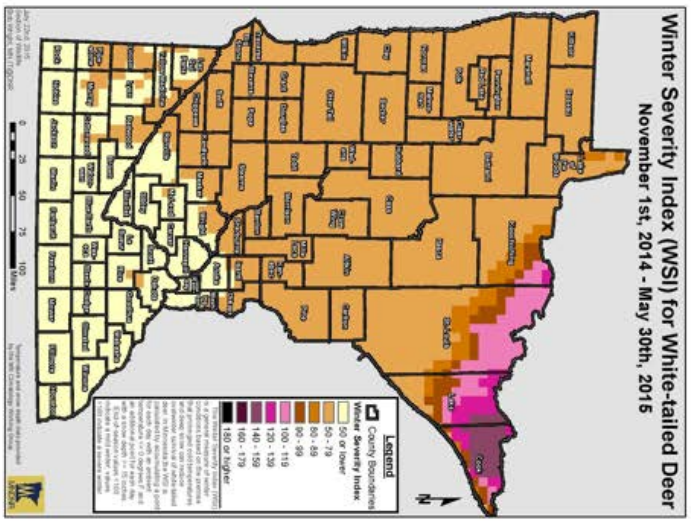
According to information by the DNR, another native resident of the Bois de Sioux and Mustinka River Watersheds - the burrowing owl - was added to the endangered species.

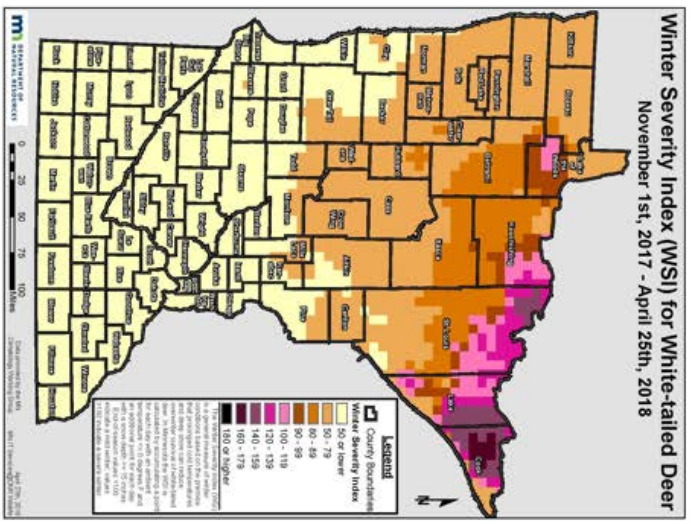
> *"The Minnesota Biological Survey continues to target this species as surveys are completed in the prairie region of the state. Burrowing owls were observed in western Minnesota in 1999, 2002, and 2004-2007. Nesting was confirmed in Norman County in 2006 and in Polk and Pipestone counties in 2007. These records represent the first documented nesting of burrowing owls in Minnesota since 1990."*
> https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ABNSB10010

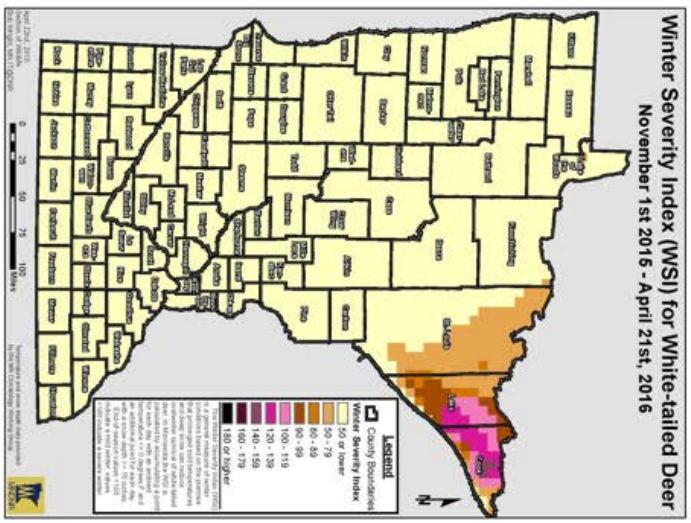
Winter weather impacts wildlife populations, and this is evidenced by white-tailed deer, which are plentiful in both watersheds. The Minnesota DNR rates the severity of winter conditions for deer. For three of the past six years, both Bois de Sioux and Mustinka River Watersheds were evaluated to have the least severe winter weather conditions for white-tailed deer.

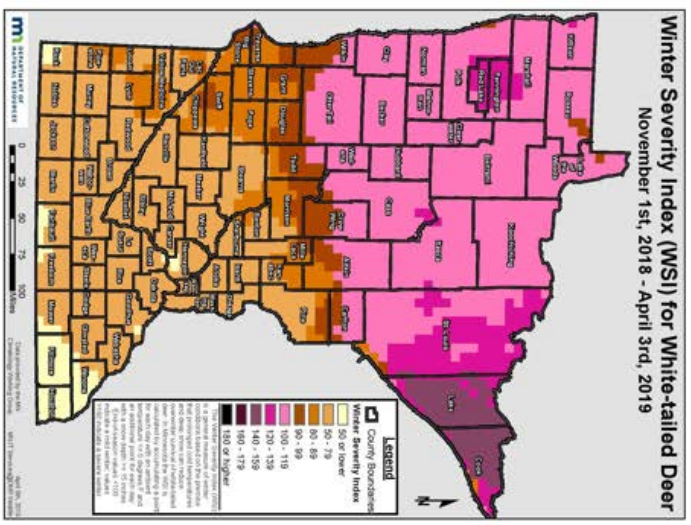

Winter Severity Index (WSI) for White-tailed Deer
November 1st, 2013 - May 30th, 2014
Legend
County Boundaries
Winter Severity Index
50 or lower
50 - 79
80 - 89
90 - 99
100 - 119
120 - 139
140 - 159
160 - 179
180 or higher


Winter Severity Index (WSI) for White-tailed Deer
November 1st, 2016 - April 5th, 2017
Legend
County Boundaries
Winter Severity Index
50 or lower
50 - 79
80 - 89
90 - 99
100 - 119
120 - 139
140 - 159
160 - 179
180 or higher

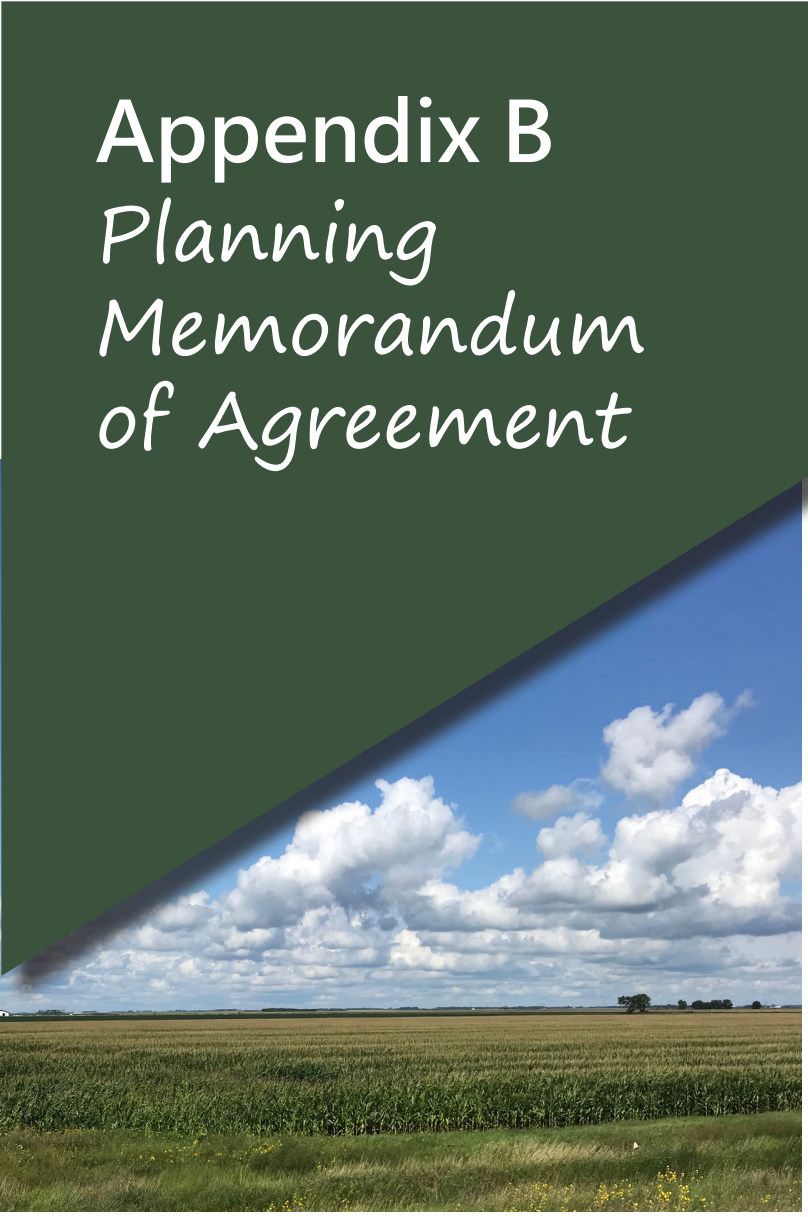

Winter Severity Index (WSI) for White-tailed Deer
November 1st, 2014 - May 30th, 2015
Legend
County Boundaries
Winter Severity Index
50 or lower
50 - 79
80 - 89
90 - 99
100 - 119
120 - 139
140 - 159
160 - 179
180 or higher


Winter Severity Index (WSI) for White-tailed Deer
November 1st, 2017 - April 25th, 2018
Legend
County Boundaries
Winter Severity Index
50 or lower
50 - 79
80 - 89
90 - 99
100 - 119
120 - 139
140 - 159
160 - 179
180 or higher


Winter Severity Index (WSI) for White-tailed Deer
November 1st 2015 - April 21st, 2016
Legend
County Boundaries
Winter Severity Index
50 or lower
50 - 79
80 - 89
90 - 99
100 - 119
120 - 139
140 - 159
160 - 179
180 or higher


Winter Severity Index (WSI) for White-tailed Deer
November 1st, 2018 - April 3rd, 2019
Legend
County Boundaries
Winter Severity Index
50 or lower
50 - 79
80 - 89
90 - 99
100 - 119
120 - 139
140 - 159
160 - 179
180 or higher

Appendix B
Planning Memorandum of Agreement



Bd SWD

MEMORANDUM OF AGREEMENT

This agreement (Agreement) is made and entered into by and between:

The Counties of Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin by and through their respective County Board of Commissioners, and
The Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin Soil and Water Conservation Districts, by and through their respective Soil and Water Conservation District Board of Supervisors, and
The Bois de Sioux Watershed District, by and through their respective Board of Managers,

Collectively referred to as the "Parties."

WHEREAS, the Counties of this Agreement are political subdivisions of the State of Minnesota, with authority to carry out environmental programs and land use controls, pursuant to Minnesota Statutes Chapter 375 and as otherwise provided by law; and

WHEREAS, the Soil and Water Conservation Districts (SWCDs) of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out erosion control and other soil and water conservation programs, pursuant to Minnesota Statutes Chapter 103C and as otherwise provided by law; and

WHEREAS, the Watershed Districts of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out conservation of the natural resources of the state by land use controls, flood control, and other conservation projects for the protection of the public health and welfare and the provident use of the natural resources, pursuant to Minnesota Statutes Chapters 103B, 103D and as otherwise provided by law; and

WHEREAS, the parties to this Agreement have a common interest and statutory authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan in Bois de Sioux and Mustinka Comprehensive Watershed Planning Area to conserve soil and water resources through the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources, ensure continued soil productivity, protect water quality, reduce damages caused by floods, preserve wildlife, protect the tax base, and protect public lands and waters; and

WHEREAS, with matters that relate to coordination of water management authorities pursuant to Minnesota Statutes Chapters 103B, 103C, and 103D with public drainage systems pursuant to Minnesota Statutes Chapter 103E, this Agreement does not change the rights or obligations of the public drainage system authorities.

WHEREAS, the Parties have been awarded a *One Watershed, One Plan* (1W1P) planning grant from the Board of Water and Soil Resources (BWSR) for the development of a Comprehensive Watershed Management Plan.

WHEREAS, the Parties have formed this Agreement for the specific goal of developing a plan pursuant to Minnesota Statutes § 103B.801, Comprehensive Watershed Management Planning, also known as *One Watershed, One Plan*.

WHEREAS, it is the intent of the Parties to develop a coordinated watershed management plan within the boundaries of the Bois de Sioux and Mustinka watersheds.

WHEREAS, the Bois de Sioux and Mustinka Comprehensive Watershed Planning area contains two watersheds that the MPCA has developed a Watershed Restoration and Protection Strategies (WRAPS) for each the Bois de Sioux River and Mustinka River Watersheds.

WHEREAS, the Parties intend to identify planning regions within the proposed planning areas as identified by BWSR that will be consistent with the Bois de Sioux River and Mustinka Comprehensive Watershed Planning Area.

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Purpose:** The Parties to this Agreement recognize the importance of partnerships to plan and implement protection and restoration efforts for the Bois de Sioux and Mustinka Comprehensive Watershed Planning Area *(Attachment A)*. The purpose of this Agreement is to collectively develop and adopt, as local government units, a coordinated watershed management plan for implementation per the provisions of the Plan.

2. **Term:** This Agreement is effective upon signature of all Parties in consideration of the Board of Water and Soil Resources (BWSR) Operating Procedures for One Watershed, One Plan; and will remain in effect until adoption of the plan by all parties unless canceled according to the provisions of this Agreement or earlier terminated by law.

3. **Adding Additional Parties:** A qualifying party desiring to become a member of this Agreement shall indicate its intent by adoption of a board resolution prior to 12/31/2017. The party agrees to abide by the terms and conditions of the Agreement; including but not limited to the bylaws, policies and procedures adopted by the Policy Committee.

4. **Withdrawal of Parties:** A party desiring to leave the membership of this Agreement shall give written notice, including the date of its withdrawal to the Policy Committee in the form of an official board resolution. Notice must be given at least 30 days in advance of the date of withdrawal from the Agreement.

5. **General Provisions:**

    a. **Compliance with Laws/Standards:** The Parties agree to abide by all federal, state, and local laws; statutes, ordinances, rules and regulations now in effect or hereafter adopted pertaining to this Agreement.

    b. **Indemnification:** Each party to this Agreement shall be liable for the acts of its officers, employees or agents and the results thereof to the extent authorized or limited by law and shall not be responsible for the acts of any other party, its officers, employees or agents. The provisions of the Municipal Tort Claims Act, Minnesota Statute Chapter 466 and other applicable laws govern liability of the Parties. To the full extent permitted by law, actions by the Parties,

their respective officers, employees, and agents pursuant to this Agreement are intended to be and shall be construed as a "cooperative activity." It is the intent of the Parties that they shall be deemed a "single governmental unit" for the purpose of liability, as set forth in Minnesota Statutes § 471.59, subd. 1a(a). For purposes of Minnesota Statutes § 471.59, subd. 1a(a) it is the intent of each party that this Agreement does not create any liability or exposure of one party for the acts or omissions of any other party.

c. **Records Retention and Data Practices:** The Parties agree that records created pursuant to the terms of this Agreement will be retained in a manner that meets their respective entity's records retention schedules that have been reviewed and approved by the State in accordance with Minnesota Statutes § 138.17. The Parties further agree that records prepared or maintained in furtherance of the agreement shall be subject to the Minnesota Government Data Practices Act. At the time this agreement expires, all records will be turned over to the Bois de Sioux Watershed District, or other participating LGU as selected by the policy committee, for continued retention.

d. **Timeliness:** The Parties agree to perform obligations under this Agreement in a timely manner and keep each other informed about any delays that may occur.

e. **Extension:** The Parties may extend the termination date of this Agreement upon agreement by all Parties.

f. **Termination:** The parties anticipate that this Agreement will remain in full force and effect through the term of the 1W1P grant agreement with BWSR and/or cancelled by all parties, unless otherwise terminated in accordance with law or other provisions of the Agreement.

6. **Administration:**

a. **Establishment of Committees for Development of the Plan.** The Parties agree to designate one representative, who must be an elected or appointed member of the governing board, to a Policy Committee for development of the watershed-based plan and may appoint one or more technical representatives to an Advisory Committee for development of the plan in consideration of the BWSR Operating Procedures for One Watershed, One Plan.

i. The Policy Committee will meet as needed to decide on the content of the plan, serve as a liaison to their respective boards, and act on behalf of their Board. Each representative shall have one vote.

ii. Each governing board may choose one alternate to serve on the Policy Committee as needed in the absence of the designated member.

iii. The Policy Committee will establish bylaws within 90 days of execution of this document to describe the functions and operations of the committee(s).

iv. The Advisory Committee will meet monthly or as needed to assist and provide technical support and make recommendations to the Policy Committee on the development and content of the plan. Members of the Advisory Committee may not be a current board member of any of the Parties.

b. **Submittal of the Plan.** The Policy Committee will recommend the plan to the Parties of this agreement. The Policy Committee will be responsible for initiating a formal review process for the watershed-based plan conforming to Minnesota Statutes Chapters 103B and 103D, including public hearings. Upon completion of local review and comment, and approval of the plan for submittal by each party, the Policy Committee will submit the watershed-based plan jointly to BWSR for review and approval.

c. **Adoption of the Plan.** The Parties agree to adopt and begin implementation of the plan within 120 days of receiving notice of state approval, and provide notice of plan adoption pursuant to Minnesota Statutes Chapters 103B and 103D.

7. **1W1P Fiscal Agent:** Fiscal duties will be contracted through a participating LGU. Specific duties will be outlined in the contract.

8. **1W1P Grant Administration/Coordination**: Grant administration/coordination duties will be contracted through a participating LGU. Specific duties will be outlined in the contract.

9. **1W1P Secretary**: Secretarial duties consisting of recording all meeting minutes will be contracted through a participating LGU or individual. Specific duties will be outlined in the contract.

10. **Authorized Representatives:** The following persons will be the primary contacts for all matters concerning this Agreement:

Otter Tail County
Bill Kalar
L&R Management Director
540 Fir Ave. W
Fergus Falls, MN 56537
Telephone: (218) 998-8095

West Otter Tail SWCD
Brad Mergens
District Manager
506 Western Ave.
Fergus Falls, MN 56537
Telephone: (218) 739-4694

Traverse County
Sara Gronfeld
P&Z Administrator
304 4th St. N
Wheaton, MN 56296
Telephone: (320) 563-8218

Traverse SWCD
Casey O'Leary
Program Technician
304 4th St. N
Wheaton, MN 56296
Telephone: (320) 563-8218

Grant County
Greg Lillemon
OLM Administrator
10 1st St. NW

Grant SWCD
Joe Montonye
District Manager
712 Industrial Park Blvd.

Elbow Lake, MN 56531
Telephone: (218) 685-8224

Elbow Lake, MN 56531
Telephone: (218) 685-5395

Stevens County
Bill Kleindl
P&Z Director
400 Colorado Ave. Ste. 306
Morris, MN 56267
Telephone: (320) 208-6558

Stevens SWCD
Matt Solemsaas
District Administrator
12 Hwy. 28 E Ste. 2
Morris, MN 56267
Telephone: (320) 589-4886

Wilkin County
Breanna Koval
Environmental Officer
505 South 8th St.
Breckenridge, MN 56520
Telephone: (218) 643-5815

Wilkin SWCD
Don Bajumpaa
District Manager
1150 Hwy. 75 N
Breckenridge, MN 56520
Telephone: (218) 643-2933

Big Stone County
Darren Wilke
Environmental Officer
20 SE Second St.
Ortonville, MN 56278
Telephone: (320) 839-6370

Big Stone SWCD
Beau Peterson
District Manager
990 US-12
Ortonville, MN 56278
Telephone: (320) 839-6149

Bois de Sioux Watershed District
Chad Engels
Senior Project Manager, Moore Engineering Inc.
925 10th Ave.
West Fargo, ND 58078
Telephone: (701) 282-4692

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

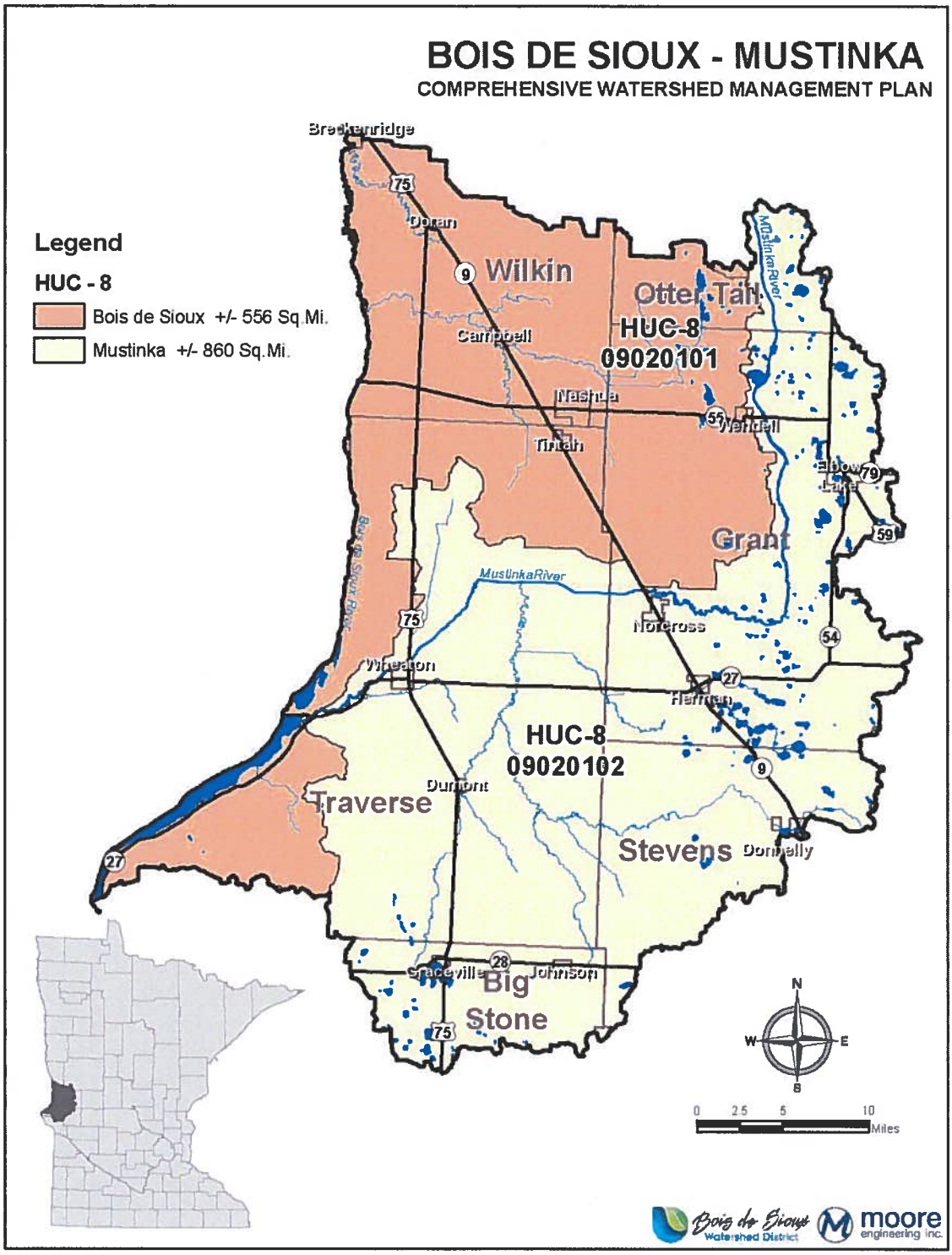
PARTNER: Bois de Sioux Watershed

APPROVED: 12/13/17

BY: Linda J Vavra 12-18-17
Board Chair Date

BY: 12/18/17
District Manager/Administrator Date

Attachment A



Big Stone Co

MEMORANDUM OF AGREEMENT

This agreement (Agreement) is made and entered into by and between:

The Counties of Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin by and through their respective County Board of Commissioners, and
The Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin Soil and Water Conservation Districts, by and through their respective Soil and Water Conservation District Board of Supervisors, and
The Bois de Sioux Watershed District, by and through their respective Board of Managers,

Collectively referred to as the "Parties."

WHEREAS, the Counties of this Agreement are political subdivisions of the State of Minnesota, with authority to carry out environmental programs and land use controls, pursuant to Minnesota Statutes Chapter 375 and as otherwise provided by law; and

WHEREAS, the Soil and Water Conservation Districts (SWCDs) of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out erosion control and other soil and water conservation programs, pursuant to Minnesota Statutes Chapter 103C and as otherwise provided by law; and

WHEREAS, the Watershed Districts of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out conservation of the natural resources of the state by land use controls, flood control, and other conservation projects for the protection of the public health and welfare and the provident use of the natural resources, pursuant to Minnesota Statutes Chapters 103B, 103D and as otherwise provided by law; and

WHEREAS, the parties to this Agreement have a common interest and statutory authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan in Bois de Sioux and Mustinka Comprehensive Watershed Planning Area to conserve soil and water resources through the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources, ensure continued soil productivity, protect water quality, reduce damages caused by floods, preserve wildlife, protect the tax base, and protect public lands and waters; and

WHEREAS, with matters that relate to coordination of water management authorities pursuant to Minnesota Statutes Chapters 103B, 103C, and 103D with public drainage systems pursuant to Minnesota Statutes Chapter 103E, this Agreement does not change the rights or obligations of the public drainage system authorities.

WHEREAS, the Parties have been awarded a *One Watershed, One Plan* (1W1P) planning grant from the Board of Water and Soil Resources (BWSR) for the development of a Comprehensive Watershed Management Plan.

WHEREAS, the Parties have formed this Agreement for the specific goal of developing a plan pursuant to Minnesota Statutes § 103B.801, Comprehensive Watershed Management Planning, also known as *One Watershed, One Plan*.

WHEREAS, it is the intent of the Parties to develop a coordinated watershed management plan within the boundaries of the Bois de Sioux and Mustinka watersheds.

WHEREAS, the Bois de Sioux and Mustinka Comprehensive Watershed Planning area contains two watersheds that the MPCA has developed a Watershed Restoration and Protection Strategies (WRAPS) for each the Bois de Sioux River and Mustinka River Watersheds.

WHEREAS, the Parties intend to identify planning regions within the proposed planning areas as identified by BWSR that will be consistent with the Bois de Sioux River and Mustinka Comprehensive Watershed Planning Area.

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Purpose:** The Parties to this Agreement recognize the importance of partnerships to plan and implement protection and restoration efforts for the Bois de Sioux and Mustinka Comprehensive Watershed Planning Area *(Attachment A)*. The purpose of this Agreement is to collectively develop and adopt, as local government units, a coordinated watershed management plan for implementation per the provisions of the Plan.

2. **Term:** This Agreement is effective upon signature of all Parties in consideration of the Board of Water and Soil Resources (BWSR) Operating Procedures for One Watershed, One Plan; and will remain in effect until adoption of the plan by all parties unless canceled according to the provisions of this Agreement or earlier terminated by law.

3. **Adding Additional Parties:** A qualifying party desiring to become a member of this Agreement shall indicate its intent by adoption of a board resolution prior to 12/31/2017. The party agrees to abide by the terms and conditions of the Agreement; including but not limited to the bylaws, policies and procedures adopted by the Policy Committee.

4. **Withdrawal of Parties:** A party desiring to leave the membership of this Agreement shall give written notice, including the date of its withdrawal to the Policy Committee in the form of an official board resolution. Notice must be given at least 30 days in advance of the date of withdrawal from the Agreement.

5. **General Provisions:**

    a. **Compliance with Laws/Standards:** The Parties agree to abide by all federal, state, and local laws; statutes, ordinances, rules and regulations now in effect or hereafter adopted pertaining to this Agreement.

    b. **Indemnification:** Each party to this Agreement shall be liable for the acts of its officers, employees or agents and the results thereof to the extent authorized or limited by law and shall not be responsible for the acts of any other party, its officers, employees or agents. The provisions of the Municipal Tort Claims Act, Minnesota Statute Chapter 466 and other applicable laws govern liability of the Parties. To the full extent permitted by law, actions by the Parties,

their respective officers, employees, and agents pursuant to this Agreement are intended to be and shall be construed as a "cooperative activity." It is the intent of the Parties that they shall be deemed a "single governmental unit" for the purpose of liability, as set forth in Minnesota Statutes § 471.59, subd. 1a(a). For purposes of Minnesota Statutes § 471.59, subd. 1a(a) it is the intent of each party that this Agreement does not create any liability or exposure of one party for the acts or omissions of any other party.

c. **Records Retention and Data Practices:** The Parties agree that records created pursuant to the terms of this Agreement will be retained in a manner that meets their respective entity's records retention schedules that have been reviewed and approved by the State in accordance with Minnesota Statutes § 138.17. The Parties further agree that records prepared or maintained in furtherance of the agreement shall be subject to the Minnesota Government Data Practices Act. At the time this agreement expires, all records will be turned over to the Bois de Sioux Watershed District, or other participating LGU as selected by the policy committee, for continued retention.

d. **Timeliness:** The Parties agree to perform obligations under this Agreement in a timely manner and keep each other informed about any delays that may occur.

e. **Extension:** The Parties may extend the termination date of this Agreement upon agreement by all Parties.

f. **Termination:** The parties anticipate that this Agreement will remain in full force and effect through the term of the 1W1P grant agreement with BWSR and/or cancelled by all parties, unless otherwise terminated in accordance with law or other provisions of the Agreement.

6. **Administration:**

a. **Establishment of Committees for Development of the Plan.** The Parties agree to designate one representative, who must be an elected or appointed member of the governing board, to a Policy Committee for development of the watershed-based plan and may appoint one or more technical representatives to an Advisory Committee for development of the plan in consideration of the BWSR Operating Procedures for One Watershed, One Plan.

i. The Policy Committee will meet as needed to decide on the content of the plan, serve as a liaison to their respective boards, and act on behalf of their Board. Each representative shall have one vote.

ii. Each governing board may choose one alternate to serve on the Policy Committee as needed in the absence of the designated member.

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7. **1W1P Fiscal Agent:** Fiscal duties will be contracted through a participating LGU. Specific duties will be outlined in the contract.

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9. **1W1P Secretary:** Secretarial duties consisting of recording all meeting minutes will be contracted through a participating LGU or individual. Specific duties will be outlined in the contract.

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Fergus Falls, MN 56537
Telephone: (218) 998-8095

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P&Z Administrator
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Wheaton, MN 56296
Telephone: (320) 563-8218

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Breckenridge, MN 56520
Telephone: (218) 643-2933

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Beau Peterson
District Manager
990 US-12
Ortonville, MN 56278
Telephone: (320) 839-6149

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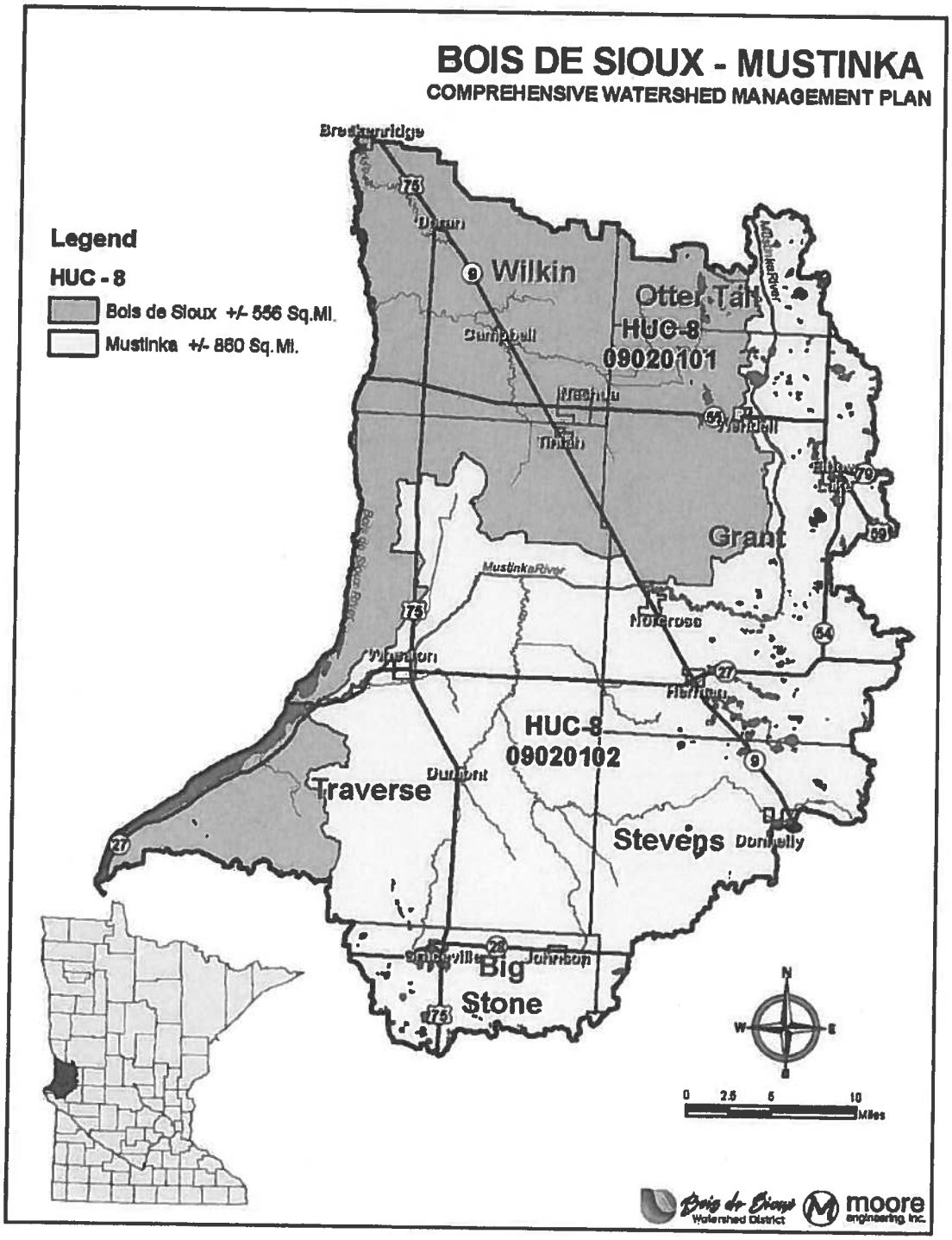
PARTNER: Big Stone County

APPROVED:

BY: _____ 12-19-17
Board Chair Date

BY: Michelle P Knutson 12/19/17
District Manager/Administrator Date

Attachment A



BS SWCD

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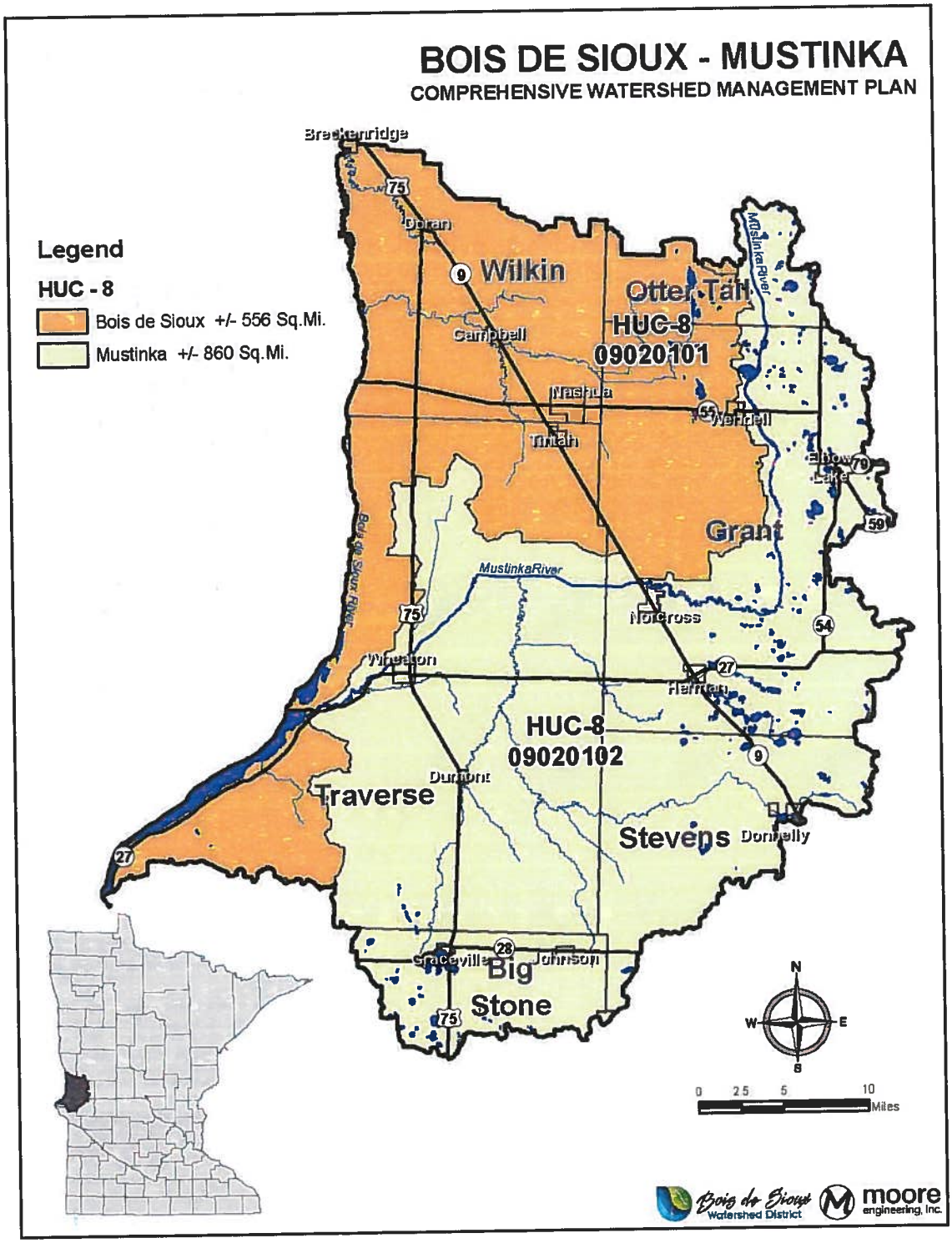
PARTNER: Big Stone SWCD

APPROVED:

BY: Michael Fogarty 12/12/2017
Board Chair Date

BY: 12/12/17
District Manager/Administrator Date

Attachment A



Grant Co

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10. **Authorized Representatives:** The following persons will be the primary contacts for all matters concerning this Agreement:

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L&R Management Director
540 Fir Ave. W
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Telephone: (218) 998-8095

Traverse County
Sara Gronfeld
P&Z Administrator
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Beau Peterson
District Manager
990 US-12
Ortonville, MN 56278
Telephone: (320) 839-6149

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

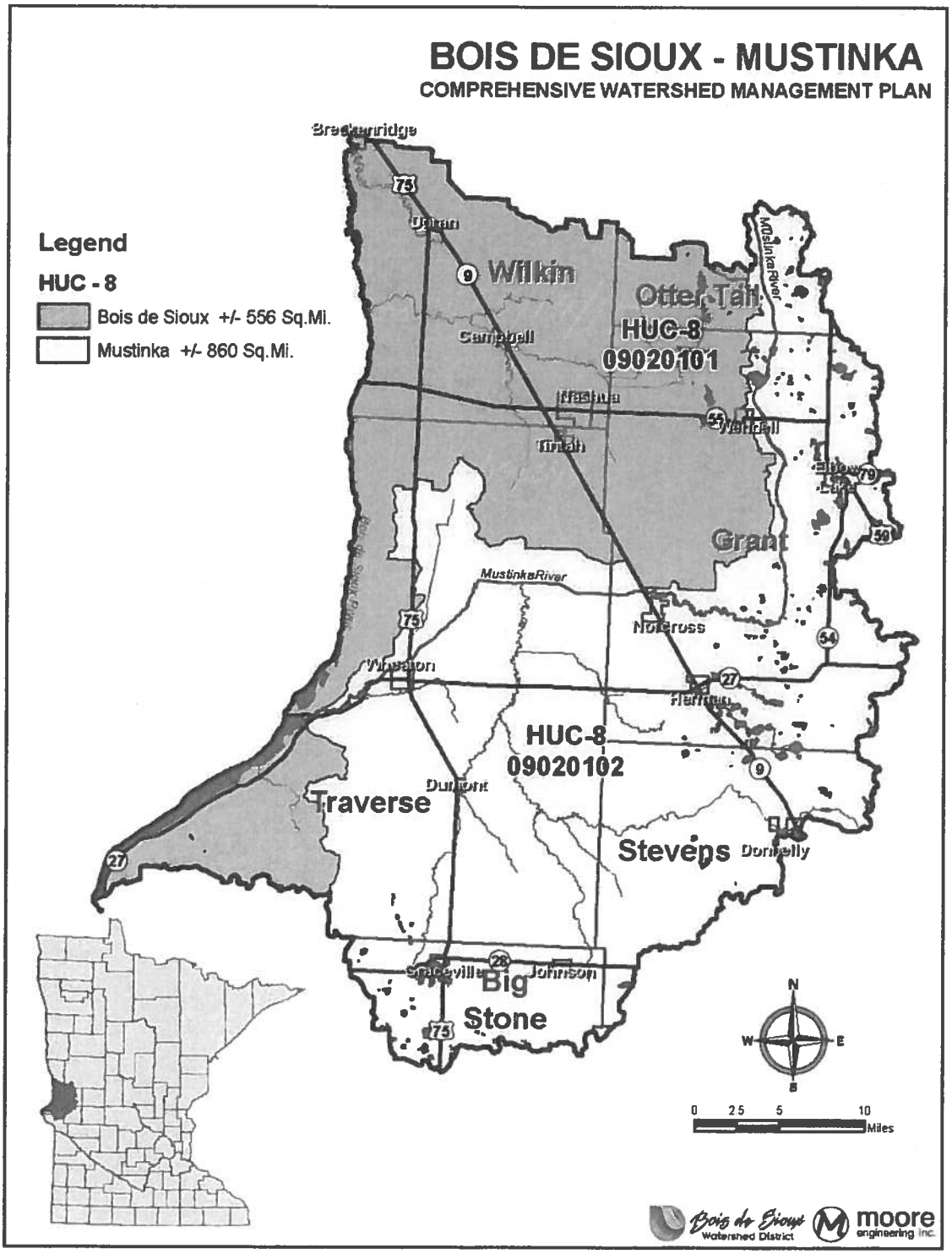
PARTNER: GRANT COUNTY

APPROVED:

BY: Keith Swanson 12/19/17
Board Chair Date

BY: Chad VanLaanen 12/19/2017
District Manager/Administrator Date

Attachment A



IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: Grant SWCD

APPROVED:

BY: _____ 12/28/17
Board Chair Date

BY: _____ 12/28/17
District Manager/Administrator Date

Otter Tail Approved
Co

MEMORANDUM OF AGREEMENT

This agreement (Agreement) is made and entered into by and between:

The Counties of Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin by and through their respective County Board of Commissioners, and

The Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin Soil and Water Conservation Districts, by and through their respective Soil and Water Conservation District Board of Supervisors, and

The Bois de Sioux Watershed District, by and through their respective Board of Managers,

Collectively referred to as the "Parties."

WHEREAS, the Counties of this Agreement are political subdivisions of the State of Minnesota, with authority to carry out environmental programs and land use controls, pursuant to Minnesota Statutes Chapter 375 and as otherwise provided by law; and

WHEREAS, the Soil and Water Conservation Districts (SWCDs) of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out erosion control and other soil and water conservation programs, pursuant to Minnesota Statutes Chapter 103C and as otherwise provided by law; and

WHEREAS, the Watershed Districts of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out conservation of the natural resources of the state by land use controls, flood control, and other conservation projects for the protection of the public health and welfare and the provident use of the natural resources, pursuant to Minnesota Statutes Chapters 103B, 103D and as otherwise provided by law; and

WHEREAS, the parties to this Agreement have a common interest and statutory authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan in Bois de Sioux and Mustinka Comprehensive Watershed Planning Area to conserve soil and water resources through the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources, ensure continued soil productivity, protect water quality, reduce damages caused by floods, preserve wildlife, protect the tax base, and protect public lands and waters; and

WHEREAS, with matters that relate to coordination of water management authorities pursuant to Minnesota Statutes Chapters 103B, 103C, and 103D with public drainage systems pursuant to Minnesota Statutes Chapter 103E, this Agreement does not change the rights or obligations of the public drainage system authorities.

WHEREAS, the Parties have been awarded a *One Watershed, One Plan* (1W1P) planning grant from the Board of Water and Soil Resources (BWSR) for the development of a Comprehensive Watershed Management Plan.

WHEREAS, the Parties have formed this Agreement for the specific goal of developing a plan pursuant to Minnesota Statutes § 103B.801, Comprehensive Watershed Management Planning, also known as *One Watershed, One Plan*.

WHEREAS, it is the intent of the Parties to develop a coordinated watershed management plan within the boundaries of the Bois de Sioux and Mustinka watersheds.

WHEREAS, the Bois de Sioux and Mustinka Comprehensive Watershed Planning area contains two watersheds that the MPCA has developed a Watershed Restoration and Protection Strategies (WRAPS) for each the Bois de Sioux River and Mustinka River Watersheds.

WHEREAS, the Parties intend to identify planning regions within the proposed planning areas as identified by BWSR that will be consistent with the Bois de Sioux River and Mustinka Comprehensive Watershed Planning Area.

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Purpose:** The Parties to this Agreement recognize the importance of partnerships to plan and implement protection and restoration efforts for the Bois de Sioux and Mustinka Comprehensive Watershed Planning Area *(Attachment A)*. The purpose of this Agreement is to collectively develop and adopt, as local government units, a coordinated watershed management plan for implementation per the provisions of the Plan.
2. **Term:** This Agreement is effective upon signature of all Parties in consideration of the Board of Water and Soil Resources (BWSR) Operating Procedures for One Watershed, One Plan; and will remain in effect until adoption of the plan by all parties unless canceled according to the provisions of this Agreement or earlier terminated by law.
3. **Adding Additional Parties:** A qualifying party desiring to become a member of this Agreement shall indicate its intent by adoption of a board resolution prior to 12/31/2017. The party agrees to abide by the terms and conditions of the Agreement; including but not limited to the bylaws, policies and procedures adopted by the Policy Committee.
4. **Withdrawal of Parties:** A party desiring to leave the membership of this Agreement shall give written notice, including the date of its withdrawal to the Policy Committee in the form of an official board resolution. Notice must be given at least 30 days in advance of the date of withdrawal from the Agreement.
5. **General Provisions:**

    a. **Compliance with Laws/Standards:** The Parties agree to abide by all federal, state, and local laws; statutes, ordinances, rules and regulations now in effect or hereafter adopted pertaining to this Agreement.

    b. **Indemnification:** Each party to this Agreement shall be liable for the acts of its officers, employees or agents and the results thereof to the extent authorized or limited by law and shall not be responsible for the acts of any other party, its officers, employees or agents. The provisions of the Municipal Tort Claims Act, Minnesota Statute Chapter 466 and other applicable laws govern liability of the Parties. To the full extent permitted by law, actions by the Parties,

their respective officers, employees, and agents pursuant to this Agreement are intended to be and shall be construed as a "cooperative activity." It is the intent of the Parties that they shall be deemed a "single governmental unit" for the purpose of liability, as set forth in Minnesota Statutes § 471.59, subd. 1a(a). For purposes of Minnesota Statutes § 471.59, subd. 1a(a) it is the intent of each party that this Agreement does not create any liability or exposure of one party for the acts or omissions of any other party.

c. **Records Retention and Data Practices:** The Parties agree that records created pursuant to the terms of this Agreement will be retained in a manner that meets their respective entity's records retention schedules that have been reviewed and approved by the State in accordance with Minnesota Statutes § 138.17. The Parties further agree that records prepared or maintained in furtherance of the agreement shall be subject to the Minnesota Government Data Practices Act. At the time this agreement expires, all records will be turned over to the Bois de Sioux Watershed District, or other participating LGU as selected by the policy committee, for continued retention.

d. **Timeliness:** The Parties agree to perform obligations under this Agreement in a timely manner and keep each other informed about any delays that may occur.

e. **Extension:** The Parties may extend the termination date of this Agreement upon agreement by all Parties.

f. **Termination:** The parties anticipate that this Agreement will remain in full force and effect through the term of the 1W1P grant agreement with BWSR and/or cancelled by all parties, unless otherwise terminated in accordance with law or other provisions of the Agreement.

6. **Administration:**

a. **Establishment of Committees for Development of the Plan.** The Parties agree to designate one representative, who must be an elected or appointed member of the governing board, to a Policy Committee for development of the watershed-based plan and may appoint one or more technical representatives to an Advisory Committee for development of the plan in consideration of the BWSR Operating Procedures for One Watershed, One Plan.

i. The Policy Committee will meet as needed to decide on the content of the plan, serve as a liaison to their respective boards, and act on behalf of their Board. Each representative shall have one vote.

ii. Each governing board may choose one alternate to serve on the Policy Committee as needed in the absence of the designated member.

iii. The Policy Committee will establish bylaws within 90 days of execution of this document to describe the functions and operations of the committee(s).

iv. The Advisory Committee will meet monthly or as needed to assist and provide technical support and make recommendations to the Policy Committee on the development and content of the plan. Members of the Advisory Committee may not be a current board member of any of the Parties.

b. **Submittal of the Plan.** The Policy Committee will recommend the plan to the Parties of this agreement. The Policy Committee will be responsible for initiating a formal review process for the watershed-based plan conforming to Minnesota Statutes Chapters 103B and 103D, including public hearings. Upon completion of local review and comment, and approval of the plan for submittal by each party, the Policy Committee will submit the watershed-based plan jointly to BWSR for review and approval.

c. **Adoption of the Plan.** The Parties agree to adopt and begin implementation of the plan within 120 days of receiving notice of state approval, and provide notice of plan adoption pursuant to Minnesota Statutes Chapters 103B and 103D.

7. **1W1P Fiscal Agent:** Fiscal duties will be contracted through a participating LGU. Specific duties will be outlined in the contract.

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Bois de Sioux Watershed District
Chad Engels
Senior Project Manager, Moore Engineering Inc.
925 10th Ave.
West Fargo, ND 58078
Telephone: (701) 282-4692

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

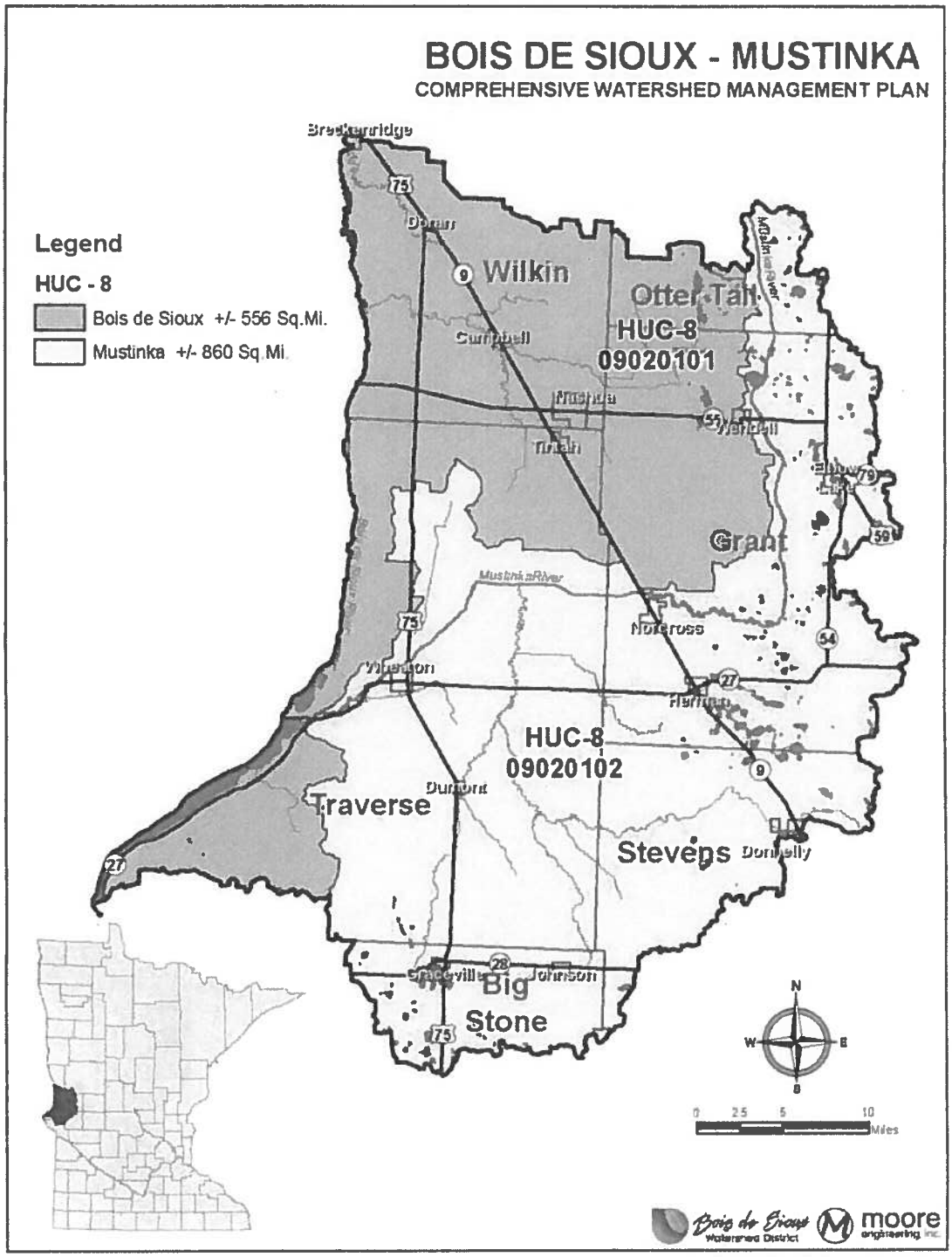
PARTNER: OTTER TAIL COUNTY

APPROVED:

BY: Wayne Johnson 2-27-18
Board Chair Date

BY: [signature] 2/28/18
~~District Manager~~/Administrator Date

Attachment A



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PARTNER: West Otter Tail Swcd

APPROVED:

BY: Richard B. Vigen 12/11/17
Board Chair Date

BY: [signature] 12/11/17
District Manager/Administrator Date

Stevens Co

MEMORANDUM OF AGREEMENT

This agreement (Agreement) is made and entered into by and between:

The Counties of Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin by and through their respective County Board of Commissioners, and
The Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin Soil and Water Conservation Districts, by and through their respective Soil and Water Conservation District Board of Supervisors, and
The Bois de Sioux Watershed District, by and through their respective Board of Managers,

Collectively referred to as the "Parties."

WHEREAS, the Counties of this Agreement are political subdivisions of the State of Minnesota, with authority to carry out environmental programs and land use controls, pursuant to Minnesota Statutes Chapter 375 and as otherwise provided by law; and

WHEREAS, the Soil and Water Conservation Districts (SWCDs) of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out erosion control and other soil and water conservation programs, pursuant to Minnesota Statutes Chapter 103C and as otherwise provided by law; and

WHEREAS, the Watershed Districts of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out conservation of the natural resources of the state by land use controls, flood control, and other conservation projects for the protection of the public health and welfare and the provident use of the natural resources, pursuant to Minnesota Statutes Chapters 103B, 103D and as otherwise provided by law; and

WHEREAS, the parties to this Agreement have a common interest and statutory authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan in Bois de Sioux and Mustinka Comprehensive Watershed Planning Area to conserve soil and water resources through the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources, ensure continued soil productivity, protect water quality, reduce damages caused by floods, preserve wildlife, protect the tax base, and protect public lands and waters; and

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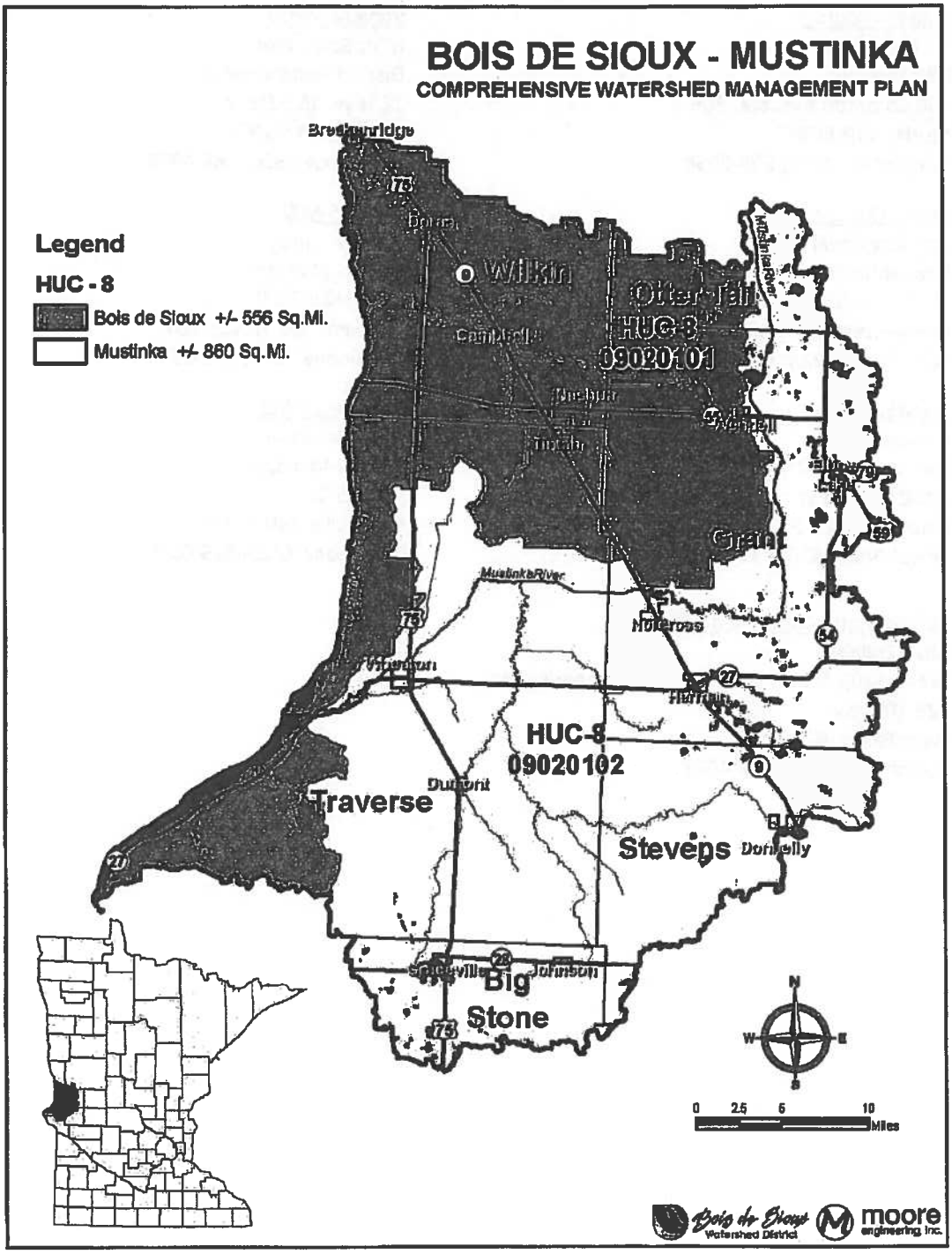
Attachment A



IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: Stevens County

APPROVED:

BY: Rolly Stupe 12/12/19
Board Chair Date

BY: Rebecca Jury 12/19/17
~~District Manager/Administrator~~ Date
City Coord.

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: Stevens SWCD

APPROVED:

BY: _____ 12-12-17
Board Chair Date

BY: _____ 12-12-17
District Manager/Administrator Date

MEMORANDUM OF AGREEMENT

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The Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin Soil and Water Conservation Districts, by and through their respective Soil and Water Conservation District Board of Supervisors, and
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WHEREAS, the parties to this Agreement have a common interest and statutory authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan in Bois de Sioux and Mustinka Comprehensive Watershed Planning Area to conserve soil and water resources through the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources, ensure continued soil productivity, protect water quality, reduce damages caused by floods, preserve wildlife, protect the tax base, and protect public lands and waters; and

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    b. **Indemnification:** Each party to this Agreement shall be liable for the acts of its officers, employees or agents and the results thereof to the extent authorized or limited by law and shall not be responsible for the acts of any other party, its officers, employees or agents. The provisions of the Municipal Tort Claims Act, Minnesota Statute Chapter 466 and other applicable laws govern liability of the Parties. To the full extent permitted by law, actions by the Parties,

their respective officers, employees, and agents pursuant to this Agreement are intended to be and shall be construed as a "cooperative activity." It is the intent of the Parties that they shall be deemed a "single governmental unit" for the purpose of liability, as set forth in Minnesota Statutes § 471.59, subd. 1a(a). For purposes of Minnesota Statutes § 471.59, subd. 1a(a) it is the intent of each party that this Agreement does not create any liability or exposure of one party for the acts or omissions of any other party.

c. **Records Retention and Data Practices:** The Parties agree that records created pursuant to the terms of this Agreement will be retained in a manner that meets their respective entity's records retention schedules that have been reviewed and approved by the State in accordance with Minnesota Statutes § 138.17. The Parties further agree that records prepared or maintained in furtherance of the agreement shall be subject to the Minnesota Government Data Practices Act. At the time this agreement expires, all records will be turned over to the Bois de Sioux Watershed District, or other participating LGU as selected by the policy committee, for continued retention.

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c. **Adoption of the Plan.** The Parties agree to adopt and begin implementation of the plan within 120 days of receiving notice of state approval, and provide notice of plan adoption pursuant to Minnesota Statutes Chapters 103B and 103D.

7. **1W1P Fiscal Agent:** Fiscal duties will be contracted through a participating LGU. Specific duties will be outlined in the contract.

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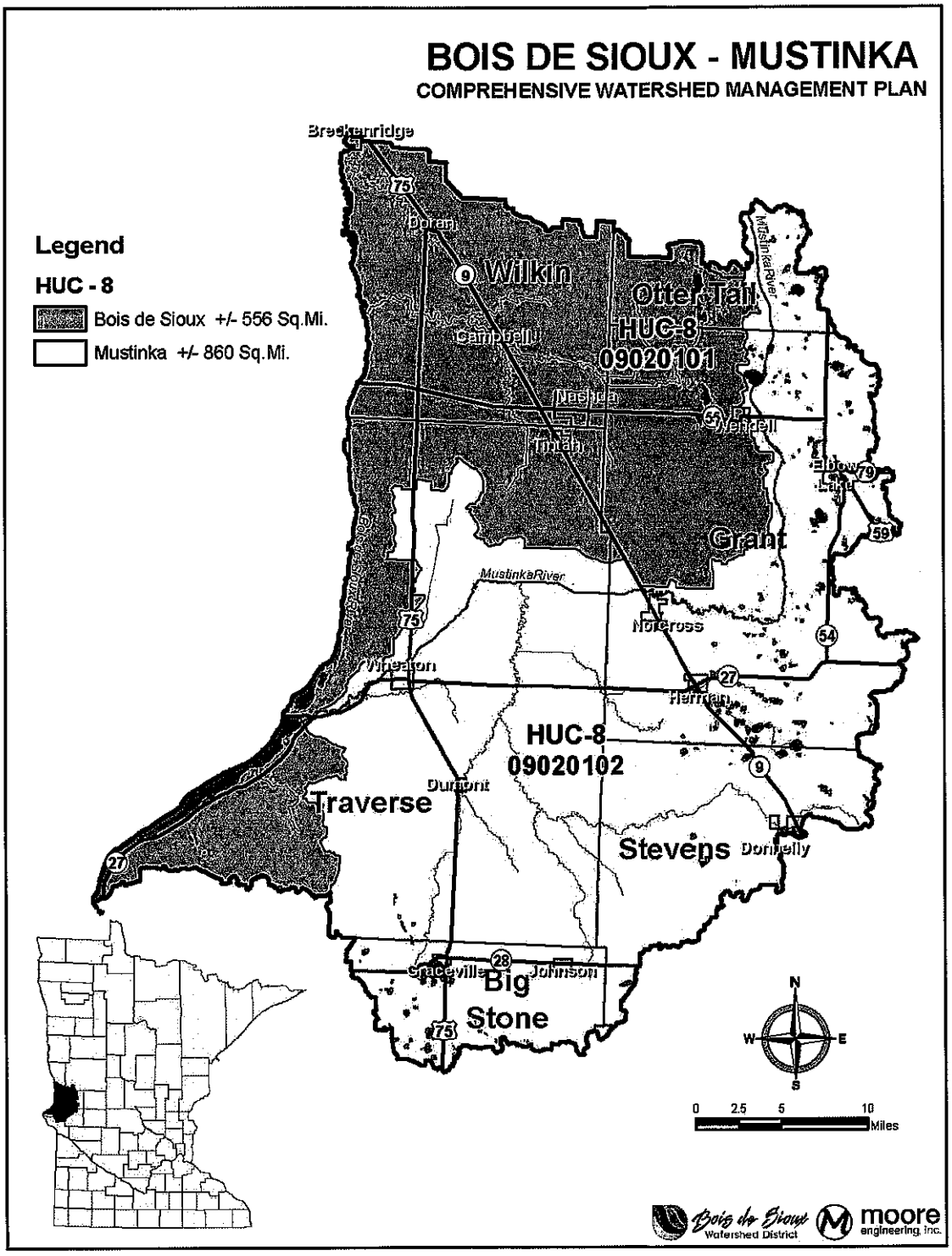
Attachment A



IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: Stevens County

APPROVED:

BY: Ronald Stone 12/12/19
Board Chair Date

BY: Rebecca Jury 12/19/17
~~District Manager~~/Administrator Date
Cty Coord.

Traverse Co

MEMORANDUM OF AGREEMENT

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The Counties of Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin by and through their respective County Board of Commissioners, and
The Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin Soil and Water Conservation Districts, by and through their respective Soil and Water Conservation District Board of Supervisors, and
The Bois de Sioux Watershed District, by and through their respective Board of Managers,

Collectively referred to as the "Parties."

WHEREAS, the Counties of this Agreement are political subdivisions of the State of Minnesota, with authority to carry out environmental programs and land use controls, pursuant to Minnesota Statutes Chapter 375 and as otherwise provided by law; and

WHEREAS, the Soil and Water Conservation Districts (SWCDs) of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out erosion control and other soil and water conservation programs, pursuant to Minnesota Statutes Chapter 103C and as otherwise provided by law; and

WHEREAS, the Watershed Districts of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out conservation of the natural resources of the state by land use controls, flood control, and other conservation projects for the protection of the public health and welfare and the provident use of the natural resources, pursuant to Minnesota Statutes Chapters 103B, 103D and as otherwise provided by law; and

WHEREAS, the parties to this Agreement have a common interest and statutory authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan in Bois de Sioux and Mustinka Comprehensive Watershed Planning Area to conserve soil and water resources through the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources, ensure continued soil productivity, protect water quality, reduce damages caused by floods, preserve wildlife, protect the tax base, and protect public lands and waters; and

WHEREAS, with matters that relate to coordination of water management authorities pursuant to Minnesota Statutes Chapters 103B, 103C, and 103D with public drainage systems pursuant to Minnesota Statutes Chapter 103E, this Agreement does not change the rights or obligations of the public drainage system authorities.

WHEREAS, the Parties have been awarded a *One Watershed, One Plan* (1W1P) planning grant from the Board of Water and Soil Resources (BWSR) for the development of a Comprehensive Watershed Management Plan.

WHEREAS, the Parties have formed this Agreement for the specific goal of developing a plan pursuant to Minnesota Statutes § 103B.801, Comprehensive Watershed Management Planning, also known as *One Watershed, One Plan*.

WHEREAS, it is the intent of the Parties to develop a coordinated watershed management plan within the boundaries of the Bois de Sioux and Mustinka watersheds.

WHEREAS, the Bois de Sioux and Mustinka Comprehensive Watershed Planning area contains two watersheds that the MPCA has developed a Watershed Restoration and Protection Strategies (WRAPS) for each the Bois de Sioux River and Mustinka River Watersheds.

WHEREAS, the Parties intend to identify planning regions within the proposed planning areas as identified by BWSR that will be consistent with the Bois de Sioux River and Mustinka Comprehensive Watershed Planning Area.

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Purpose:** The Parties to this Agreement recognize the importance of partnerships to plan and implement protection and restoration efforts for the Bois de Sioux and Mustinka Comprehensive Watershed Planning Area *(Attachment A)*. The purpose of this Agreement is to collectively develop and adopt, as local government units, a coordinated watershed management plan for implementation per the provisions of the Plan.

2. **Term:** This Agreement is effective upon signature of all Parties in consideration of the Board of Water and Soil Resources (BWSR) Operating Procedures for One Watershed, One Plan; and will remain in effect until adoption of the plan by all parties unless canceled according to the provisions of this Agreement or earlier terminated by law.

3. **Adding Additional Parties:** A qualifying party desiring to become a member of this Agreement shall indicate its intent by adoption of a board resolution prior to 12/31/2017. The party agrees to abide by the terms and conditions of the Agreement; including but not limited to the bylaws, policies and procedures adopted by the Policy Committee.

4. **Withdrawal of Parties:** A party desiring to leave the membership of this Agreement shall give written notice, including the date of its withdrawal to the Policy Committee in the form of an official board resolution. Notice must be given at least 30 days in advance of the date of withdrawal from the Agreement.

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IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

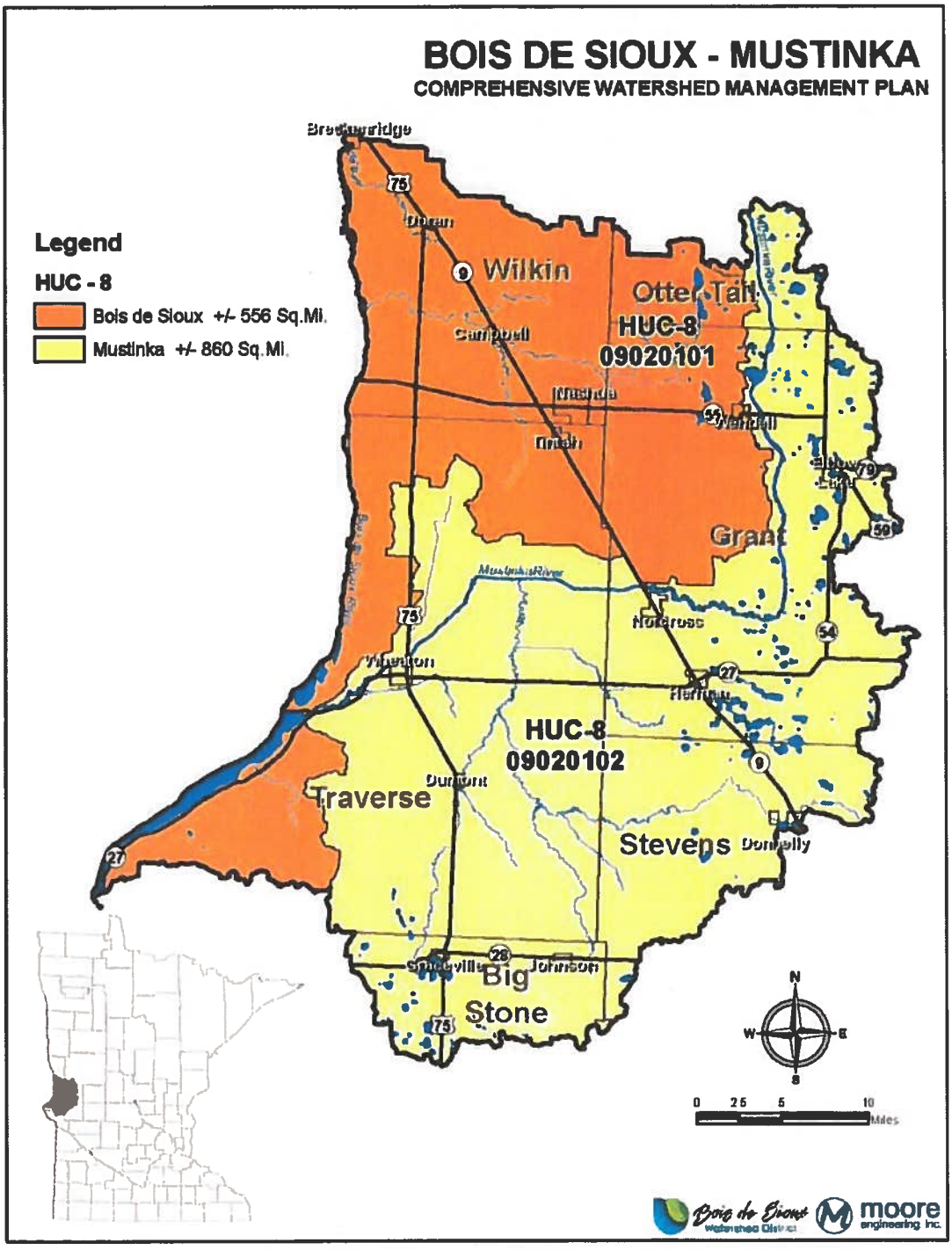
PARTNER: Traverse County

APPROVED:

BY: _____ 12/19/2017
Board Chair **Date**

BY: _____ 12-19-2017
District Manager/Administrator **Date**

Attachment A



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The Bois de Sioux Watershed District, by and through their respective Board of Managers,

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IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: Greg Happe

Traverse Soil and Water Conservation District

APPROVED:

BY: Greg Happe 12/7/2017

Board Chair **Date**

BY: Susa Gronfeld 12/7/2017

District Manager/Administrator **Date**

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i. The Policy Committee will meet as needed to decide on the content of the plan, serve as a liaison to their respective boards, and act on behalf of their Board. Each representative shall have one vote.

ii. Each governing board may choose one alternate to serve on the Policy Committee as needed in the absence of the designated member.

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7. **1W1P Fiscal Agent:** Fiscal duties will be contracted through a participating LGU. Specific duties will be outlined in the contract.

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Telephone: (218) 643-2933

Big Stone SWCD
Beau Peterson
District Manager
990 US-12
Ortonville, MN 56278
Telephone: (320) 839-6149

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

PARTNER: Greg Hoppe

Traverse Soil and Water Conservation District

APPROVED:

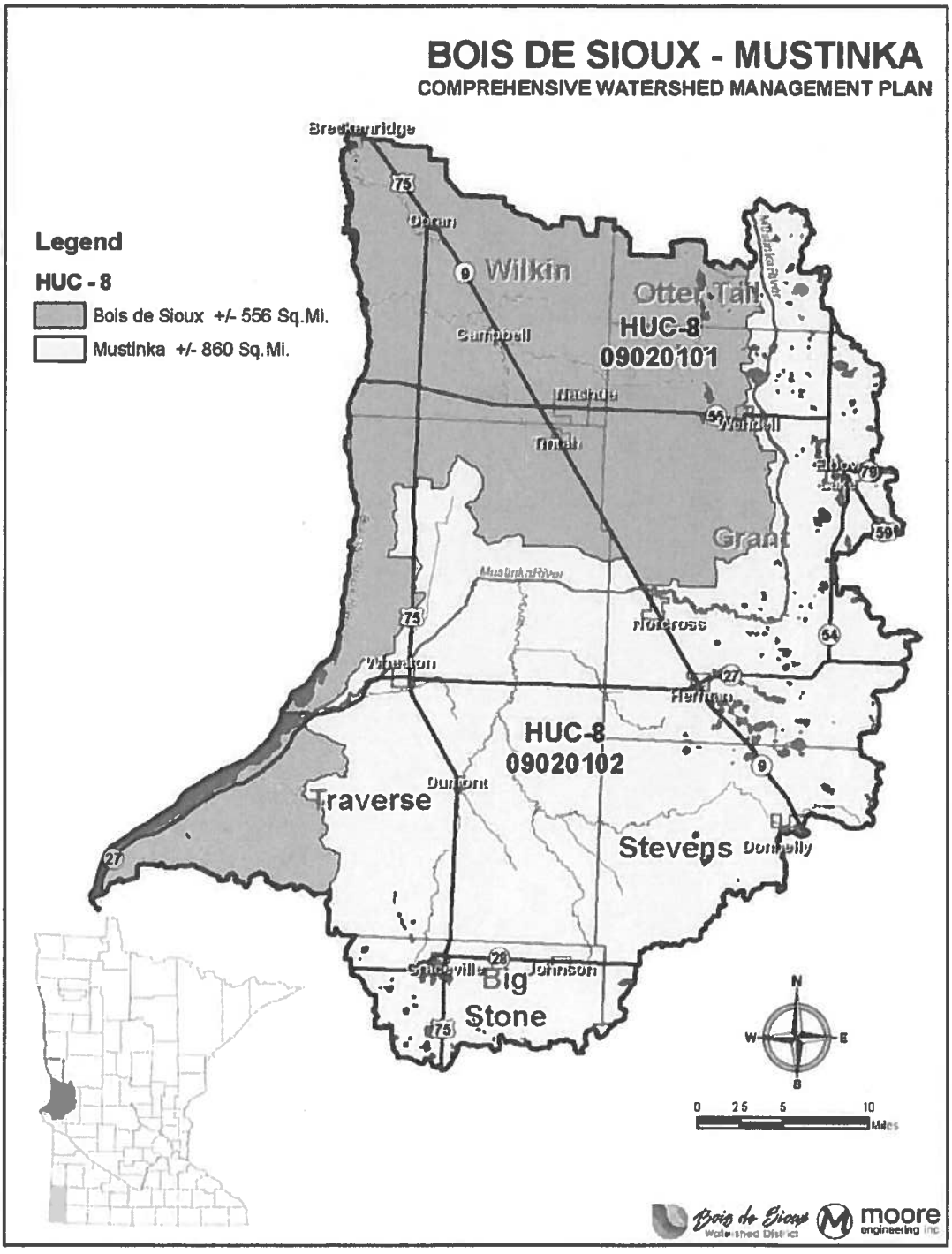
BY: Greg Hoppe 12/7/2017

Board Chair **Date**

BY: Susa Gronfeld 12/7/2017

District Manager/Administrator **Date**

Attachment A



Wilkin Co

MEMORANDUM OF AGREEMENT

This agreement (Agreement) is made and entered into by and between:

The Counties of Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin by and through their respective County Board of Commissioners, and

The Big Stone, Grant, Otter Tail, Stevens, Traverse and Wilkin Soil and Water Conservation Districts, by and through their respective Soil and Water Conservation District Board of Supervisors, and

The Bois de Sioux Watershed District, by and through their respective Board of Managers,

Collectively referred to as the "Parties."

WHEREAS, the Counties of this Agreement are political subdivisions of the State of Minnesota, with authority to carry out environmental programs and land use controls, pursuant to Minnesota Statutes Chapter 375 and as otherwise provided by law; and

WHEREAS, the Soil and Water Conservation Districts (SWCDs) of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out erosion control and other soil and water conservation programs, pursuant to Minnesota Statutes Chapter 103C and as otherwise provided by law; and

WHEREAS, the Watershed Districts of this Agreement are political subdivisions of the State of Minnesota, with statutory authority to carry out conservation of the natural resources of the state by land use controls, flood control, and other conservation projects for the protection of the public health and welfare and the provident use of the natural resources, pursuant to Minnesota Statutes Chapters 103B, 103D and as otherwise provided by law; and

WHEREAS, the parties to this Agreement have a common interest and statutory authority to prepare, adopt, and assure implementation of a comprehensive watershed management plan in Bois de Sioux and Mustinka Comprehensive Watershed Planning Area to conserve soil and water resources through the implementation of practices, programs, and regulatory controls that effectively control or prevent erosion, sedimentation, siltation and related pollution in order to preserve natural resources, ensure continued soil productivity, protect water quality, reduce damages caused by floods, preserve wildlife, protect the tax base, and protect public lands and waters; and

WHEREAS, with matters that relate to coordination of water management authorities pursuant to Minnesota Statutes Chapters 103B, 103C, and 103D with public drainage systems pursuant to Minnesota Statutes Chapter 103E, this Agreement does not change the rights or obligations of the public drainage system authorities.

WHEREAS, the Parties have been awarded a *One Watershed, One Plan* (1W1P) planning grant from the Board of Water and Soil Resources (BWSR) for the development of a Comprehensive Watershed Management Plan.

WHEREAS, the Parties have formed this Agreement for the specific goal of developing a plan pursuant to Minnesota Statutes § 103B.801, Comprehensive Watershed Management Planning, also known as *One Watershed, One Plan*.

WHEREAS, it is the intent of the Parties to develop a coordinated watershed management plan within the boundaries of the Bois de Sioux and Mustinka watersheds.

WHEREAS, the Bois de Sioux and Mustinka Comprehensive Watershed Planning area contains two watersheds that the MPCA has developed a Watershed Restoration and Protection Strategies (WRAPS) for each the Bois de Sioux River and Mustinka River Watersheds.

WHEREAS, the Parties intend to identify planning regions within the proposed planning areas as identified by BWSR that will be consistent with the Bois de Sioux River and Mustinka Comprehensive Watershed Planning Area.

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Purpose:** The Parties to this Agreement recognize the importance of partnerships to plan and implement protection and restoration efforts for the Bois de Sioux and Mustinka Comprehensive Watershed Planning Area *(Attachment A)*. The purpose of this Agreement is to collectively develop and adopt, as local government units, a coordinated watershed management plan for implementation per the provisions of the Plan.

2. **Term:** This Agreement is effective upon signature of all Parties in consideration of the Board of Water and Soil Resources (BWSR) Operating Procedures for One Watershed, One Plan; and will remain in effect until adoption of the plan by all parties unless canceled according to the provisions of this Agreement or earlier terminated by law.

3. **Adding Additional Parties:** A qualifying party desiring to become a member of this Agreement shall indicate its intent by adoption of a board resolution prior to 12/31/2017. The party agrees to abide by the terms and conditions of the Agreement; including but not limited to the bylaws, policies and procedures adopted by the Policy Committee.

4. **Withdrawal of Parties:** A party desiring to leave the membership of this Agreement shall give written notice, including the date of its withdrawal to the Policy Committee in the form of an official board resolution. Notice must be given at least 30 days in advance of the date of withdrawal from the Agreement.

5. **General Provisions:**

    a. **Compliance with Laws/Standards:** The Parties agree to abide by all federal, state, and local laws; statutes, ordinances, rules and regulations now in effect or hereafter adopted pertaining to this Agreement.

    b. **Indemnification:** Each party to this Agreement shall be liable for the acts of its officers, employees or agents and the results thereof to the extent authorized or limited by law and shall not be responsible for the acts of any other party, its officers, employees or agents. The provisions of the Municipal Tort Claims Act, Minnesota Statute Chapter 466 and other applicable laws govern liability of the Parties. To the full extent permitted by law, actions by the Parties,

their respective officers, employees, and agents pursuant to this Agreement are intended to be and shall be construed as a "cooperative activity." It is the intent of the Parties that they shall be deemed a "single governmental unit" for the purpose of liability, as set forth in Minnesota Statutes § 471.59, subd. 1a(a). For purposes of Minnesota Statutes § 471.59, subd. 1a(a) it is the intent of each party that this Agreement does not create any liability or exposure of one party for the acts or omissions of any other party.

c. **Records Retention and Data Practices:** The Parties agree that records created pursuant to the terms of this Agreement will be retained in a manner that meets their respective entity's records retention schedules that have been reviewed and approved by the State in accordance with Minnesota Statutes § 138.17. The Parties further agree that records prepared or maintained in furtherance of the agreement shall be subject to the Minnesota Government Data Practices Act. At the time this agreement expires, all records will be turned over to the Bois de Sioux Watershed District, or other participating LGU as selected by the policy committee, for continued retention.

d. **Timeliness:** The Parties agree to perform obligations under this Agreement in a timely manner and keep each other informed about any delays that may occur.

e. **Extension:** The Parties may extend the termination date of this Agreement upon agreement by all Parties.

f. **Termination:** The parties anticipate that this Agreement will remain in full force and effect through the term of the 1W1P grant agreement with BWSR and/or cancelled by all parties, unless otherwise terminated in accordance with law or other provisions of the Agreement.

6. **Administration:**

a. **Establishment of Committees for Development of the Plan.** The Parties agree to designate one representative, who must be an elected or appointed member of the governing board, to a Policy Committee for development of the watershed-based plan and may appoint one or more technical representatives to an Advisory Committee for development of the plan in consideration of the BWSR Operating Procedures for One Watershed, One Plan.

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Telephone: (320) 839-6149

IN TESTIMONY WHEREOF the Parties have duly executed this agreement by their duly authorized officers.

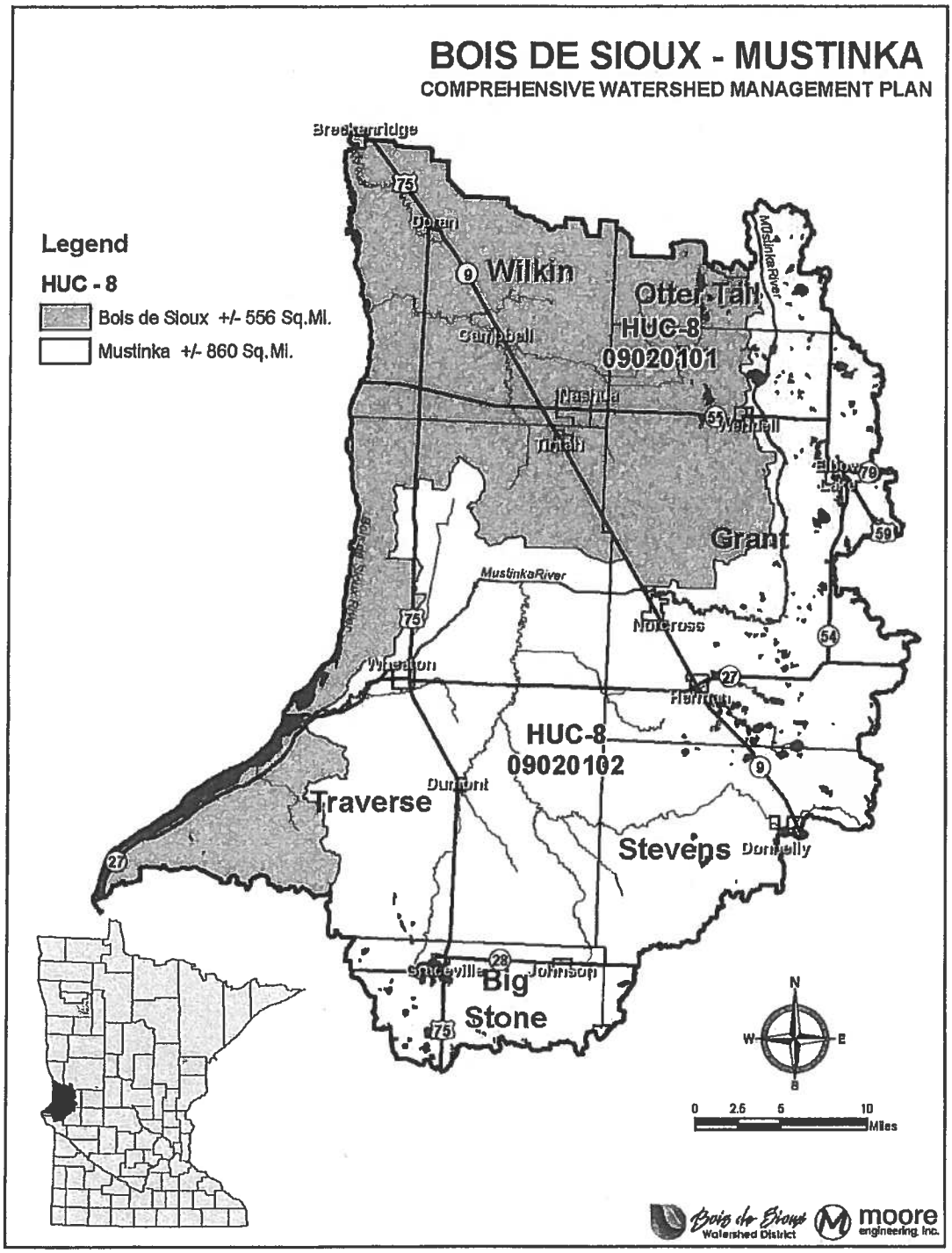
PARTNER: Wilkin County

APPROVED:

BY: Stephanie Miranowski 12/12/17
Board Chair Date

BY: [signature] 12/12/17
District Manager/Administrator Date

Attachment A



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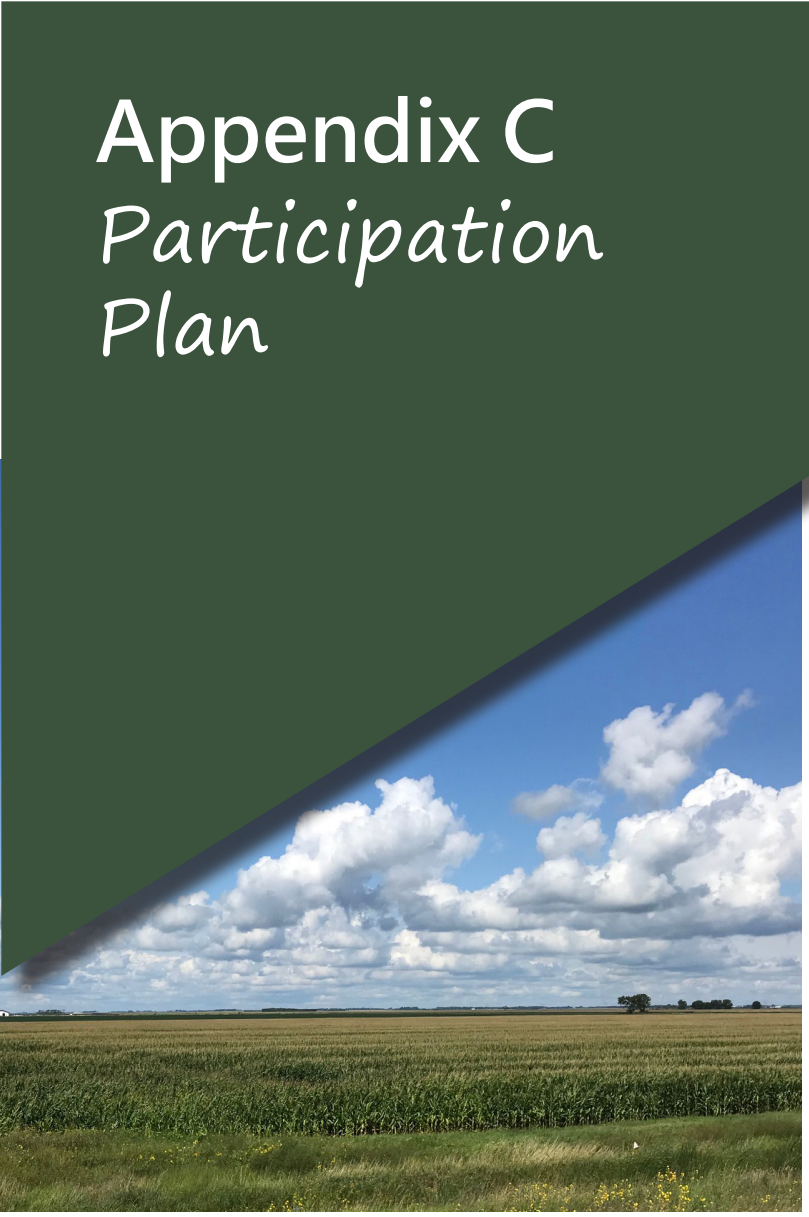
PARTNER: WILKIN SWCD

APPROVED:

BY: _____ 12-13-17
Board Chair Date

BY: _____ 11/13/17
District Manager/Administrator Date

Appendix C
Participation Plan



March 7, 2019

Bois de Sioux - Mustinka One Watershed, One Plan

Participation Plan

Image source: Bois de Sioux Watershed District

Table of Contents

Acronyms and Abbreviations List

1W1P	One Watershed, One Plan
BWSR	Board of Water and Soil Resources
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MNDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
SWCD	Soil & Water Conservation District

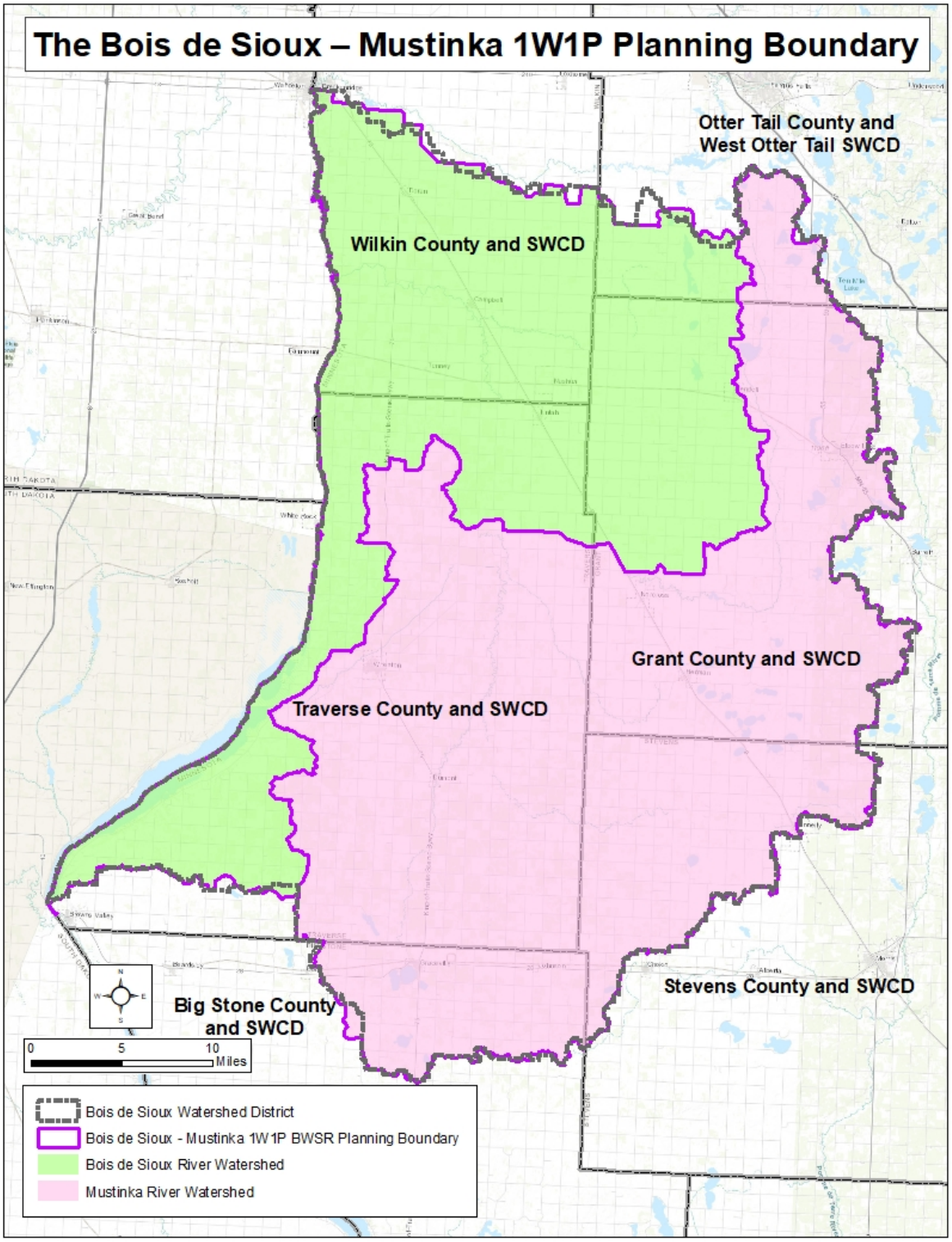
1 BACKGROUND

The Big Stone, Grant, Otter Tail, Stevens, Traverse, and Wilkin Counties, by and through their respective County Board of Commissioners, and the Big Stone, Grant, West Otter Tail, Stevens, Traverse, and Wilkin Soil and Water Conservation Districts (SWCDs), by and through their respective SWCD Board of Supervisors, and the Bois de Sioux Watershed District, by and through its respective Board of Managers were selected in the 2017 planning year by the Board of Water and Soil Resources (BWSR), to complete a One Watershed One Plan (1W1P). Collectively, the parties are called the Bois de Sioux – Mustinka 1W1P Partnership (hereafter referred to as the "Partnership"). The Bois de Sioux – Mustinka 1W1P planning area is comprised of two major watersheds: the Bios de Sioux River Watershed and the Mustinka River Watershed. These watersheds and the Bois de Sioux – Mustinka 1W1P planning area is shown in **Figure 1**.

The Partnership is responsible for preparing a Comprehensive Watershed Management Plan (Plan) under the 1W1P effort. The members of the local government units share an interest in and the statutory authority to prepare, adopt, and assure implementation of a Plan for the Bois de Sioux – Mustinka de Sioux River Watershed.

The purpose of this document is to describe the participation process for developing the Plan.

Figure 1. Bois de Sioux – Mustinka 1W1P Planning Area, as established by the Board of Water and Soil Resources (BWSR)



2 COMMITTEES & ROLES

One of the guiding principles of 1W1P is that the process "must involve a broad range of stakeholders to ensure an integrated approach to watershed management." A stakeholder is defined as a party (person or group) who holds a vested interest in the outcome of the planning process. The primary outcome resulting from the Plan will be a targeted implementation schedule, focused on the implementation of specific best management practices, capital improvement projects, educational and outreach programs, monitoring activities, and regulatory controls.

Participants in the planning process are comprised of several potential stakeholder target audiences or planning committees. These committees and their respective planning roles are described in the following sections.

2.1 Steering Committee

The Steering Committee is comprised of local SWCD, County, and Watershed District staff for the purposes of logistical and day-to-day decision-making in the planning process. The Steering Committee includes the plan writing consultant, plan facilitator, and BWSR Board Conservationist who are also responsible for assembling the draft and final Plan. Members of the Steering Committee are responsible for providing information needed for the planning process, reviewing and accepting draft plan related information, and assisting in Plan development. Identifying priority resources, concerns, and issues for their specific jurisdictional boundary is also the responsibility of the Steering Committee.

The Steering Committee will meet monthly and/ or as needed to maintain pace of progress for plan development. Decisions about Plan content will progress without designated Lead or Alternate attendance. If Steering Committee absences becomes evident, at the discretion of the Steering Committee, Steering Committee member must attend Policy Committee meeting to explain absence.

2.2 Advisory Committee

Membership on the Advisory Committee may consist of members from the Steering Committee, other local government staff, the state's main water agencies and/or plan review agencies, interested members of the general public, trade organizations, nonprofit organizations, and special interest groups. Leaders within the local community are valued members of the Advisory Committee. Membership to the Advisory Committee is reviewed and approved by the Policy Committee.

The purpose of an Advisory Committee is to make recommendations on the Plan and the targeted implementation schedule to the Policy Committee, including identification of priority resources, concerns, and issues affecting the plan area. Expectations are that members of the Advisory Committee will communicate Plan related activities to their respective organizations. Advisory Committee members are

expected to communicate practical concerns during the plan development process and to assist the Policy Committee in ensuring a credible Plan development process. Meetings for Advisory Committee members are expected to be every other month or when subject matter expertise is warranted. No less than three Steering Committee members will attend Advisory Committee meetings.

Each state or federal agency or organization participating on the Advisory Committee shall designate one lead representative and one designated alternate. An agency's or organization's guidance, input, and decisions shall be communicated through the lead representative or designated alternative. The lead agency or organization representative is expected to coordinate information flow and communication within their agency or organization.

2.3 Policy Committee

The primary role of the Policy Committee is to collectively develop and adopt, as local government units, a coordinated watershed management plan within the Bois de Sioux – Mustinka 1W1P planning area. Bylaws have been adopted to guide the decision-making process, leadership, and direction of process for the Policy Committee. Expectations are that the Policy Committee will review and approve information about the priority resources, concerns and issues affecting the plan area, and review and approve the Plan. An additional expectation is that members of the Policy Committee will engage in constructive discussion and debate about issues addressed by the Plan and provide consensus direction on plan development matters to the Steering Committee. The Policy Committee will also review and approve membership on the Advisory Committee. Meeting commitments for the Policy Committee are expected to be every other month. The Policy Committee has additional obligations as described by the Memorandum of Agreement executed by the Partnership.

2.4 General Public

Various public meetings and hearings will be completed as part of the Plan development process. The general public is expected to be an important stakeholder group. Input from the public meetings will be used to ensure a complete list of priority issues is developed. The role of the general public is expected to include identifying issues affecting resources. At the direction of the local committees, the public may also be engaged to rank issues establishing a "public priority" rank. An additional role for the general public is expected to include review of and discussion about the targeted implementation schedule and ability to achieve the measurable goals.

3 INTENT FOR STAKEHOLDER INVOLVEMENT

The principal intent of involving stakeholders during the planning process is to discover what's happening in the watershed, what is important to stakeholders, and build acceptance of the Plan and the

recommended solutions described by the targeted implementation schedule. Acceptance is critical because the Partnership is focused on actively utilizing their Plan to implement projects and programs within the Bois de Sioux – Mustinka 1W1P planning area. Successful implementation will depend highly on the degree to which the stakeholders believe their concerns, issues, or expectations are addressed within the Plan.

The Partnership intends for the stakeholder involvement process to be active, genuine, and credible. To that end, the stakeholder groups will be involved early in the planning process and will remain engaged through plan completion. Input provided by stakeholders is intended to help ensure the comprehensiveness of the Plan and validate the implementation priorities of the Partnership and stakeholders.

4 TOOLS FOR STAKEHOLDER INVOLVEMENT

The Partnership expects to use several tools to involve stakeholders. These tools include:

- Informing the stakeholders of status and progress by posting information on a website;
- Convening meetings and workshops with stakeholders at key milestones to discuss relevant content and obtain input; and
- Use of existing "standing" committees within each county, including local water plan advisory committees. These committees tend to include broad representation.

In addition, BWSR has developed guidance for agency comments for the 1W1P planning process that is applicable to all stakeholder groups participating in Plan development (See table below for BWSR guidance on providing comments). This guidance is available on the link provided below.
http://www.bwsr.state.mn.us/planning/1W1P/Best_Practices_for_Agency_Comments_on_Water_Plans.pdf

Practical and Valuable Comments	Less Valuable Comments
The following types of comments can be very valuable to the planning effort: ■ Feedback on the legality or statutory authority of a proposed action or strategy in a plan, and/or consistency with an agency rule or policy ■ Identification of opportunities for agency collaboration, including when an agency might be willing to lead and/or funds are available through the agency to accomplish a strategy or action ■ Identification of alternative methods to identify or accomplish a goal ■ Identification of data not reviewed or properly considered, or data that may validate a potential concern or issue ■ Work that can or will be done in the future to improve the plan	The following types of comments are less valuable to the planning process: ■ Individual comments that have not been vetted or delivered as an agency perspective ■ Comments that question a method without suggestions for an alternative method ■ Editorial comments, especially in early working drafts of plans, unless the text is unclear

5 CONDUCT

The conduct of members of the various stakeholder groups—how the committees function and affect the process—will be based on the overall intent of building acceptance of the Plan through a credible yet timely process. Where appropriate, the Partnership will strive to achieve consensus on Plan related matters. However, because of the diversity of issues and range of resources, full agreement between or among all stakeholders is not realistic or expected. Within the Policy Committee, bylaws specify voting. The ultimate responsibility for the content of the Plan rests with the Policy Committee. Participants are expected to act in a professional, constructive, and contributory manner. Members failing to act in good faith during the planning process can be removed from the Advisory Committee by consensus of the Policy Committee.

6 STAKEHOLDER LIST *(SUBJECT TO CHANGE)*

6.1 Steering Committee Members

Member Organization	Committee Representative	Designated Alternate
Big Stone County	Danny Tuckett	
Big Stone SWCD	Beau Peterson	Joseph Otto
Grant County	Greg Lillemon	
Grant SWCD	Joe Montonye	Jared House
Otter Tail County	Kyle Westergard	
West Otter Tail SWCD	Brad Mergens	Ben Underhill
Stevens County	Bill Kliendl	
Stevens SWCD	Matt Solemsaas	
Traverse County	Lynn Siegel	Bruce Johnson
Traverse SWCD	Sara Gronfeld	Bruce Johnson
Wilkin County	Breanna Koval	
Wilkin SWCD	Craig Lingen	Don Bajumpaa
Bois de Sioux Watershed District	Jamie Beyer	Linda Vavra
Moore Engineering, Inc.	Chad Engels	

6.2 Advisory Committee Members

Note: Members of the Policy Committee and Steering Committee can also participate in the Advisory Committee.

Member Organization	Committee Representative	Designated Alternate
Big Stone County	Danny Tuckett	
Big Stone SWCD	Beau Peterson	Joseph Otto
Grant County	Greg Lillemon	
Grant SWCD	Joe Montonye	Jared House
Otter Tail County	Kyle Westergard	
West Otter Tail SWCD	Brad Mergens	Ben Underhill
Stevens County	Bill Kliendl	
Stevens SWCD	Matt Solemsaas	
Traverse County	Lynn Siegel	Bruce Johnson

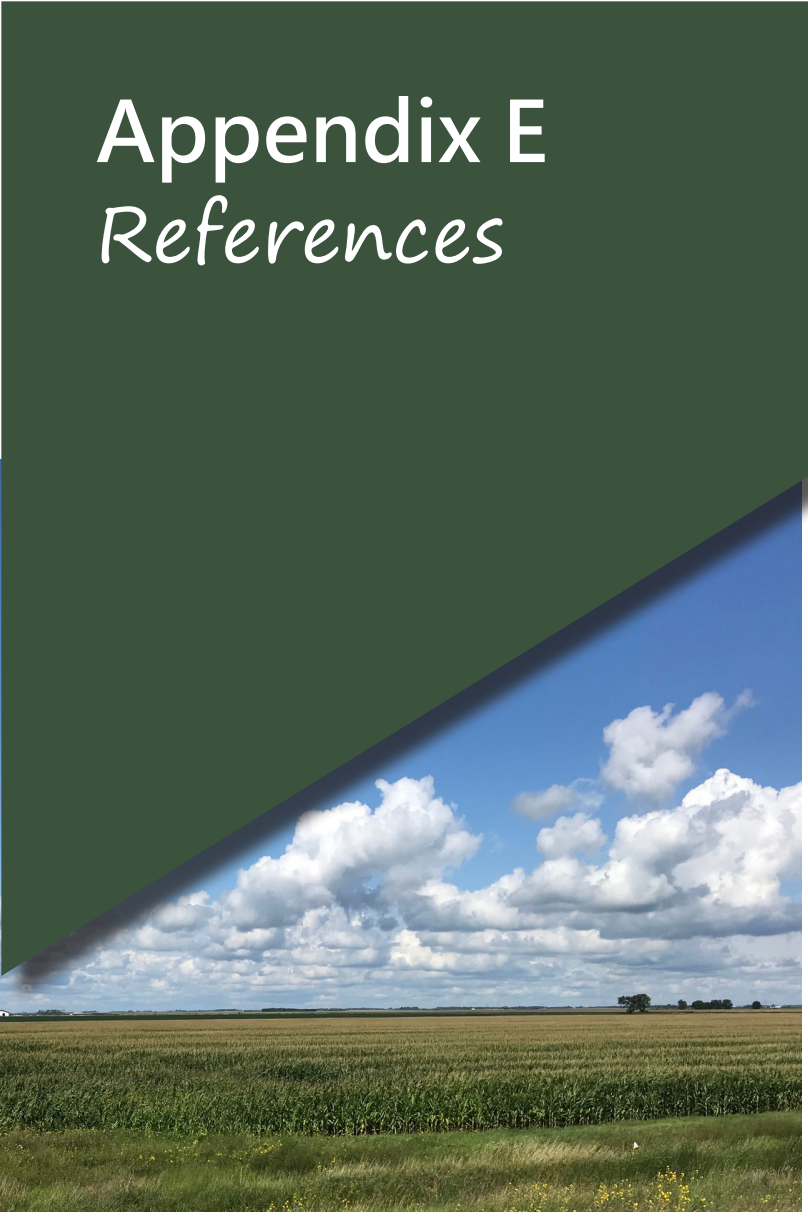
Traverse SWCD	Sara Gronfeld	Bruce Johnson
Wilkin County	Breanna Koval	
Wilkin SWCD	Craig Lingen	Don Bajumpaa
Bois de Sioux Watershed District	Jamie Beyer	Linda Vavra
BWSR	Pete Waller	
BWSR	Henry Van Offelen	
MNDNR	Annette Drewes	
MPCA	Cary Hernandez	
MDA	Ryan Lemickson	
MDH	Amanda Strommer	

6.3 Policy Committee Members

Member Organization	Committee Representative	Designated Alternate
Big Stone County	Commissioner Jay Backer	
Big Stone SWCD	Supervisor Dan Morrill	
Grant County	Commissioner Bill LaValley	Commissioner Doyle Sperr
Grant SWCD	Supervisor Randy Larson	Supervisor Odell Christenson
Otter Tail County	Commissioner John Lindquist	Commissioner Lee Rogness
West Otter Tail SWCD	Supervisor John Walkup	Supervisor Richard Viger
Stevens County	Commissioner Ron Staples	Commissioner Neil Wiese
Stevens SWCD	Supervisor Greg Fynboh	Supervisor Debbie Anderson
Traverse County	Commissioner Tom Monson	Commissioner Kevin Leininger
Traverse SWCD	Supervisor Chester Raguse	Supervisor Carol Johnson
Wilkin County	Commissioner Eric Klindt	Commissioner Dennis Larson
Wilkin SWCD	Supervisor Kyle Gowin	Supervisor Josh Deal
Bois de Sioux Watershed District	Manager Linda Vavra	Manager Allen Wold

Appendix D
Plan Comments and Responses

Appendix E
References



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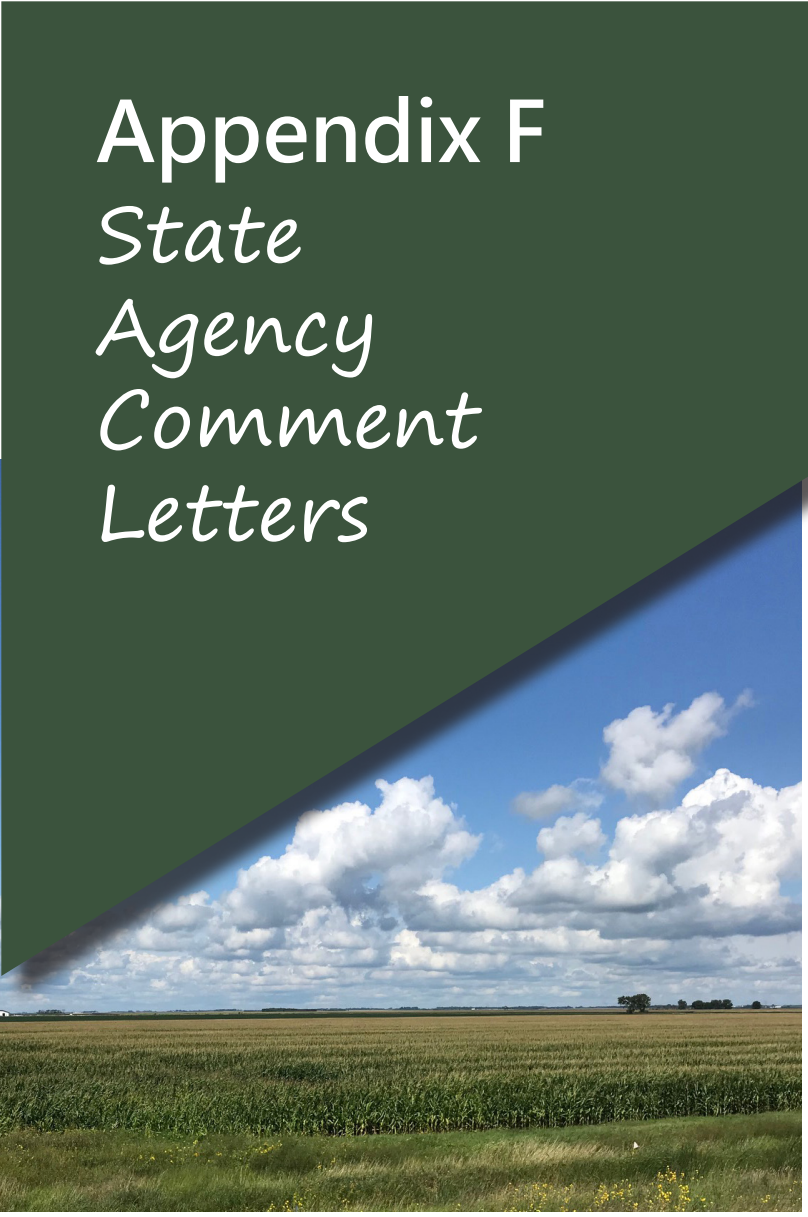
Appendix F
State Agency Comment Letters



BOARD OF WATER AND SOIL RESOURCES

March 29, 2019

Bois de Sioux – Mustinka Partnership
C/O Jamie Beyer, Bois de Sioux Watershed District
704 Hwy 75 South
Wheaton, MN 56296
bdswd@runestone.net

Dear Jamie,

Thank you for this opportunity to provide input into the priority issues being considered in development of the Bois de Sioux – Mustinka comprehensive watershed management plan(s) under Minnesota Statutes section 103B.801.

The planning team has recently drafted a list of issues statements. The following list of issues are the highest priority issues from the perspective of the Board of Water and Soil Resources (BWSR).

Issue Statement - Drainage System instability &/or inadequacy: Erosion, sedimentation & channel instability and/or inadequacy contribute to flood damages and have an effect on surface water quality throughout the Bois de Sioux and Mustinka watersheds. The planning partners are encouraged to identify and prioritize specific resources impacted by this issue and develop implementation strategies consistent with multipurpose drainage principles and the Basin Technical and Scientific Advisory Committee papers related to surface and sub-surface drainage to ensure these plans provide comprehensive solutions to drainage water management

Issue Statement - Non-point source loading (sediment, nutrient &/or bacteria) to surface waters: Improving water quality should be a priority issue within the watersheds. Numerous impaired waters have been identified by the MPCA in the Watershed Restoration and Protection Strategy (WRAPS) process. The State's Nonpoint Priority Funding Plan (NPFP) recommends that priority waters for protection and restoration are those which are listed as impaired but nearly meet standards and those waters not listed as impaired that barely meet standards. The NPFP outlines a criteria-based process to prioritize Clean Water Fund investments which can be found at http://bwsr.state.mn.us/planning/npfp/index.html .

Issue Statement – Loss and degradation of wetland habitat: The Bois de Sioux & Mustinka watersheds provide many opportunities to restore drained basins which will augment base flows, attenuate peak flows, improve water quality and restore habitat. A variety of data and tools are available in the watershed to help identify and prioritize restorations to achieve watershed management goals. As these watershed plans are developed, BWSR staff look forward to providing an overview of some of this data and can also provide information on the compensation planning framework (CPF) in the Upper Red River Watershed that will guide wetland mitigation siting in the future. We believe that there is good rationale for the local partnership to influence the CPF by being a stakeholder in this related process. The CPF will assess baseline conditions, identify watershed scale

trends, and use stakeholder input to formulate a strategy to prioritize wetland restoration efforts with primarily private landowners.

Issue Statement - Productivity of agricultural land: Productive agricultural land has been a priority resource for local governments and an economic driver in the watersheds and should be a priority issue in these plans. Identifying and prioritizing productive agricultural lands, setting goals, and implementation of practices (e.g. soil health, adequate drainage, etc) for protection and improvement of agricultural lands can be a strength of these plans combined with flood damage reduction and natural resource enhancement.

Issue statement – Flood Damage Reduction: Flood damage reduction has been a priority issue in the Bois de Sioux and Mustinka watersheds for a long time. The Red River Watershed Management Board and the 1998 Mediation Agreement have established flood damage reduction as a primary goal in the Red River Basin. The Bois de Sioux Watershed District has been a regional leader in development of projects to reduce flood damage. Recognizing flood damage reduction as a priority issue in these watersheds will help ensure that the plans include goals and recommends practices consistent with Technical and Scientific Advisory committee technical papers, particularly Technical paper 11. Building on past work to reduce flood damage should increase the resiliency of the resources in the watershed to flooding.

Issue statement – Altered hydrology: The hydrologic conditions of these watersheds has changed over time. In recent decades more precipitation, more runoff, and more runoff per unit of precipitation has been observed as well as more frequent periods of extremely low flow in some watercourses. These hydrologic changes as well as others have contributed to instability of natural and artificial watercourses, degradation of wetland habitats, loss of agricultural productivity, and increased the risk of flood damages. Recognizing altered hydrology as a priority issue in the plans will help ensure that a driving factor behind many related issues are directly addressed in the plans.

Issue statement – Unstable river and stream channels: Rivers and streams in these watersheds provide outlets for many drainage systems and habitat for diverse aquatic communities. Many streams and rivers in the watershed are unstable and bed and bank erosion contribute to water quality impairments. Stream habitat rehabilitation and restoration projects are already ongoing in this watershed (e.g. Mustinka River in Redpath and Doran Creek) and additional opportunities exist. Recognizing and prioritizing this issue in the plans would help ensure that projects protecting and restoring natural watercourses are part of the partnership's long-term plans.

BWSR staff look forward to working with the steering, advisory, and policy committees as the comprehensive watershed management plans are developed. These watersheds have strong local plans and an extensive local government staff knowledge base to build upon. These watersheds also have an expansive set of resource based data and models for biology, hydrology, and water quality to help set goals, prioritize watershed areas, and target work to meet plan goals. As the planning effort moves forward and develops the Comprehensive Watershed Management Plans believe the partnership should also consider a couple of other important issues:

- Expiring Conservation Reserve Program lands. In 2019, 2020 and 2021 nearly 4,500 acres of CRP Wetland Restoration and Farmable Wetland Program practices are scheduled to expire within the partnership's counties. In 2019, 2020 and 2021 nearly 6,500 acres of CRP Filterstrips and Riparian Buffers practices are scheduled to expire within the partnership's counties. These expiring contracts have the potential to effect many of the priority issues listed above. The plans should recognize this issue, its potential effects, and the plans may want to consider prioritizing working with producers regarding the management of those acres within the Bois de Sioux & Mustinka to achieve goals of the plans. The Re-Invest in Minnesota (RIM) Reserve easement program, via the Conservation Reserve

Enhancement Program (CREP) is an option that could be considered in discussions of expiring CRP as well as a whole suite of conservation practices should the acres be brought back into production.

- Multipurpose project and partnership development. BWSR encourages the local partnership to prioritize actions in the plans to provide multi-purpose benefits and address multiple resource concerns. Many implementation actions will provide multiple benefits and contribute to achieving multiple goals. The comprehensive watershed planning process should recognize opportunities to achieve multiple goals in priority areas of the watersheds and target actions in these areas of the watersheds. This approach should ensure implementation of comprehensive projects and help partners secure funding from a variety of sources.

We commend the partners for their participation in the planning effort. We look forward to working with you through required planning process and ensuring plan content are met so the end result are local plans the partnership can be successful with. BWSR will ultimately be successful when the local partnership is successful. If you have any questions, please feel free to contact me.

Sincerely,

Pete Waller

Board Conservationist

cc: Rachel Olm and Kris Guentzel, HEI (via email)
Ryan Hughes and Henry Van Offelen, BWSR (via email)
Barbara Weisman and Nathan Kestner, DNR (via email)
Margaret Wagner & Ryan Lemickson, MDA (via email)
Carrie Raber and Amanda Strommer, MDH (via email)
Juline Holleran and Cary Hernandez, PCA (via email)

DEPARTMENT OF NATURAL RESOURCES

Minnesota Department of Natural Resources
Regional Operations
2115 Birchmont Beach Road NE
Bemidji, MN 56601

March 20, 2019

Jamie Beyer
Administrator
Bois de Sioux Watershed District
704 Hey 75 South
Wheaton, MN 56296

Dear Ms. Beyer:

Thank you for inviting the Minnesota Department of Natural Resources (DNR) to provide input on resource priorities for the Mustinka/Bois de Sioux Watershed as you and your partners begin developing a Comprehensive Watershed Management Plan. I am writing on behalf of DNR Commissioner Sarah Strommen to share our resource priorities and express our support of this effort, which will help sustain and improve healthy water resources for the future.

Attached are priorities we encourage you to address in your plan – keys to protecting and improving the health of the watershed. Along with these priorities the DNR can assist with scientific data and information as needed. We look forward to participating and providing assistance to help ensure success of the One Watershed One Plan (1W1P) process.

Our lead staff person for this 1W1P project is Annette Drewes, Clean Water Legacy Specialist, 218-308-2468, Annette.drewes@state.mn.us, based at the EWR Co-located DNR office in Bemidji. Please contact Annette if you have questions or want more information about the attached priorities or the types of technical support we can provide.

Also feel free to contact me directly if needed. As the DNR's Regional Director, I am committed to ensuring that DNR staff in the region are organized to support 1W1P planning efforts and implementation of future projects identified through the plan. We greatly value the opportunity to contribute to the process and hope the information we provide is helpful.

Sincerely,

Rita C. Albrecht
Northwest Regional Director

ec: Annette Drewes (DNR), Nathan Kestner (DNR), Barbara Weisman (DNR), Pete Waller (BWSR), Cary Hernandez (MPCA), Amanda Strommer (MDH), Ryan Lemickson (MDA)

DNR Priorities for *Mustinka/Bois de Sioux River Watershed*

Representatives from each of the DNR's divisions sat down and discussed the Mustinka/Bois de Sioux River Watershed from each of our areas of expertise. The priorities listed below, in no specific order, are issues we would like to see addressed in this first Comprehensive Watershed Management Plan. As a team we looked for issues and opportunities that provide multiple benefits towards watershed protection and improvement. We will be involved in this process and can bring more information to the table as needed. Thanks again for the opportunity to provide input.

Priority Resource Concerns & Issues

Resource Concern: Habitat and Recreation The Mustinka/Bois de Sioux River Watershed is heavily cultivated (85%) and loss of prairie and wet prairie habitat has been extensive. Public lands, primarily Waterfowl Production Areas (WPA's) and Wildlife Management Areas (WMA's), along with private easements protect limited habitat for birds and wildlife. Many prairie species including greater prairie chickens, sharp-tailed grouse and rare species such as the small white lady's slipper have disappeared throughout much of the prairie region. Natural areas like the Ottertail Prairie Scientific and Natural Area (SNA) and surrounding lands provide critical habitat for wildlife, offer opportunities for recreational hunting and wildlife watching, and improve water retention in the soil.

Issue: Fragmentation and continuing loss of perennial cover, including wetland/grassland areas. Within the Mustinka/Bois de Sioux Watershed the *DNR's Prairie Plan* extends north and south along the beach ridge, connecting the Otter Tail Prairie SNA south to the Mud Lake WPA, Blakesley WMA, Johnson and Pepperton WPA's, and Scharf WMA to the Big Stone Moraine Prairie core area. These areas benefit from adjoining lands with perennial cover that slow the spread of terrestrial invasives, provide connecting habitat for wildlife movement and increase plant diversity to sustain soil health. Expiring CRP contracts and increased agricultural drainage are converting important prairie wetland/grassland areas back into cropland, resulting in a decline in permanently protected habitat and perennial cover (Prairie Plan 2018).

Issue: Decline in terrestrial and aquatic habitat quality. Land use changes in the watershed, including conversion of pasture and grasslands to row crops, drainage of wetlands, loss of buffers, and more miles of drainage ditches and drain tile, have contributed to increased runoff and higher rates of erosion. *Altered hydrology is considered a major driver of water quality impairments that adversely affects wetlands, streams, rivers, riparian lands, groundwater recharge and decreases aquatic and terrestrial habitat quality.*

Issue: Unique resources at risk or threatened. Several calcareous fens, one of the rarest natural communities in the U.S. are located in the headwaters of the Mustinka watershed. Lake Traverse and areas of the west branch of Twelvemile Creek subwatershed are designated Important Bird Areas and the steep slopes along the east edge of Lake Traverse contain the largest concentration of native prairie remnants in the watershed. Several calc fens and upland prairies, saved from agriculture because they were too rocky or sandy to farm, are now at risk from an increase in demand for sand and gravel aggregate.

Resource Concern: Streams and Rivers

The Bois de Sioux River is the headwaters to the Red River of the North. Similar to the rest of the Red River Valley, altered hydrology, high incidence of row crops and lack of perennial cover are the main issues that drive water quality decline. Improvements in the headwaters need to be done systematically, taking into account upstream and downstream conditions and impacts on streamflows. Research by Kelly et al. (Human *amplified changes in precipitation-runoff patterns*, 2017) across basins, including the Upper Red River, suggests that substantial gains in water quality may depend primarily on increasing water retention through cover crops, perennial cover, wetland restoration and an increase in soil health.

Issue: Lack of perennial cover adjacent to waterways and intermittent stream channels that are being farmed. Perennial cover with buffer strips along streams and ditches slows down runoff, increases infiltration and reduces the amount of sediment reaching the streams. An estimated 60% of acreas immediately adjacent to waterways in this watershed are farmed according to a Board of Water and Soil Resources analysis conducted in 2009. Cultivating these riparian areas destabilizes stream banks and increased runoff.

Issue: Channelized reaches of the Bois de Sioux and Mustinka Rivers and many tributary streams. Improving channel stability, floodplain connectivity and stream habitat using a geomorphological approach to restore channelized reaches should be considered in this plan. DNR can help set reasonable stream and floodplain restoration goals that provide multiple benefits, including flood reduction, improved water quality, wildlife habitat, an enhanced fishery, and more recreational opportunities.

Issue: Higher peak flows and loss of stream base flows increase channel erosion and reduce fish and other in-stream habitat. A DNR Fisheries survey in 2000 identified fish communities in the Bois de Sioux watershed as declining. Stream flows and the changes in hydrology are negatively impacting all life stages of fish in this river. As the headwaters for the Red River of the North, this loss of diversity has impacts far downstream. DNR staff with stream restoration expertise can help identify restoration opportunities to improve habitat.

Resource Concern: Shallow Lakes

Issue: Shoreline protection and reduction of nutrient loading to Lake Traverse. Lake Traverse, in addition to being a popular fishing lake, is a lake of high biological significance within the watershed. Drainage within the watershed is extensive, and development along the lakeshore may contribute to increased runoff and nutrient loading.

DEPARTMENT OF AGRICULTURE

March 29, 2019

Bois de Sioux Watershed District
C/o Jamie Beyer
704 Hwy 75 South
Wheaton, MN 56296
bdswd@runestone.net

Dear Mrs. Beyer

Thank you for the opportunity to provide priority issues for consideration in the development of the Bois de Sioux – Mustinka One Watershed One Plan (1W1P). The Minnesota Department of Agriculture (MDA) looks forward to working with local government units, stakeholders, and other agency partners in the planning process, as well as to help provide technical information to appropriate landowners and agricultural organizations in the watershed.

One of the MDA's roles, related to the 1W1P process, is technical assistance. The MDA maintains a variety of water quality programs including research, on-farm demonstrations, and groundwater and surface water monitoring. Our goal is to provide you with data from the programs to help understand the resource concerns and further engage the agricultural community in local problem solving.

The MDA's research and on-farm demonstration projects help ensure that current scientific information is made available to help address water quality concerns to support farmer-led discussion and peer-to-peer learning. Engaging farmers and crop advisers in a trusted relationship is essential for making on–farm decisions.

MDA Priority Concerns

Nitrates and pesticides in groundwater are the priority resource concerns for the MDA statewide. However, data suggests this is not a significant concern in the watershed. The MDA is interested in working with local and state partners to engage the agricultural community, support on-farm demonstrations, promote the Minnesota Ag Water Quality Certification Program, and use the most recent and relevant research and tools to share information about cover crops and other conservation practices.

Nitrogen Fertilizer Management Plan (NFMP)
www.mda.state.mn.us/nfmp

The goal is to involve local farmers and agronomists in problem-solving to address elevated levels of nitrate in groundwater.

Township Testing Program
www.mda.state.mn.us/townshiptesting

The MDA has identified townships throughout the state that are vulnerable to groundwater contamination and have significant row crop production. At this time, no townships are currently scheduled to be tested in the watershed.

Pesticide Water Quality Monitoring

Annual Report: www.mda.state.mn.us/monitoring
MDA's ambient surface and groundwater water quality data is available at the National Water Quality Monitoring Council: https://www.waterqualitydata.us/

The MDA has been conducting pesticide monitoring in groundwater since 1985, and in surface waters since 1991. Annually, the MDA completes approximately 250 sample collection events from groundwater and 800 sample collection events from rivers, streams, and lakes across the state. In general, the MDA collects water samples from agriculture and urban areas of Minnesota and analyzes water for up to approximately 150 different pesticide compounds that are widely used and/or pose the greatest risk to water resources. Groundwater monitoring is conducted by the MDA and Minnesota Pollution Control Agency staff. Surface water monitoring is conducted by the MDA and local organizations. All monitoring is completed following annual work plans and standard operating procedures (SOP's) developed by the MDA.

The purpose of the MDA's pesticide monitoring program is to determine the presence and concentration of pesticides in Minnesota waters, and present long-term trend analysis. Trend analysis requires a long-term investments in monitoring within the MDA's established networks.

The MDA will continue to conduct statewide pesticide monitoring and will provide additional information related to the occurrence of pesticides in Minnesota waters.
The MDA began evaluating pesticide presence and magnitude in private residential drinking water wells as part of the Private Well Pesticide Sampling (PWPS) Project in 2014 as a companion program to the MDA Township Testing Program (TTP). Townships in different counties have been, and will continue to be, sampled every year until the project concludes in 2020. Townships in the PWPS depend on the participation of well owners and may not reflect all of the townships sampled in the TTP.

Water samples are collected by trained MDA hydrologists and analyzed by a private contract lab for compounds similar to the MDA ambient water quality monitoring program. All monitoring is completed following annual work plans and standard operating procedures (SOP's) developed by the MDA.

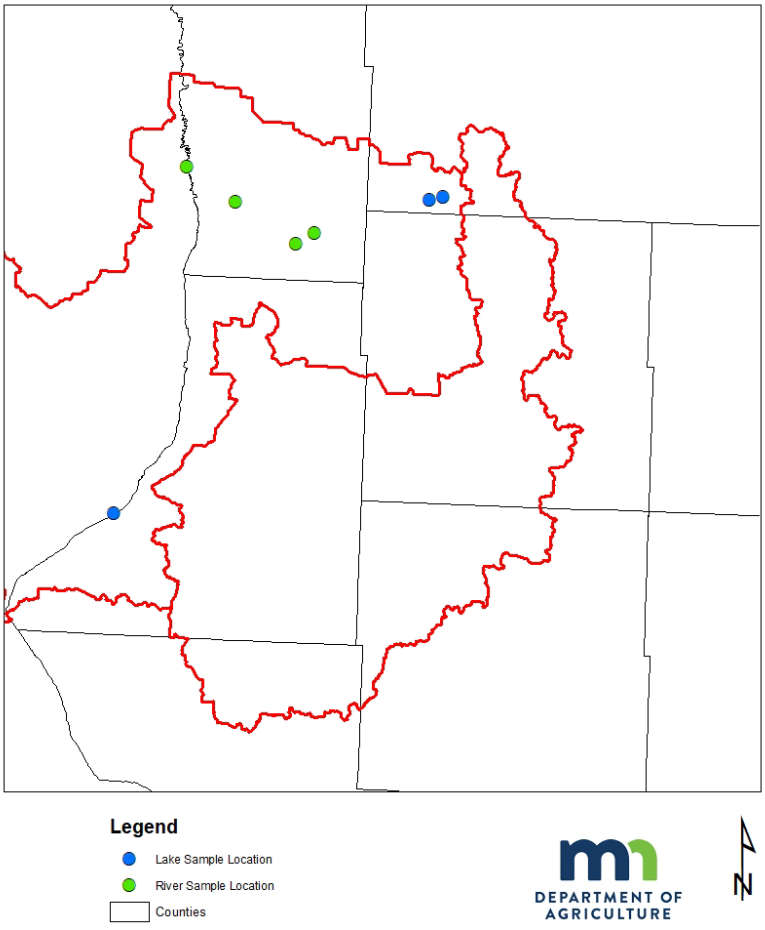
Groundwater

The MDA does not have any groundwater monitoring sites within these watersheds. It is not expected that monitoring will begin in the near future. In addition, no townships within this watershed will be sampled for the PWPS.

Surface Water

The MDA has completed **115** pesticide and/or nutrient water quality sample collection events from **4** locations in the watershed from 2005-2018. The MDA has also completed 4 pesticide water quality sample collection events from three lakes (2010-2017).

There are currently no pesticide water quality impairments in the watershed. The MDA has been actively monitoring the Bois de Sioux River on CSAH-6, 5.1 miles west of Doran, Minnesota (S000-533) since 2005. The MDA collected pesticide water quality samples at this location in 2018 and will continue monitoring through at least 2023.



Agricultural Edge-of-Field Monitoring

The MDA has no edge-of-field monitoring locations in the watershed. However, there are currently two locations just outside the watershed that may provide valuable information for the planning process in the future

Clay County Drainage Site

www.mda.state.mn.us/protecting/cleanwaterfund/onfarmprojects/claycounty

This site collects surface and sub-surface water from a 155 acre watershed where corn, sugar beets and edible beans are grown. The soils and topography across this site represents field

characteristics common in the most productive agricultural areas in the Red River Valley. Available data includes summaries for sediment, nitrogen and phosphorus losses, surface runoff and weather/field condition data including precipitation, soil temperature, soil moisture, air temperature, relative humidity, wind speed/direction and solar radiation.

Red River Valley Drainage Water Management Project (RRVDWM)
www.mda.state.mn.us/redrivervalleydwm

The goal of the RRVDWM project is to minimize the environmental impacts of subsurface drainage while maintaining or improving agricultural productivity. Some objectives include demonstrating controlled drainage and saturated buffers as flood mitigation practices as well as their water quality and quantity benefits. The project is intended to set an example to increase the adoption of drainage water management practices in the Red River Valley. Monitoring information began in 2016 and will continue until 2020 or longer.

Nitrogen and Pesticide Use Surveys

The MDA surveys farmers through the National Agricultural Statistics Service (NASS). A summary of the survey data is attached. The most recent nitrogen use survey was for the 2014 crop year, specifically the Irrigated and Non-Irrigated sandy soils, Northwestern, Southwestern and West Central BMP regions. The most recent pesticide use survey was from the 2013 crop year.

For reference, the University of Minnesota fertilizer recommendations are found here:
https://extension.umn.edu/nutrient-management/crop-specific-needs

Additional Resources and Opportunities for BMP funding and Cost-Share

Since there is a significant portion of the watershed in agricultural production, we would like to bring to your attention a couple resources that we encourage you to reference during the planning process.

The **Ag BMP Handbook**, recently revised in 2018, provides a comprehensive summary of BMPs that are practical for Minnesota: **www.mda.state.mn.us/agbmphandbook .** Please let us know if you would like a hard copy for your reference.

Minnesota Agricultural Water Quality Certification Program (MAWQCP)
www.mda.state.mn.us/awqcp.

The MAWQCP is a voluntary opportunity for farmers and agricultural landowners to take the lead in implementing conservation practices that protect water quality. Participants that implement and maintain approved farm management practices will be certified and in turn obtain regulatory certainty for a period of ten years. This is a planning program that should be

included in the 1W1P because it is an opportunity for agricultural producers to evaluate nutrient and field management practices within the watershed to help reduce losses.

There are currently 10 farmers and 12,811 acres certified in the watershed. As a result of certification, 21 new conservation projects have been undertaken including:

- 12 tile intakes treated
- 3.3 acres of filter strip installed
- 2,867 acres changed their nitrogen and phosphorus application timing and rate to reduce water quality risks
- 3.3 acres of filter strip installed
- 10 grade stabilization projects installed
- 2,580 lineal feet of grassed waterway installed
- 145 acres increased residue cover
- 1 sediment basin installed
- 2 water and sediment basins installed

Pollution reduction calculations on the filter strips, grade stabilization, grassed waterways, and basins resulted in an estimated reduction of 167 tons of sediment and 201 pounds of phosphorus delivered to surface waterways on an annual basis.

Agricultural Land Preservation Program
The MDA assists local government in protection of farmland through its Agricultural Land Preservation Program. This includes online tools and programmatic support. More information is available at https://www.mda.state.mn.us/environment-sustainability/farmland-protection

Agricultural Growth, Research, and Innovation (AGRI) Program
The AGRI program has funding that may be helpful in water quality protection. Specifically:

- The AGRI **Livestock Investment Grant** encourages long-term industry development for Minnesota livestock farmers and ranchers by helping them improve, update, and modernize their livestock operation infrastructure and equipment. More information is available at www.mda.state.mn.us/livestockinvestment.

- The AGRI **Sustainable Agriculture Demonstration Grant** supports innovative on-farm research and demonstrations. It funds projects that explore sustainable agriculture practices and systems that could make farming more profitable, resource efficient, and personally satisfying. Findings are published in the MDA's annual *Greenbook*. More information is available at www.mda.state.mn.us/sustagdemogrant.

Nutrient Management Initiative (NMI)
www.mda.state.mn.us/nmi

The NMI assists crop advisers and farmers in evaluating nutrient management practices on their own fields through the use of on-farm trials. This is a great opportunity to promote new strategies that are available that could improve fertilizer use efficiency, as well as to help open

the door to include local cooperators in the water quality discussion. In addition, advanced trials with the University of Minnesota researchers help guide nitrogen rate recommendations. Since 2015, there have been approximately 500 on-farm trials established in Minnesota through the NMI program. Nine on-farm trials have been completed in the watershed where crop advisers worked directly with their farmers and focused on new strategies that evaluated nitrogen rate and application timing on their own fields. New ideas in other watersheds included on-farm cover crop, fertilizer placement, tillage, as well as precision agriculture and technology based evaluations.

Minnesota Discovery Farms
https://discoveryfarmsmn.org/

Discovery Farms Minnesota is a farmer-led effort to gather field scale water quality information from different types of farming systems in landscapes all across Minnesota. The mission of the Discovery Farms program is to gather water quality information under real-world conditions. The goal is to provide practical, credible, site-specific information to enable better farm management.

The program is designed to collect accurate measurements of sediment, nitrogen, and phosphorus movement over the soil surface and through subsurface drainage tiles. This work leads to a better understanding of the relationship between agricultural management and water quality. There are currently no Discovery Farms located in the watershed, but other sites in Wilkin and Norman County can be used to provide valuable data that could pertain to the watershed (2012-present).

The AgBMP Loan Program
www.mda.state.mn.us/agbmploans

The AgBMP Loan Program is a water quality program that provides low interest loans to farmers, rural landowners, and agriculture supply businesses. The purpose is to encourage agricultural best management practices that prevent or reduce runoff from feedlots, farm fields, and other pollution problems identified by the county in local water plans.

Thank you again for the opportunity to provide background and relevant information as we look forward to being involved in the 1W1P process.

Sincerely,

Ryan Lemickson
MDA
23070 North Lakeshore Drive
Glenwood, MN 56334
612-209-9181
Ryan.Lemickson@state.mn.us

DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

March 26, 2019

Jamie Beyer
Bois de Sioux Watershed District
704 Hwy 75 South
Wheaton, MN 56296
bdswd@runestone.net

Dear Ms. Beyer,

Subject: Initial Comment Letter – Bois de Sioux-Mustinka One Watershed One Plan

Thank you for the opportunity to submit comments regarding water management issues for consideration in the One Watershed One Plan (1W1P) planning process for the Bois de Sioux-Mustinka Watershed. Our agency looks forward to working closely with the local government units, stakeholders, and other agency partners on this watershed planning initiative.

The Minnesota Department of Health's (MDH) mission is to protect, maintain, and improve the health of all Minnesotans. An important aspect to protecting citizens health is the protection of drinking water sources. MDH is the agency responsible for implementing programs under the federal Safe Drinking Water Act (SDWA).

Source Water Protection (SWP) is the framework MDH uses to protect drinking water sources. The broad goal of SWP in Minnesota is to protect and prevent contamination of public and private sources of groundwater and surface water sources of drinking water using best management practices and local planning. Core MDH programs relevant to watershed planning are the State Well Code (MR 4725), Wellhead Protection (MR 4720) and surface water / intake protection planning resulting in a strong focus in groundwater management and protecting drinking water sources.

One of the three high level state priorities in Minnesota's Nonpoint Priority Funding Plan is to "Restore and protect water resources for public use and public health, including drinking water" which aligns with our agency's mission and recommendations to your planning process.

MDH Priority Concerns:

Prioritize Drinking Water Supply Management Areas (DWSMA) in the Bois de Sioux-Mustinka 1W1P.

DWSMA boundaries establish a protection area through an extensive evaluation that determines the contribution area of a public water supply well, aquifer vulnerability and provide an opportunity to prioritize specific geographic areas for drinking water protection purposes. DWSMA boundaries that extend beyond city jurisdictional limits or are established in Wellhead Protection (WHP) Action Plans for nonmunicipal public water supplies, like mobile home parks, can be a special focus for local partners prioritizing drinking water protection activities.

Aquifer vulnerability determines the level of management required to protect a drinking water supply and provides an opportunity to target implementation practices in accordance with the level of risk different land uses pose. The attached Public Water Supply Summary Spreadsheet highlights the primary drinking water protection activities for many DWSMAs in the watershed.

Prioritize Sealing Abandoned Wells

Unused, unsealed wells can provide a conduit for contaminants from the land surface to reach the sources of drinking water. This activity is particularly important for abandoned wells that penetrate a confining layer above a source aquifer.

Sealing wells is a central practice in protecting groundwater quality, however when resource dollars are limited it is important to evaluate private well density to identify the populations most at risk from a contaminated aquifer.

Prioritize Protection of Private Wells

Many residents of the watershed rely on a private well for the water they drink. However, no public entity is responsible for water testing or management of a private well after drilling is completed. Local governments are best equipped to assist private landowners through land use management and ordinance development, which can have the greatest impact on protecting private wells. Other suggested activities to protect private wells include: hosting well testing or screening clinics, providing water testing kits, working with landowners to better manage nutrient loss, promoting household hazardous waste collection, managing storm water runoff, managing septic systems, and providing best practices information to private well owners.

Approximately thirty percent of the 106 arsenic samples taken from wells in the Bois de Sioux-Mustinka Watershed have levels of arsenic higher than the Safe Drinking Water Act (SDWA) standard of 10 micrograms per liter (µg/L). Arsenic occurs naturally in rocks and soil and can dissolve into groundwater. Consuming water with low levels of arsenic over a long time (chronic exposure) is associated with diabetes and increased risk of cancers of the bladder, lungs, liver and other organs. The SDWA standard for arsenic in drinking water is 10 µg/L; however, drinking water with arsenic at levels lower than the SDWA standard over many years can still increase the risk of cancer. The EPA has set a goal of 0 µg/L for arsenic in drinking water because there is no safe level of arsenic in drinking water.

Targeting Groundwater & Drinking Water Activities in the 1W1P Planning Process

Limitation of Existing Tools –

Watershed models used for prioritizing and targeting implementation scenarios in the 1W1P, whether PTMapp, HSPF-Scenario Application Manager (SAM) or others, leverage GIS information and/or digital terrain analysis to determine where concentrated flow reaches surface water features. While this is an effective approach for targeting surface water contaminates, it does not transfer to groundwater concerns because it only accounts for the movement of water on the land's surface. Unfortunately, targeting tools are not currently available to model the impact on groundwater resources. The Minnesota Department of Health suggests using methodologies applied by the agency to prioritize and target implementation activities in the Source Water Protection program.

Using the Groundwater Restoration and Protection Strategies (GRAPS) Report –

The MDH, along with its state agency partners, are developing a Groundwater Restoration and Protection Strategies (GRAPS) report for *the Bois de Sioux-Mustinka. GRAPS* will provide information and strategies on groundwater and drinking water supplies to help inform the local decision making process of the 1W1P. Information in a GRAPS Report can be used to identify risks to drinking water from different land uses. Knowing the risks to drinking water in a specific area allows targeting of specific activities.

- Prioritize Actions Identified in the Groundwater Restoration and Protection Strategies (GRAPS) report.

Using Wellhead Protection Plans –

- Identify Drinking Water Supply Management Areas (DWSMA) located in the watershed.
- Examine the vulnerability of the aquifer to contamination risk to determine the level of management required to protect groundwater quality. For example, a highly vulnerable setting requires many different types of land uses to be managed, whereas a low vulnerability setting focuses on a few land uses due to the long recharge time and protective geologic layer.
- Use the Management Strategies Table in a Wellhead Protection Plan to identify and prioritize action items for each DWSMA

Using Guidance Documents to Manage Specific Potential Contaminant Sources –

The MDH has developed several guidance documents to manage impacts to drinking water from specific potential contaminant sources. Topics include mining, stormwater, septic systems, feedlots, nitrates, and chemical and fuel storage tanks. This information is available at https://www.health.state.mn.us/communities/environment/water/swp/resources.html

Attached you will find a listing of MDH data and information to help you in the planning process. Thank you for the opportunity to be involved in your watershed planning process. If you have any questions, please feel free to contact me at (507) 476-4241 or Amanda.strommer@state.mn.us.

Sincerely,

Amanda Strommer, Principal Planner
Minnesota Department of Health, Source Water Protection Unit
1400 E. Lyon Street, Marshall, MN 56282

Attachments

CC: Mark Wettlaufer, MDH Source Water Protection Unit
Jenilynn Marchand, MDH Source Water Protection Unit
Yarta Clemens-Billaigbakpu, MDH Source Water Protection Unit
Carrie Raber, MDH Source Water Protection Unit
Derek Richter, MDH Source Water Protection Unit
Chris Elvrum, MDH Well Management Section
Pete Waller, BWSR Board Conservationist
Henry Van Offelen, BWSR Clean Water Specialist
Annette Drewes, DNR
Cary Hernandez, MPCA
Ryan Lemickson, MDA

MDH Data and information:

- Drinking Water Statistics – Where do people get their drinking water in the Bois de Sioux-Mustinka Watershed? One hundred percent obtain their drinking water from groundwater sources. This information can help you understand where people are obtaining their drinking water and develop implementation strategies to protect the sources of drinking water in the watershed.

- A spreadsheet of the public water supply systems in the watershed, status in wellhead protection planning, and any drinking water protection concerns or issues that have been identified in protection areas. This information can help you understand the drinking water protection issues in the watershed, prioritize areas for implementation activities, and identify potential multiple benefits for implementation activities.

    - Shape files of the Drinking Water Supply Management Areas (DWSMA) in the watershed are located at https://www.health.state.mn.us/communities/environment/water/swp/maps/index.htm. This information can help you prioritize and target implementation activities that protect drinking water sources for public water supplies.

MDH Figures:

- A figure detailing the "Pollution Sensitivity of Near-Surface Materials" in the Bois de Sioux-Mustinka Watershed. This information can help you understand the ease with which recharge and contaminants from the ground surface may be transmitted into the upper most aquifer on a watershed scale. Individual wellhead protection areas provide this same information on a localized scale. This is turn can be used to prioritize areas and implementation activities.
- A figure detailing "Pollution Sensitivity of Wells" in the Bois de Sioux-Mustinka Watershed. This information can help you understand which wells in the watershed are most geologically sensitive based on the vulnerability of the aquifer in which the well is completed. This information allows for targeting of implementation activities to the sources of water people are drinking.
- A figure detailing "Pollution Sensitivity of Wells and Nitrate Results" in the Bois de Sioux-Mustinka Watershed Underlain by Geologic Sensitivity Ratings from Wells. This information takes what we know about the sensitivity of wells to contamination and combines it with nitrate results to highlight areas of the watershed where there is known nitrate contamination of the water people are drinking. This figure can help prioritize implementation activities aimed at reducing nitrate levels in the sources of drinking water.
- A figure detailing "Arsenic Results" in the Bois de Sioux-Mustinka Watershed Underlain by Geologic Sensitivity Ratings from Wells. This information can help you understand which wells in the watershed contain elevated arsenic levels.
- A figure detailing "DWSMA Vulnerability" in the Bois de Sioux-Mustinka Watershed. This information can help you understand which DWSMA is most vulnerable to contamination from the ground surface. This figure allows for targeting of implementation activities for public water suppliers.

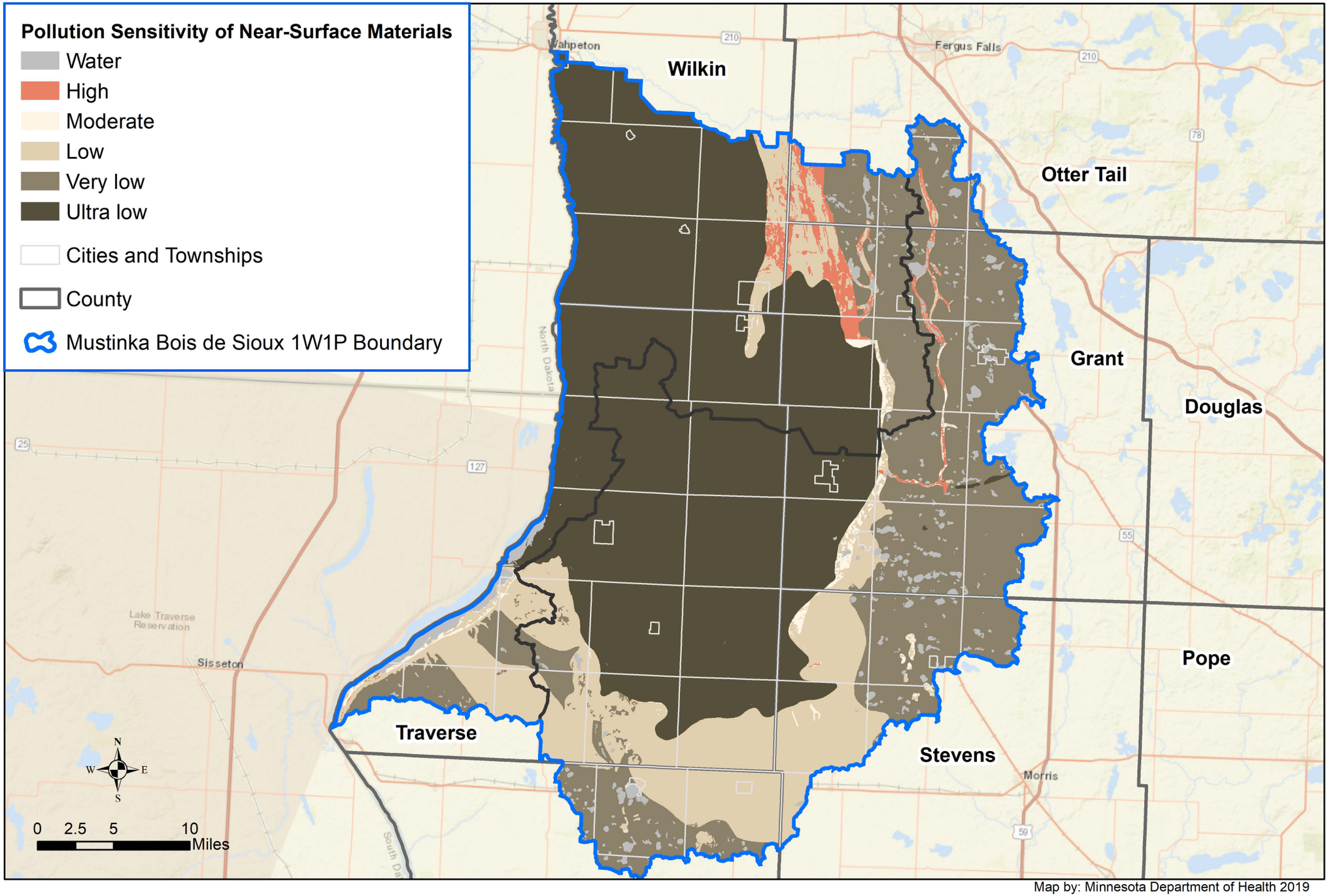
Bois de Sioux-Mustinka Watershed Basin Public Water Supplies - Drinking Water Protection Concerns for Quality & Quantity

Aquifer Risk	Name	County	Watershed	Subwatershed (HUC 12)	WHP Plan	DWSMA Vulnerability	Comments
Low potential contaminant risk - Focus on sealing of unused wells and old public water supply wells (funding available from MDH)							
	Campbell	Wilkin	Bois de Sioux	Rabbit River	Yes	Low	
	Tintah	Traverse	Bois de Sioux	JD 12	Yes	Low	
	Wendell	Grant	Bois de Sioux	Ash Lake	Yes	Low	
	Breckenridge	Wilkin	Bois de Sioux	Otter Tail River	Yes	Low	DWSMA outside watershed
	Donnelly	Stevens	Mustinka	Upper E Branch Twelvemile Creek	Yes	Low	DSWMA partially inside watershed
	Dumont	Traverse	Mustinka	W Branch Twelvemile Creek	Yes	Low	
	Elbow Lake	Grant	Mustinka	Round Lake	Yes	Low	DWSMA outside watershed
	Graceville	Big Stone	Mustinka	County Ditch 44-W Branch Twelvemile Creek	No	Low	WHP will be initiated after 2020
	Herman	Grant	Mustinka	Niemackl Lakes	Yes	Low	
	Johnson	Big Stone	Mustinka	County Ditch 38	No	Low	WHP will be initiated after 2020
	Norcross	Grant	Mustinka	Mustinka River Ditch	Yes	Low	
	Wheaton	Traverse	Mustinka	Eighteen Mile Creek	Yes	Low	

1 Vulnerable Community, Non-Municipal Public Water Supplier in Mustinka-Toqua Lakes Subwatershed
17 Non-Community Public Water Suppliers

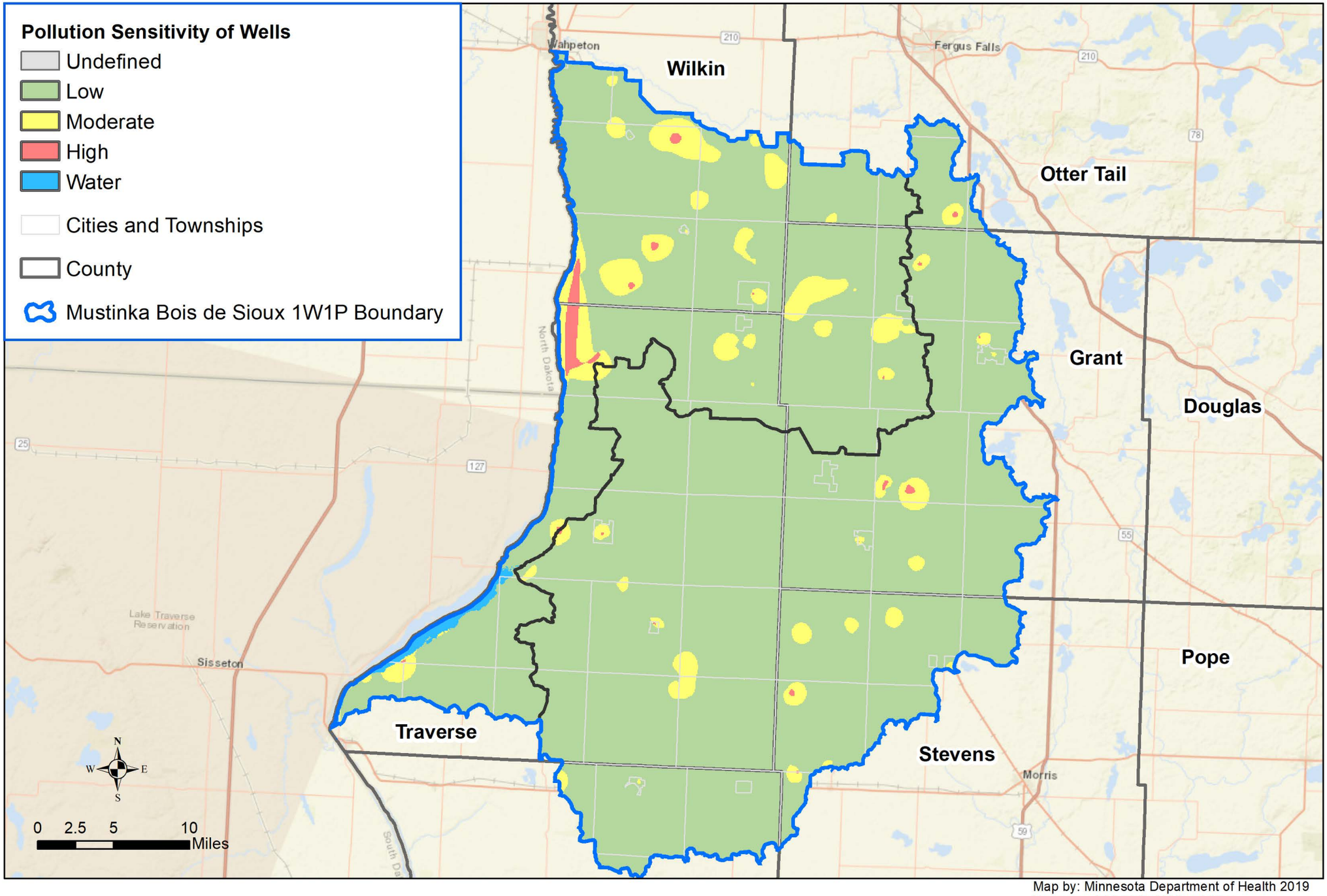
Acronyms:
SWCA=Surface Water Contribution Area
DWSMA=Drinking Water Supply Management Area
WHP=Wellhead Protection Plan

Mustinka Bois de Sioux River - Pollution Sensitivity of Near-Surface Materials



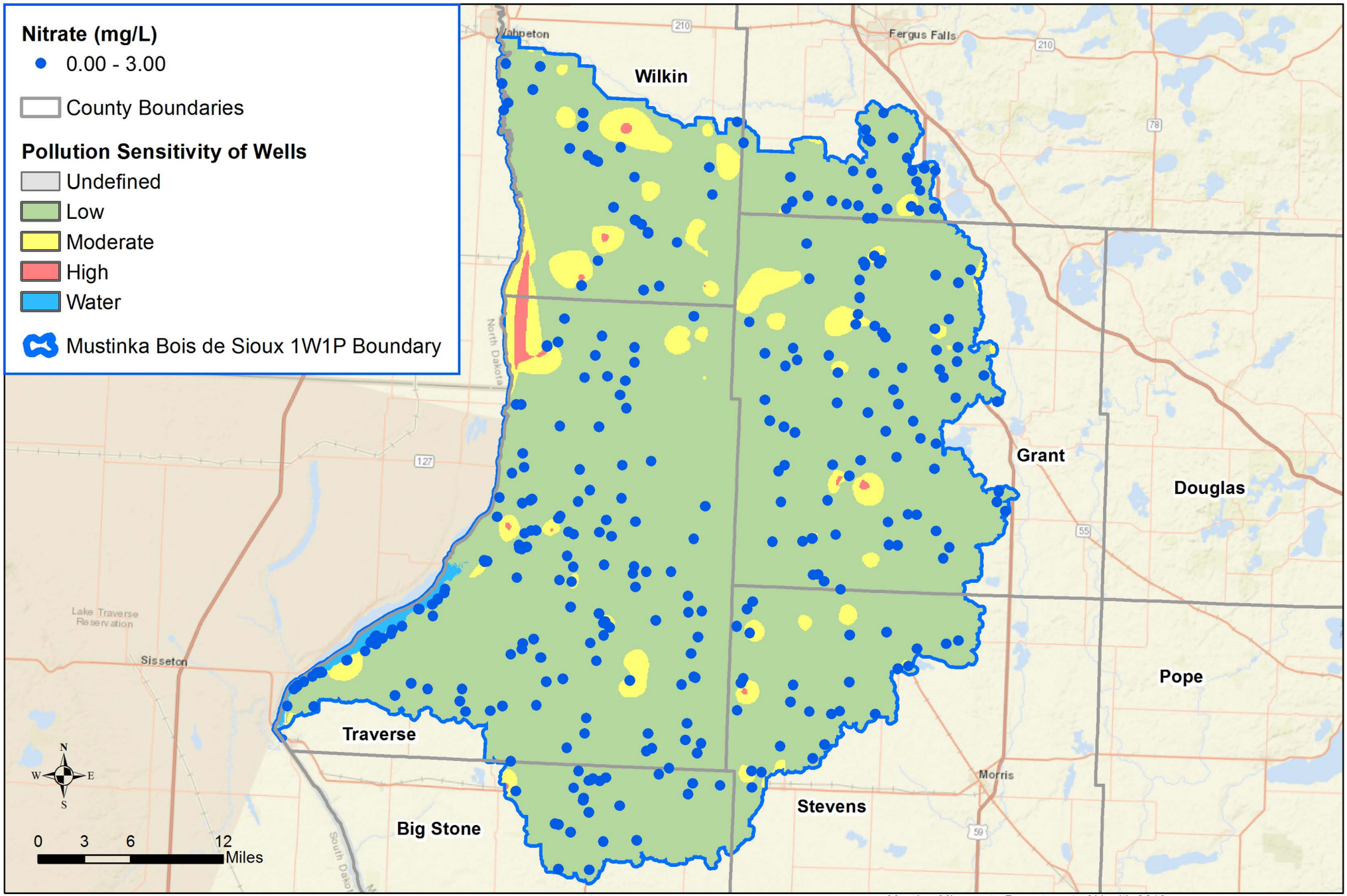
Map by: Minnesota Department of Health 2019
Basemap: ESRI World Street Map
Data: MNDNR Pollution Sensitivity

Mustinka Bois de Sioux River - Pollution Sensitivity of Wells



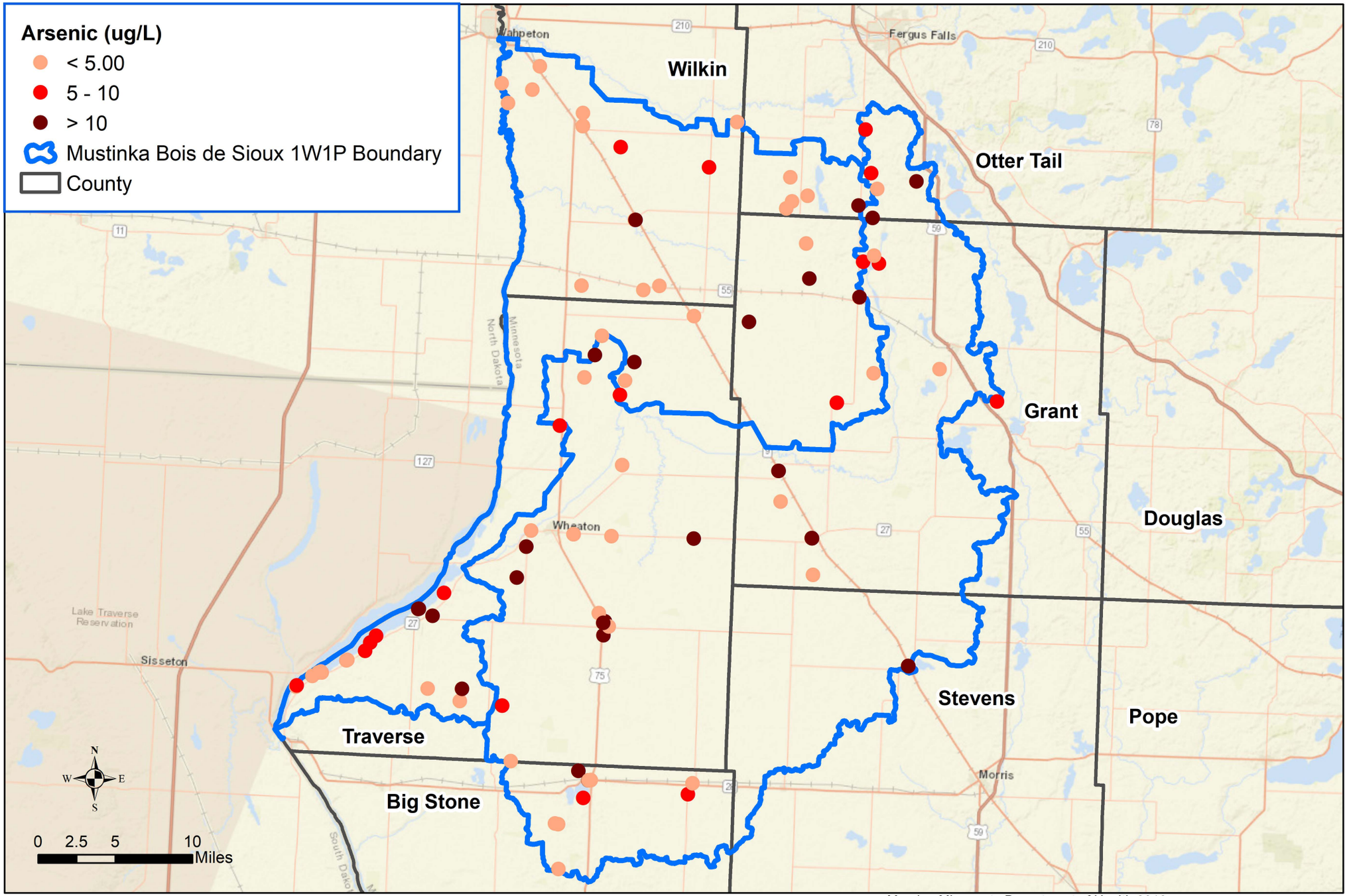
Map by: Minnesota Department of Health 2019
Basemap: ESRI World Street Map
Data: County Well Index

Mustinka Bois de Sioux River - Pollution Sensitivity of Wells and Nitrate Results



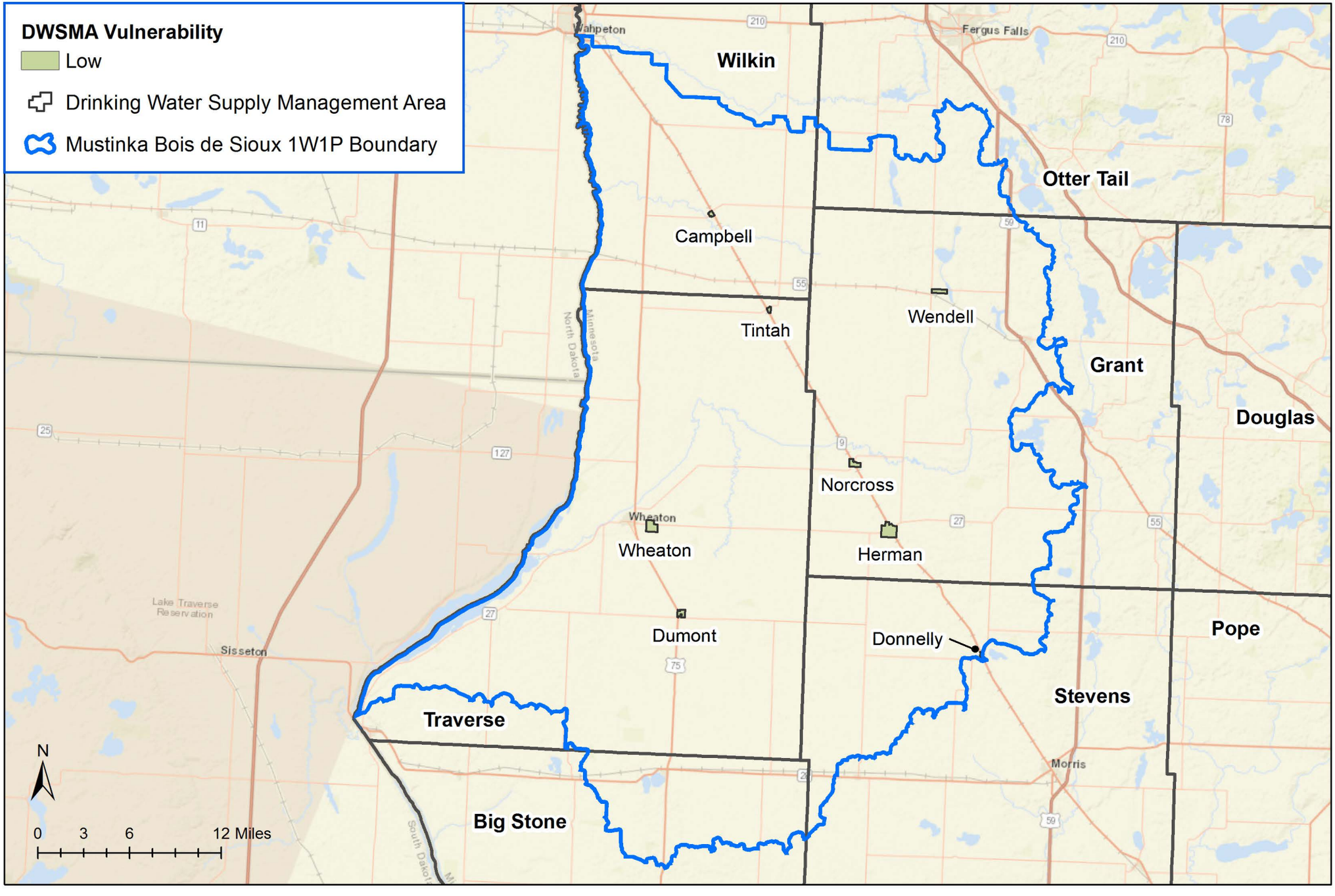
Map by: Minnesota Department of Health 2019
Basemap: ESRI World Street Map
Data: County Well Index, MN Drinking Water Information System (MNDWIS)
MDH Water Chemsitry (WCHEM), MDH Well Management (WELLS)

Mustinka Bois de Sioux River - Arsenic Results



Map by: Minnesota Department of Health 2018
Basemap: ESRI World Street Map
Data: County Well Index, MN Drinking Water Information System (MNDWIS)
MDH Water Chemsitry (WCHEM), MDH Well Management (WELLS)

Mustinka Bois de Sioux River -Drinking Water Supply Management Area Vulnerability



MINNESOTA POLLUTION CONTROL AGENCY

Detroit Lakes Office | 714 Lake Avenue | Suite 220 | Detroit Lakes, MN 56501 | 218-847-1519

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March 25, 2019

Ms. Jamie Beyer, Administrator
Bois de Sioux Watershed District
704 Highway 75 South
Wheaton, MN 56296

RE: Mustinka-Bois de Sioux Watershed One Watershed One Plan

Dear Ms. Beyer,

The Minnesota Pollution Control Agency (MPCA) is pleased to provide priority concerns for consideration in the development of the Mustinka-Bois de Sioux Watershed One Watershed One Plan (1W1P). We would invite you to consider the following reports and studies during 1W1P development.

The Minnesota Nutrient Reduction Strategy (2014) – A guide for reducing excess nutrients in waters so that in-state and downstream water quality goals are ultimately met. https://www.pca.state.mn.us/sites/default/files/wq-s1-80.pdf

Bois de Sioux River Watershed Monitoring and Assessment Report (2013) – Summary of 2010/2011 intensive watershed monitoring efforts. https://www.pca.state.mn.us/sites/default/files/wq-ws3-09020101b.pdf

Bois de Sioux River Watershed Stressor Identification (SID) Report (2016) - This report summarizes and evaluates factors, natural and human, which are likely responsible for the impaired conditions of the fish and macroinvertebrate communities. A thorough description of the natural features and processes occurring in the watershed and the extent of various human activity throughout the watershed that may have potential to degrade streams, rivers, and lakes. https://www.pca.state.mn.us/sites/default/files/wq-ws5-09020101a.pdf

Bois de Sioux River Watershed Restoration and Protection Strategy (WRAPS) (Expected to be finalized in 2019) – High level summary of past assessment and diagnostic work and outlines ways to prioritize actions and strategies for continued implementation.

Bois de Sioux River Watershed Total Maximum Daily Load (TMDL) Study (Expected to be finalized in 2019) – This TMDL study addresses phosphorus (P), total suspended solids (TSS), and bacteria (in the form of *Escherichia coli* [*E. coli]*) impairments in two lakes and four streams located in the Bois de Sioux River Watershed.

Mustinka River Watershed Monitoring and Assessment Report (2013) - Summary of 2010/2011 intensive watershed monitoring efforts. https://www.pca.state.mn.us/sites/default/files/wq-ws3-09020102b.pdf

Mustinka River Watershed SID Report (2015) - This report summarizes and evaluates factors, natural and human, which are likely responsible for the impaired conditions of the fish and macroinvertebrate communities. A thorough description of the natural features and processes occurring in the watershed

and the extent of various human activity throughout the watershed that may have potential to degrade streams, rivers, and lakes. https://www.pca.state.mn.us/sites/default/files/wq-ws5-09020102a.pdf

Rabbit River Turbidity TMDL Study (2010) – This study addresses the stream turbidity-related aquatic life impairment in AUID 09020101-502 (Grant County/Wilkin County line to the Bois de Sioux River) of the rabbit river. https://www.pca.state.mn.us/sites/default/files/wq-iw5-05e.pdf

Mustinka River Watershed WRAPS Report (2016) - High level summary of past assessment and diagnostic work and outlines ways to prioritize actions and strategies for continued implementation. https://www.pca.state.mn.us/sites/default/files/wq-ws4-20a.pdf

Mustinka River Watershed TMDL Study (2017) - This TMDL study addresses lake eutrophication (phosphorus), stream turbidity (TSS), stream dissolved oxygen (DO), stream fish/macroinvertebrate assessments, and stream bacteria (*E. coli*) impairments in three lakes and ten streams located in the Mustinka River Watershed. https://www.pca.state.mn.us/sites/default/files/wq-iw5-08e.pdf

Mustinka River Turbidity TMDL Report (2010) – This TMDL study addresses turbidity impairments on two reaches in the Mustinka River Watershed, which were listed in 2004. The two reaches are Grant/Traverse County line to Five Mile Creek (09020102-518) and Unnamed Creek to Lake Traverse (09020102-503). https://www.pca.state.mn.us/sites/default/files/wq-iw5-04e.pdf

Mustinka River Turbidity TMDL Implementation Plan (2010) - This implementation plan addresses two reaches of the Mustinka River with aquatic life impairments due to high turbidity. The plan includes implementation measures intended to decrease the turbidity in these reaches so that the turbidity water quality standard is met. https://www.pca.state.mn.us/sites/default/files/wq-iw5-04c.pdf

The following table lists the Mustinka and Bois de Sioux Watersheds' streams that are identified as resource concerns per the 2018 Impaired Waters 303(d) list:

Name	AUID	Description	Affected Use: Pollutant/Stressor	TMDL Status
Bois de Sioux River	09020101-501	Rabbit R to Otter Tail R	*Aquatic Recreation:* *E. coli*	Pending Approval
			Aquatic Life: Dissolved oxygen	Pending Approval
			Aquatic Life: Fish Bioassessments	Pending Approval
			Aquatic Life: Turbidity	Pending Approval
			Aquatic Life: Nutrient/eutrophication biological indicators	Deferred
			Aquatic Recreation: *E. coli*	Pending Approval

Name	AUID	Description	Affected Use: Pollutant/Stressor	TMDL Status
Rabbit River	09020101-502	Wilkin County line to Bois de Sioux R	*Aquatic Life:* Dissolved oxygen	Pending Approval
			Aquatic Life: Macroinvertebrate Bioassessments	Pending Approval
			Aquatic Life: Fish Bioassessments	Pending Approval
			Aquatic Life: Turbidity	Approved
Unnamed Creek (Doran Slough)	09020101-510	Headwaters to Bois de Sioux R	*Aquatic Recreation: E. coli*	Pending Approval
			Aquatic Life: Dissolved oxygen	Non-pollutant based stressors
Rabbit River, South Fork	09020101-512	Wilkin County line to Rabbit R	*Aquatic Life:* Dissolved oxygen	Pending Approval
			Aquatic Life: Fish Bioassessments	Pending Approval
			Aquatic Life: Turbidity	Pending Approval
Unnamed Creek	09020101-515	Unnamed Cr to Rabbit R	*Aquatic Life:* Dissolved oxygen	Deferred
			Aquatic Life: Turbidity	Deferred
Unnamed Creek	09020101-535	Unnamed Cr to Lk Traverse	*Aquatic Life:* Fish Bioassessments	Non-pollutant based stressors
County Ditch 52	09020101-540	Unnamed Cr to Unnamed Cr	*Aquatic Life:* Fish Bioassessments	Non-pollutant based stressors
Mustinka River	09020102-506	Headwaters to Lightning Lake	*Aquatic Recreation: Escherichia coli*	Complete
			Aquatic Life: Dissolved Oxygen	Deferred
Fivemile Creek	09020102-510	T127 R45W S24, east line to Mustinka River Ditch	*Aquatic Recreation: Escherichia coli*	Complete
Twelvemile Creek, West	09020102-511	T125 R46W S33, south line to Twelvemile Creek	*Aquatic Recreation: Escherichia coli*	Complete
			Aquatic Life: Dissolved	Complete

Name	AUID	Description	Affected Use: Pollutant/Stressor	TMDL Status
Branch			oxygen	
Twelvemile Creek	09020102-514	T126 R45W S21, south line to West Branch Twelvemile Creek	*Aquatic Recreation: Escherichia coli*	Complete
			Aquatic Life: Dissolved oxygen	Complete
			Aquatic Life: Macroinvertebrate Bioassessments	TP TMDL; Other non-pollutant based stressors
			Aquatic Life: Fish Bioassessments	TP TMDL; Other non-pollutant based stressors
			Aquatic Life: Turbidity	Complete
Mustinka River	09020102-518	Grant/Traverse County line to Fivemile Creek	*Aquatic Recreation: Escherichia coli*	Complete
			Aquatic Life: Turbidity	Complete
Twelvemile Creek	09020102-557	West Branch Twelvemile Creek to Mustinka River Ditch	*Aquatic Recreation: Escherichia coli*	Complete
			Aquatic Life: Macroinvertebrate Bioassessments	Upstream TP TMDLs (-514, -511); Other non-pollutant based stressors
			Aquatic Life: Fish Bioassessments	Upstream TP TMDLs (-514, -511); Other non-pollutant based stressors
			Aquatic Life: Turbidity	Complete
Mustinka River	09020102-580	Lightning Lake to Grant/Mustinka Flowage	*Aquatic Recreation: Escherichia coli*	Complete
			Aquatic Life: Dissolved oxygen	Complete
			Aquatic Life: Fish Bioassessments	Non-pollutant based stressors
			Aquatic Life: Turbidity	Complete
Mustinka River	09020102-503	Unnamed Cr to Lake Traverse	*Aquatic Life:* Dissolved oxygen	Non-pollutant based stressors
			Aquatic Life: Turbidity	Complete
Eighteenmile Creek	09020102-508	Unnamed Cr to Mustinka River	*Aquatic Life:* Dissolved oxygen	Complete
			Aquatic Life: Macroinvertebrate Bioassessments	Complete
			Aquatic Life: Fish	Complete

Name	AUID	Description	Affected Use: Pollutant/Stressor	TMDL Status
			Bioassessments	
Unnamed Creek	09020102-538	Unnamed Cr to Mustinka River	*Aquatic Life:* Macroinvertebrate Bioassessments	Non-pollutant based stressors
			Aquatic Life: Fish Bioassessments	Non-pollutant based stressors
Unnamed Creek	09020102-578	Unnamed Creek to Unnamed Creek	*Aquatic Life:* Fish Bioassessments	Non-pollutant based stressors
Mustinka River	09020102-502	Fivemile Creek to Unnamed Cr	*Aquatic Life:* Turbidity	Complete
Mustinka River	09020102-582	Mustinka River Flowage to Grant/Traverse County Line	*Aquatic Life:* Turbidity	Complete

As a result of deferred assessments from the 2010 cycle, which will be assessed in the spring of 2019, 16 stream reaches located in the Mustinka and Bois de Sioux Watersheds are being recommended for new or additional impairments on the 2020 Impaired Waters List. These reaches are listed in the table below.

Mustinka and Bois de Sioux Watersheds' Stream Reaches Recommended for New or Additional Impairments

Name	Waterbody ID	Description	Affected Use
Bois de Sioux River	09020101-503	Mud Lake to Rabbit River	*Aquatic Life:* Fish Bioassessments
Unnamed creek	09020101-539	Unnamed Crk to CD 52	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
Unnamed ditch	09020101-547	Unnamed ditch to unnamed ditch	*Aquatic Life:* Fish Bioassessments
Judicial Ditch 2	09020101-548	Unnamed ditch to unnamed ditch	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
Unnamed ditch	09020101-557	Unnamed ditch to JD 2	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
Mustinka River (Old Channel)	09020102-502	Five Mile Crk to Unnamed Crk	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments

Name	Waterbody ID	Description	Affected Use
Mustinka River	09020102-503	Unnamed Crk to Lake Traverse	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
Mustinka River	09020102-506	Headwaters to Lightning Lake	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
Judicial Ditch 4	09020102-512	Headwaters to Twelve Mile Crk	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
Mustinka River	09020102-518	Grant/Traverse Co. line to Five Mile Crk	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
County Ditch 8	09020102-527	Headwaters to Lannon Lake	*Aquatic Life:* Fish Bioassessments
Unnamed creek	09020102-532	Unnamed Crk to Unnamed Crk	*Aquatic Life:* Fish Bioassessments
Unnamed creek	09020102-561	Unnamed Crk to Mustinka River	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
Unnamed ditch	09020102-564	Unnamed Crk to Unnamed ditch	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
County Ditch 42	09020102-579	Between Twelve Mile Crk and Five Mile Crk	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments
Mustinka River	09020102-582	Mustinka River Flowage to Grant/Traverse Co. Line	*Aquatic Life:* Fish Bioassessments
			Aquatic Life: Macroinvertebrate Bioassessments

While the above waterbodies are not currently listed as impaired, the watershed district should be aware of their proposed listing status during development of the 1W1P.

The following table lists the Mustinka and Bois de Sioux Watersheds' lakes that are identified as resource concerns per the 2018 Impaired Waters 303(d) list:

Name	Lake ID	Location	Affected Use/Impairment	TMDL Status
East Toqua Lake	06-0138-00	At Graceville	*Aquatic Recreation:* Nutrient/ Eutrophication Biological Indicators (Phosphorus)	Complete
Lannon Lake	06-0139-00	Near Graceville	*Aquatic Recreation:* Nutrient/ Eutrophication Biological Indicators (Phosphorus)	Complete
Lightning Lake	26-0282-00	2 miles N of Wendell	*Aquatic Recreation:* Nutrient/ Eutrophication Biological Indicators (Phosphorus)	Complete
Ash	26-0294-00	3 mi. NW of Wendell	*Aquatic Recreation:* Nutrient/ Eutrophication Biological Indicators (Phosphorus)	Pending Approval
Mud	78-0024-00	3 mi W of Wheaton	*Aquatic Recreation:* Nutrient/ Eutrophication Biological Indicators (Phosphorus)	Deferred
Upper Lightning	56-0957-00	Near Western	*Aquatic Recreation:* Nutrient/ Eutrophication Biological Indicators (Phosphorus)	Pending Approval

The following list describes some of the major water quality concerns and implementation strategies identified in the Mustinka and Bois de Sioux WRAPS Plans:

- **Nutrients, Sediment, and Flow -** Multi-purpose flood control structures, such as North Ottawa (which manages flow, nutrients, and sediment), for water quality because of the fundamental need to manage high-flow periods in the Red River Basin. Road "retention" projects where culverts are downsized to provide flood storage with additional water quality reduction benefits.

- **Nutrients and Sediment -** Source control/reduction: reducing the amount of nutrients applied to fields and the export of nutrients and sediments from fields, will reduce nutrient and

sediment loads to downstream surface waters and increase the effectiveness of downstream structural BMPs.

- **Nutrients, Sediment, and Flow -** Soil health: intensive agricultural practices, including intensive tillage, can deplete the organic matter content of the soil over time, which increases dissolved nutrient leaching and decreases infiltration of runoff into the soil. Preservation of soil health in the fertile soils of the Mustinka and Bois de Sioux Watersheds is important for maintaining crop yields, reducing nutrient losses, and improving water infiltration. Challenges remain with cover crops due to herbicide residue and short growing season limiting cover crop growth. Crop rotation and reduced tillage are identified as a potential and feasible ways to preserve and build organic matter and soil health.

- **Nutrients and Flow -** Agricultural drainage: past ditching and substantial recent and ongoing increases in tile drainage have altered watershed runoff patterns and stream flow; in particular, increases in tile drainage are likely to increase nitrate and dissolved P concentrations in downstream streams and lakes. Tile systems without surface intakes have low concentrations of sediment-bound P and TSS, but high concentrations of nitrate and dissolved P. In the Mustinka and Bois de Sioux Watersheds, dissolved P is a pollutant of concern for downstream lakes and streams. Policies that encourage or require outlet control structures on drain tile can give greater flexibility and control in retaining dissolved nutrients in fields, extending the time that these nutrients are available to crops.

- **Biological communities and Nutrients -** Altered hydrology: damming of Lake Traverse and its reservoir discharges, stream channelization, loss of wetland storage, laser-guided grading of farmed-through head water streams, and tiling of the shallow groundwater – all components of altered hydrology – have exacerbated the effect of typical late-summer dry conditions and 'flashy' flows during spring-thaw and storm events throughout the watersheds. This can result in extended periods of stagnant, low-flow conditions in streams and ditches which adversely impacts local fish, macroinvertebrates, and nutrient release.

- **Biological communities –** Lake or stream connectivity: perched culverts and disconnection from the natural floodplain have limited hydrologic and biologic connectivity in the watersheds' streams. Efforts to restore stream connections, sinuosity and floodplains should be considered wherever possible and feasible and especially on those reaches which identify these stressors as causal to biological impairments.

Additional information identifying restoration and protection strategies for individual lakes and streams and subwatershed-level pollutant reduction goals can be found in the Strategies and Actions Tables located in each watershed's WRAPS report. Additionally, each watershed's WRAPS report contains maps identifying sediment and P 'Hotspots' based upon Hydrologic Simulation Program – FORTRAN (HSPF) modeling and the Water Quality Decision Support Application (WQDSA)/PTMapp tool.

Thank you for the opportunity to provide input on the watersheds' resource concerns. Please feel free to contact me with any questions.

Sincerely,

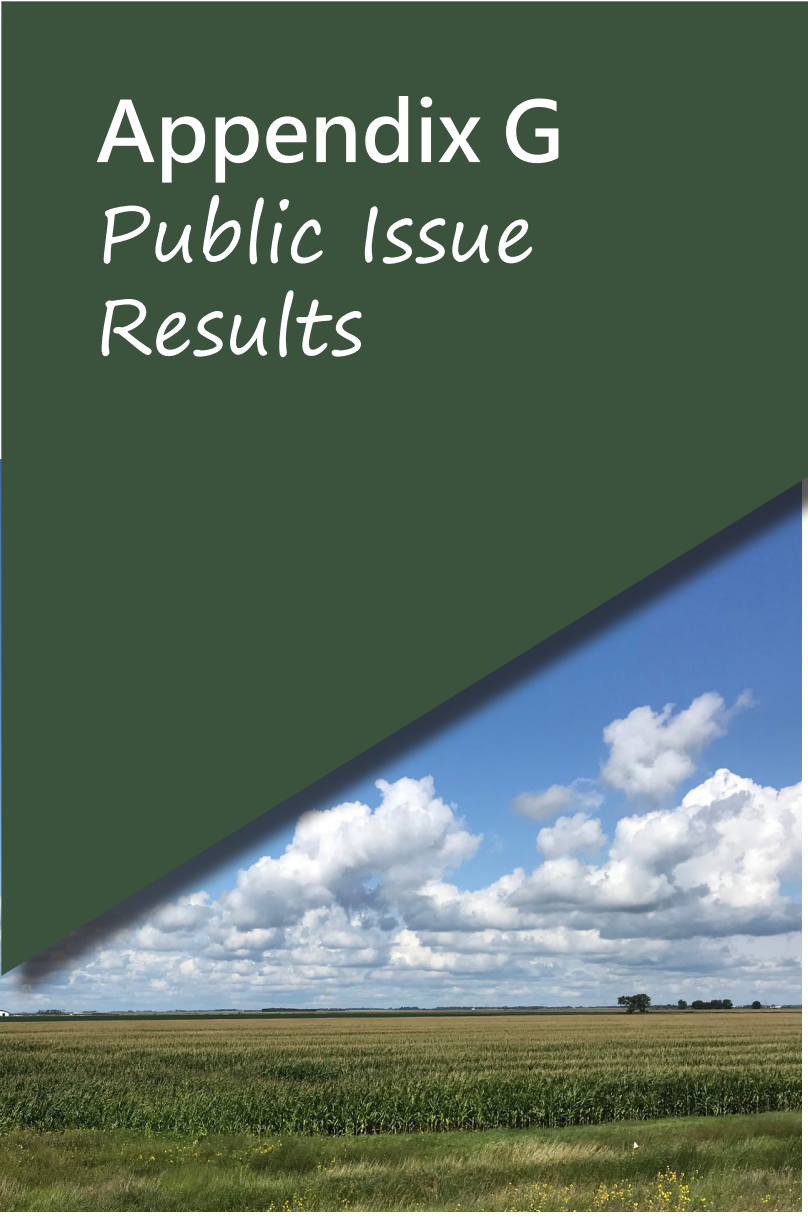
Jim Courneya

This document has been electronically signed.

Jim Courneya
Supervisor
Northwest Watershed Unit
Watershed Division
Minnesota Pollution Control Agency

cc: Pete Waller, BWSR
Cary Hernandez, MPCA

Appendix G
Public Issue Results



Input from the general public regarding issue prioritization was collected during the Mustinka River Watershed Public Kickoff Meeting held in Wheaton on April 2, 2019 and the Bois de Sioux River Watershed Public Kickoff Meeting held in Wendell on April 3, 2019. The tallied public input was compiled by the Steering Committee and is included in **Tables G-1 and G-2**.

Upon review of the results from the public meetings and further review of the complete issue list, the Steering Committee chose to eliminate one issue theme and a small number of associated issues (Issue Theme - Action List in **Table G-1**, Issue No. 15 – multi-benefit projects, No. 29 – inadequate funding, and No. 30 inadequate enforcement in **Tables G-2**). The issues removed from the prioritization process were deemed action items, not issues, and therefore did not justify issue ranking.

Table G-1: Summary of voting results for priority issues within the Bios de Sioux River and Mustinka River Watersheds and for the two watersheds combined, tallied from public meetings and grouped by issue theme.

	Watersheds Combined		Bois de Sioux Watershed		Mustinka Watershed	
Issue Theme	**Votes**	**% of Votes**	**Votes**	**% of Votes**	**Votes**	**% of Votes**
Altered Hydrology	5	1%	3	2%	2	1%
Drainage	181	46%	86	46%	95	46%
Erosion and Sedimentation	69	18%	43	23%	26	13%
Flooding	47	12%	19	10%	28	14%
Groundwater	14	4%	10	5%	4	2%
Habitat	4	1%	3	2%	1	0%
Land Use Management	31	8%	13	7%	18	9%
Surface Water Quality	14	4%	2	1%	12	6%
Action List*	26	7%	7	4%	19	9%

* This Issue Theme was removed as the associated issues were reclassified as Action Items

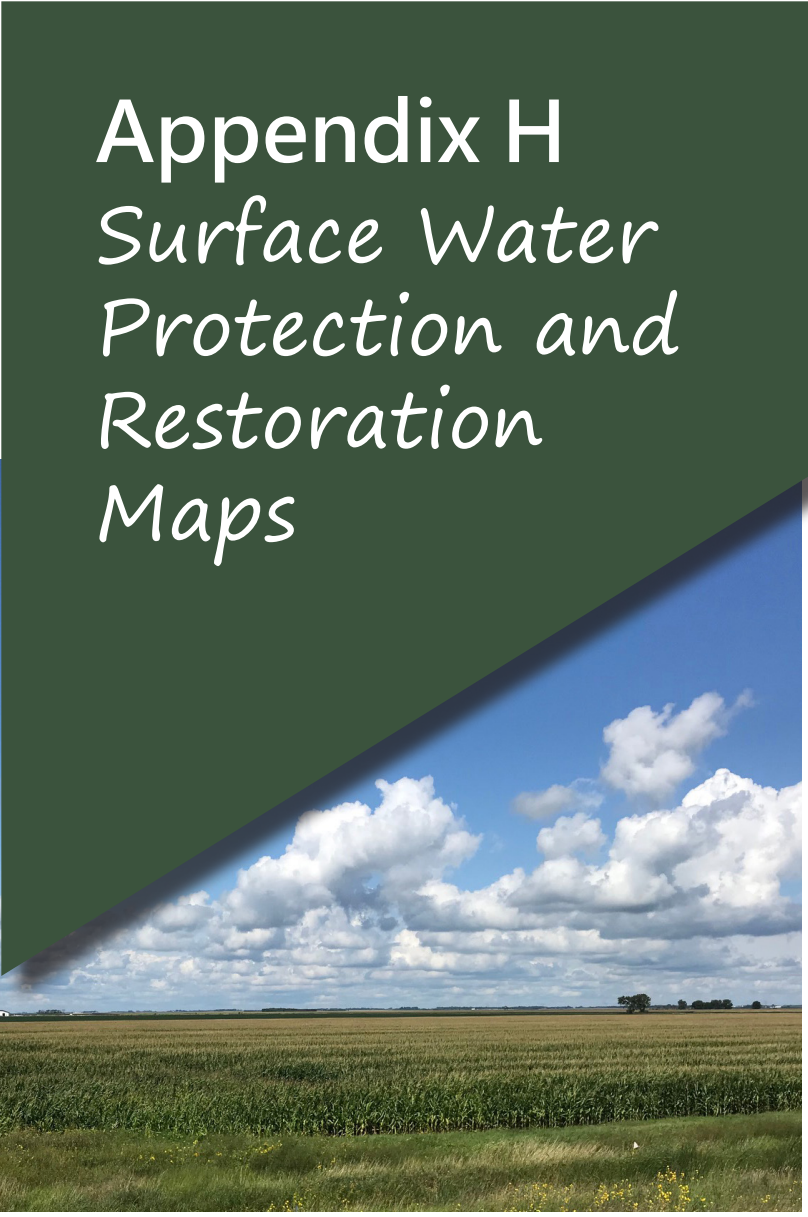
Table G-2: Summary of voting results for priority issues within the watershed from public meetings.

Issue No.	Issue Statement	Issue Theme	Watersheds Combined		Bois de Sioux Watershed		Mustinka Watershed	
			Votes	% of Votes	Votes	% of Votes	Votes	% of Votes
1	Drainage system instability	Drainage	16	4%	15	8%	1	0%
2	Drainage system inadequacy	Drainage	98	25%	54	29%	44	21%
3	Drainage system records modernization and standardization	Drainage	20	5%	3	2%	17	8%
4	Out of date benefit determinations	Drainage	44	11%	11	6%	33	16%
5	Sediment loading to surface waters	Erosion and Sedimentation	54	14%	34	18%	20	10%
6	Nutrient loading to surface waters	Surface Water Quality	9	2%	1	1%	8	4%
7	Bacteria loading to surface waters	Surface Water Quality	2	1%	1	1%	1	0%
8	Low dissolved oxygen in surface waters	Surface Water Quality	2	1%		0%	2	1%
10	Unstable river and stream channels	Erosion and Sedimentation	15	4%	9	5%	6	3%
12	Altered hydrologic conditions	Altered Hydrology	5	1%	3	2%	2	1%
13	Flood damage to communities and public infrastructure	Flooding	21	5%	5	3%	16	8%
14	Flood damage to farmland, homesteads, and public infrastructure surrounding farmland.	Flooding	26	7%	14	8%	12	6%
15	Multi-benefit project development (for e.g., flood mitigation and habitat enhancements); Designing projects with clear primary and secondary operational objectives	Action List*	6	2%	3	2%	3	1%
17	Loss and degradation of wetland habitat	Habitat	1	0%	0	0%	1	0%
19	Loss and degradation of riparian habitats	Habitat	3	1%	3	2%	0	0%

Issue No.	Issue Statement	Issue Theme	Watersheds Combined		Bois de Sioux Watershed		Mustinka Watershed	
			Votes	% of Votes	Votes	% of Votes	Votes	% of Votes
20	Substandard/Failing WWTF & SSTS	Surface Water Quality	1	0%	0	0%	1	0%
22	Groundwater protection	Groundwater	14	4%	10	5%	4	2%
23	Protect and improve agricultural land productivity	Land Use Management	31	8%	13	7%	18	9%
29	Inadequate funding for conservation practices	Action List*	16	4%	0	0%	16	8%
30	Inadequate enforcement of conservation practices regulations	Action List*	4	1%	4	2%	0	0%
31	Inconsistent drainage authority administration	Drainage	3	1%	3	2%	0	0%

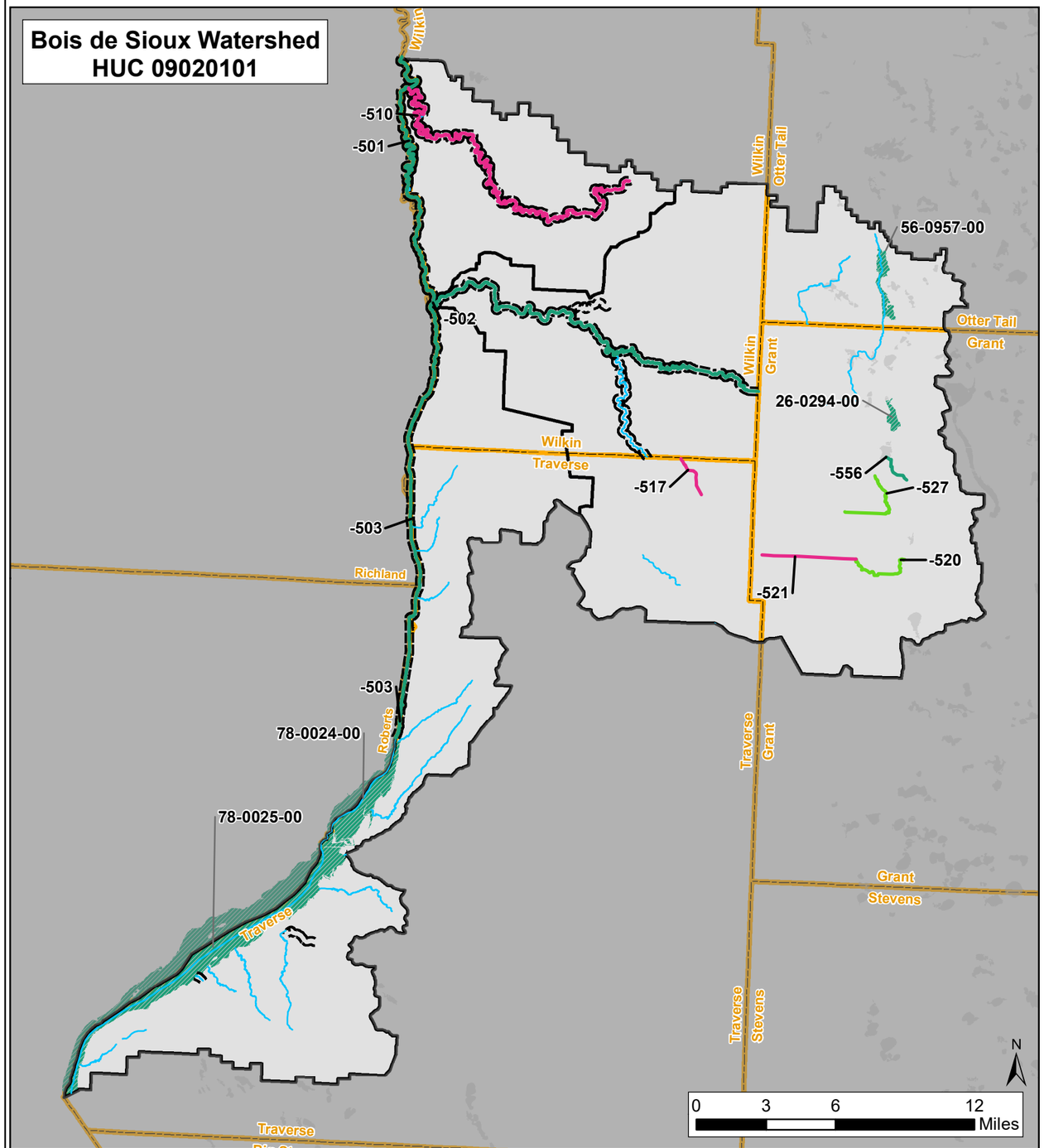
* This Issue Theme was removed as the associated issues were reclassified as Action Items

Appendix H
Surface Water Protection and Restoration Maps

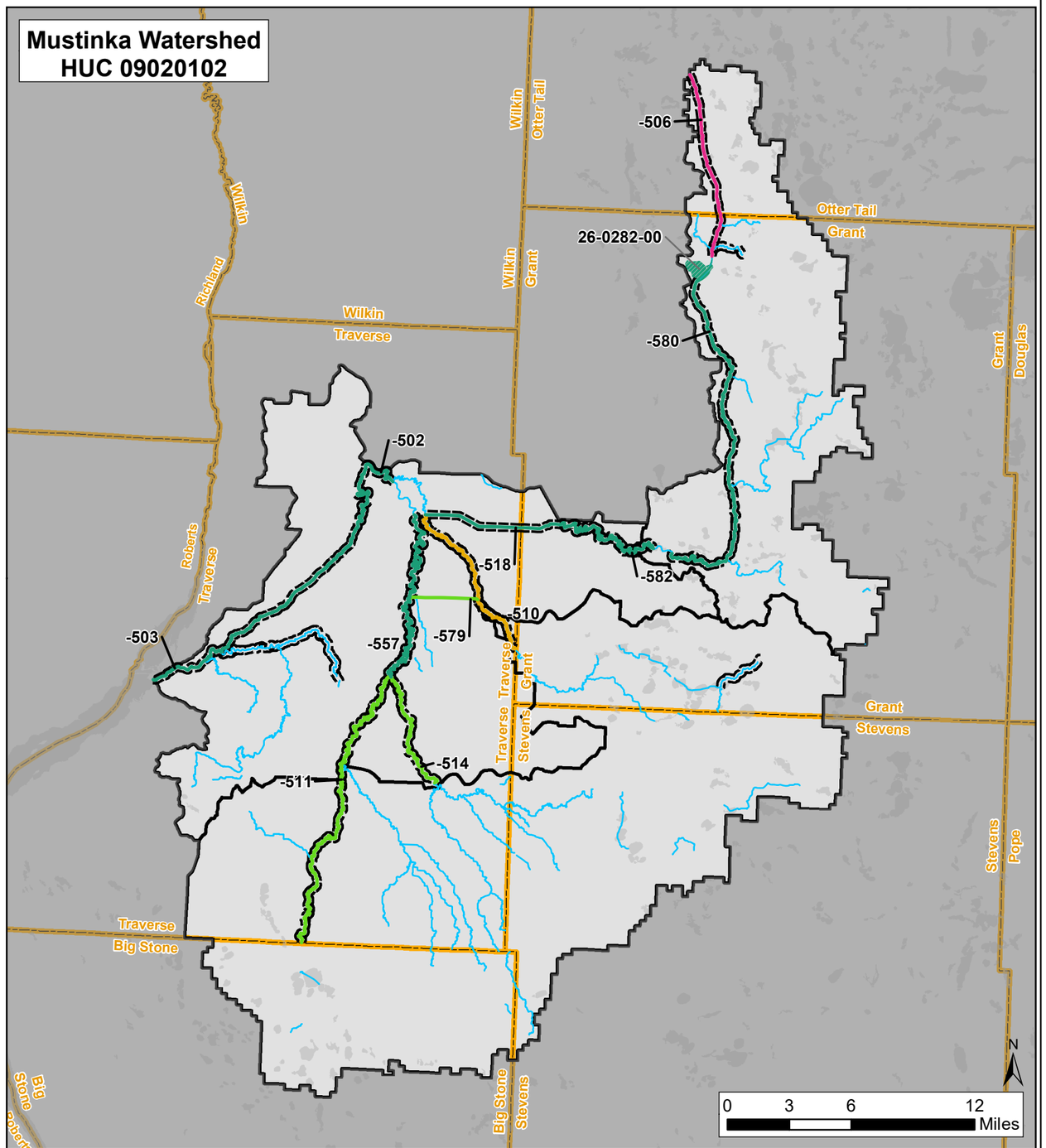


Protection: Above Average Quality

Bois de Sioux Watershed HUC 09020101



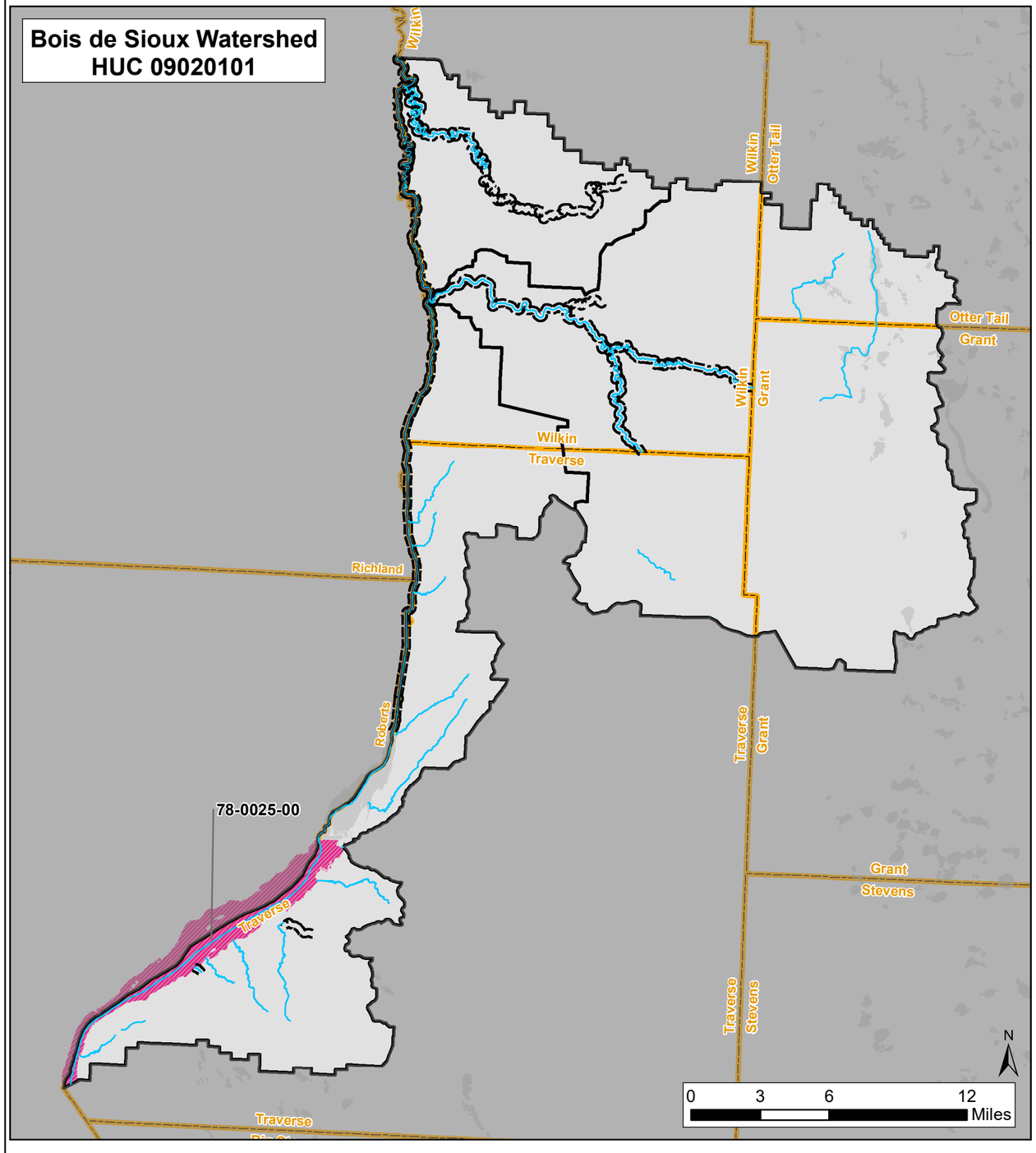
Mustinka Watershed HUC 09020102



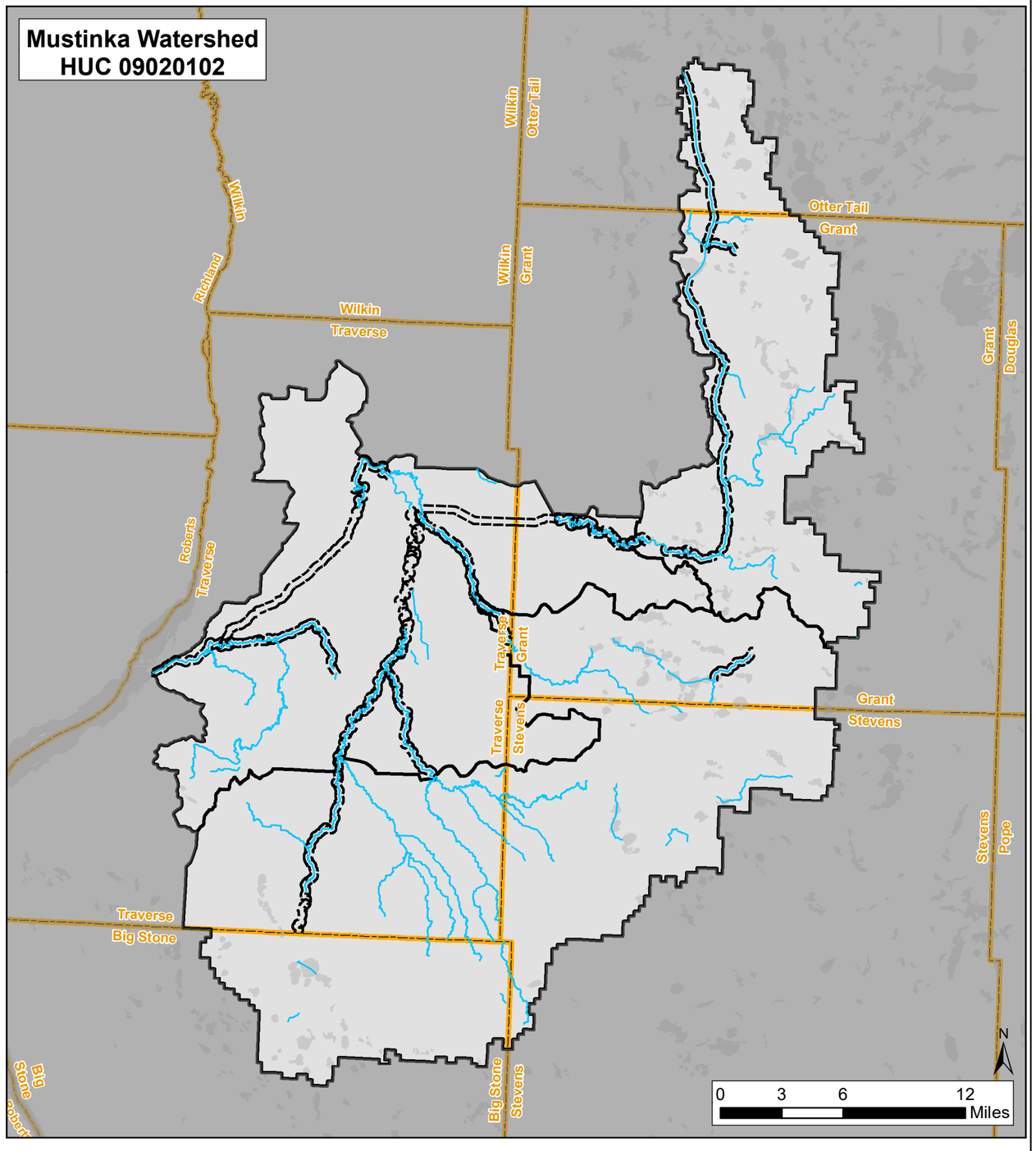
Nitrogen
Nitrogen
Total Suspended Solids
Nitrogen, Total Suspended Solids
Total Phosphorus, Total Suspended Solids
Public Watercourses
Impaired Streams
Planning Regions
County Boundaries

Protection: Potential Impairment Threat

Bois de Sioux Watershed
HUC 09020101



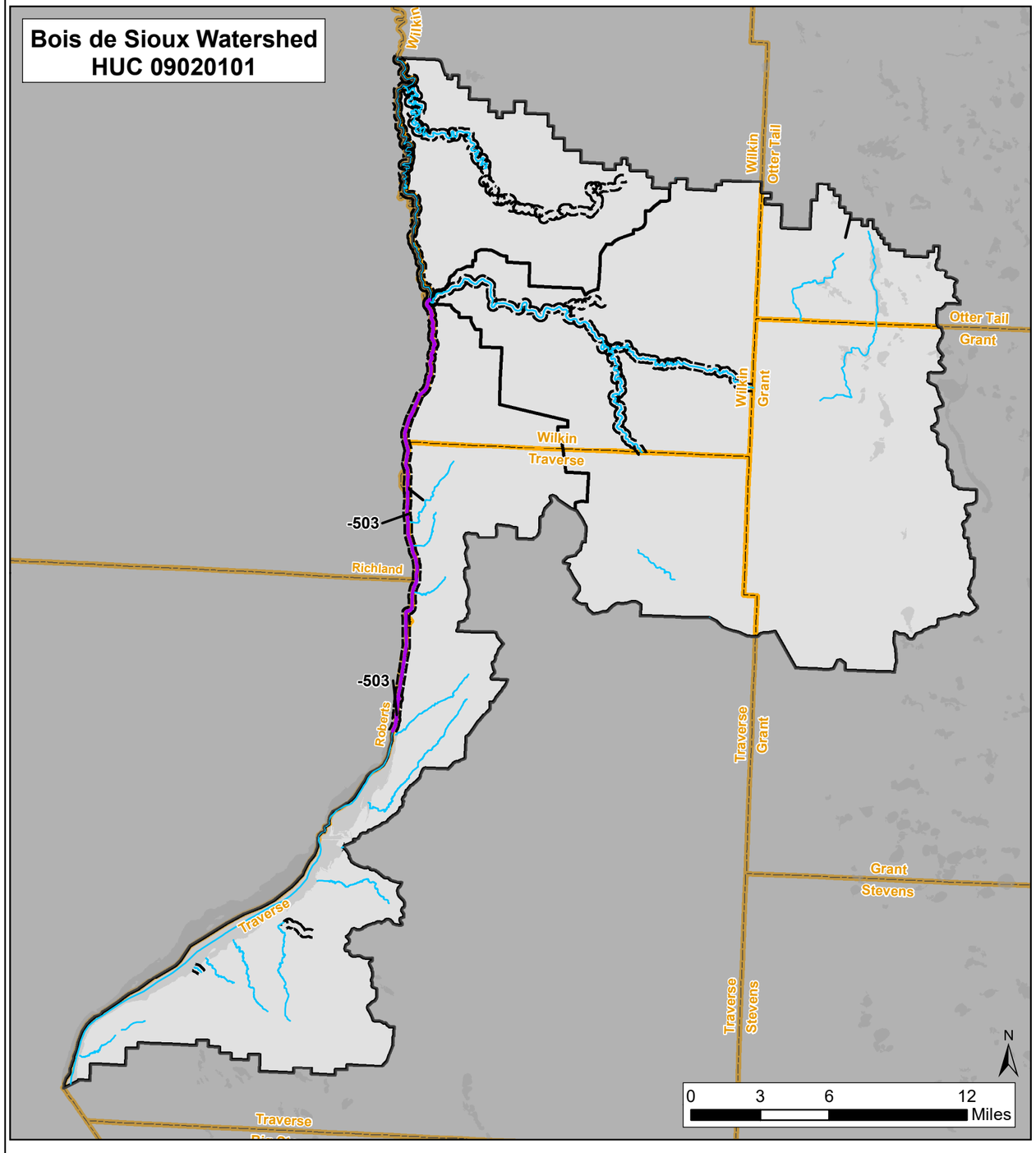
Mustinka Watershed
HUC 09020102



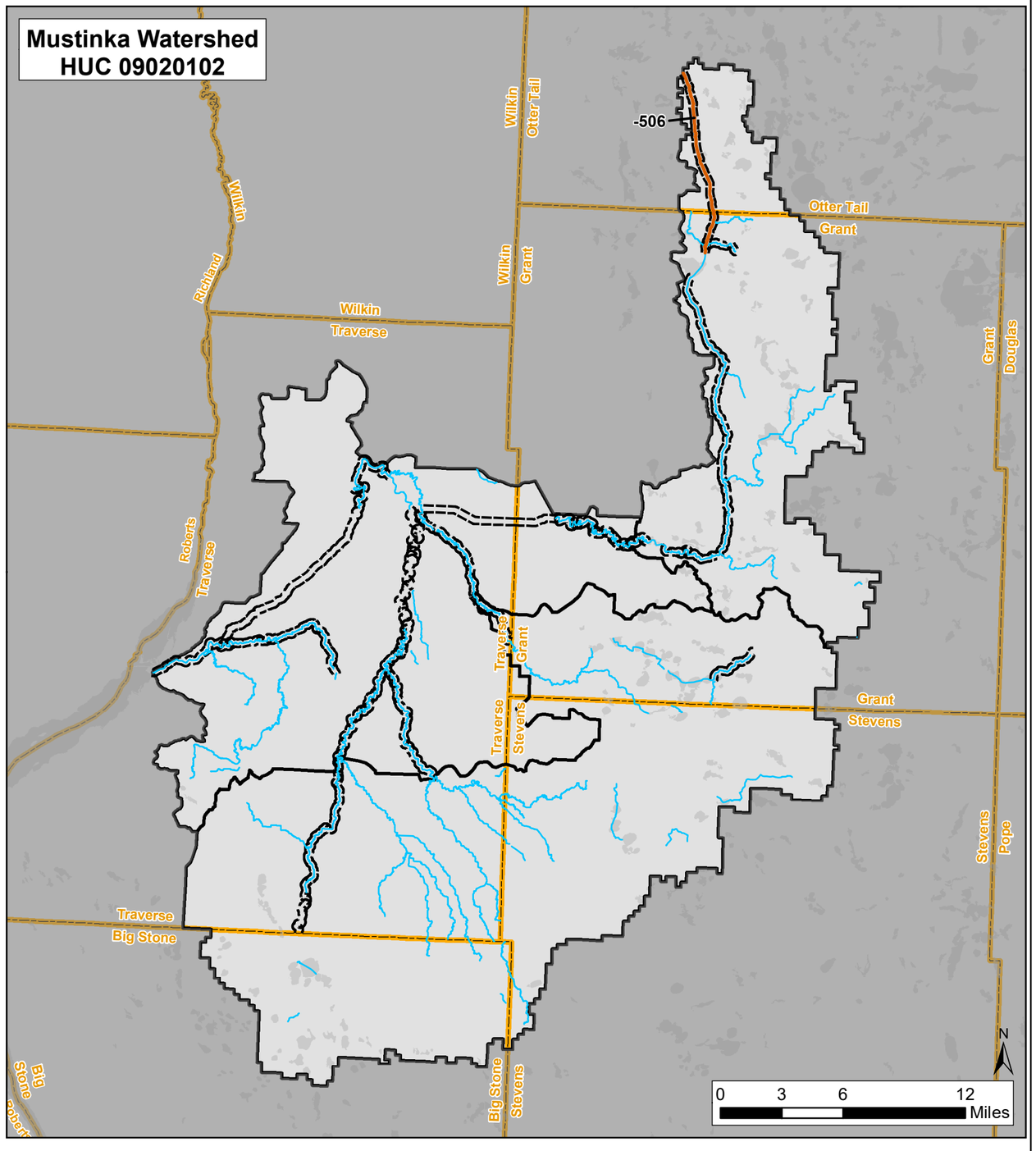
Total Suspended Solids
Impaired Streams
Public Watercourses
County Boundaries
Planning Regions

Protection: Threatened Impairment Risk

Bois de Sioux Watershed
HUC 09020101

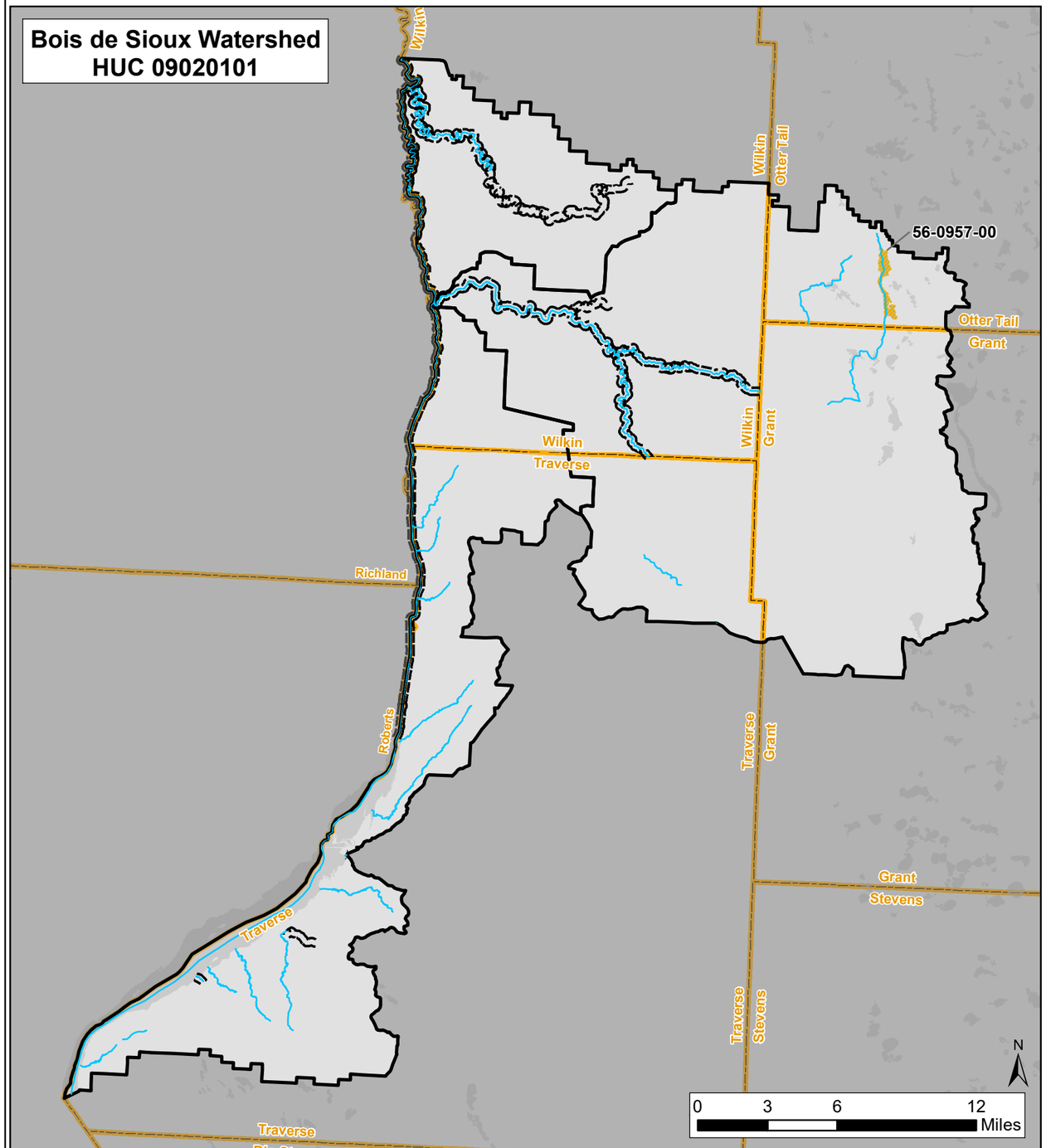


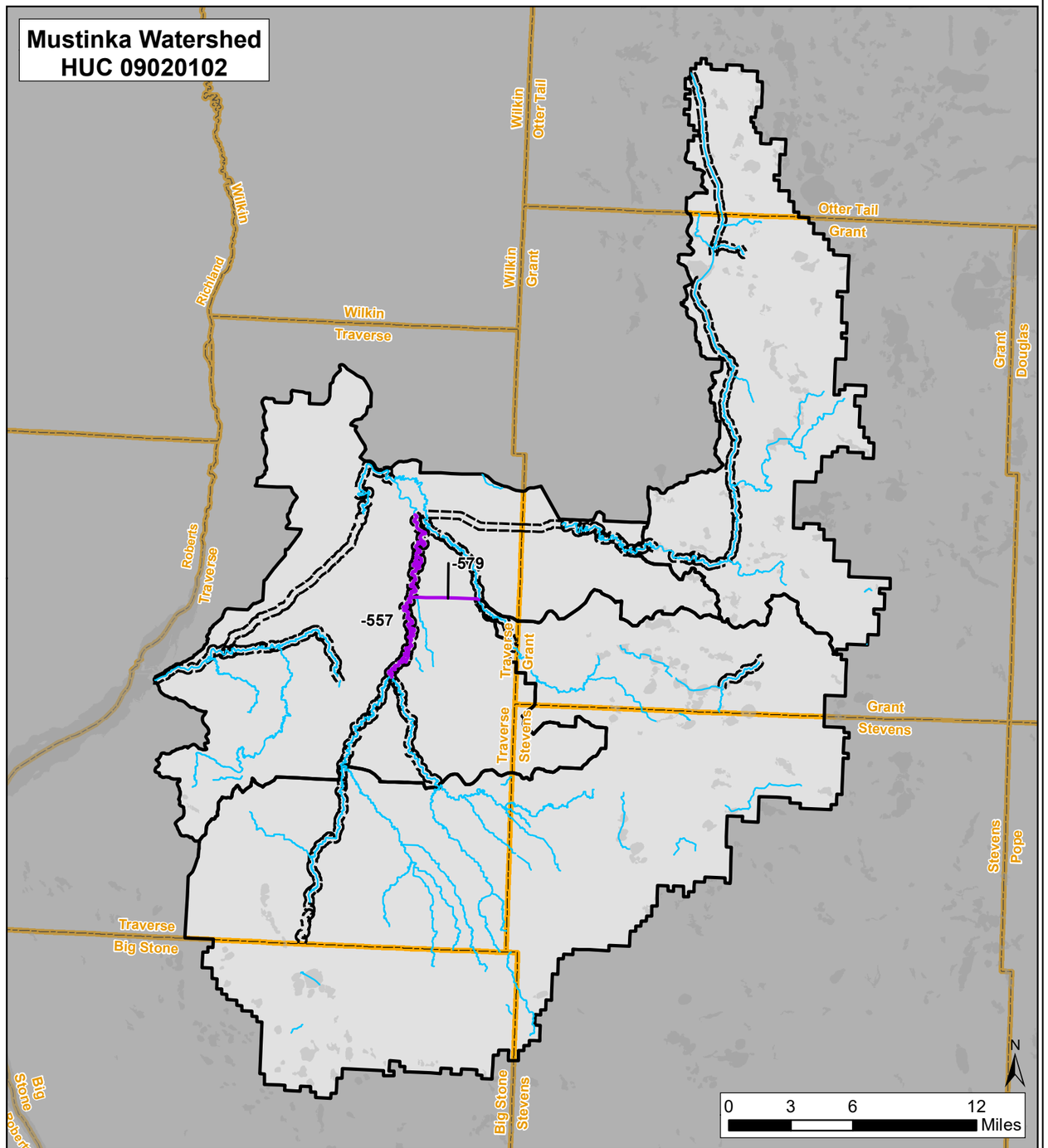
Mustinka Watershed
HUC 09020102



Total Phosphorus
E coli
Public Watercourses
Impaired Streams
Planning Regions
County Boundaries

Restoration: Low Restoration Effort





Total Phosphorus, Total Suspended Solids
E coli
Public Watercourses
Impaired Streams
Planning Regions
County Boundaries

Restoration: High Restoration Effort

Bois de Sioux Watershed
HUC 09020101

-510
-501
-502
-516
26-0294-00
-517
-527
-521
-520
-551
-503
-503
78-0024-00
78-0025-00

Wilkin
Otter Tail
Grant
Traverse
Richland
Roberts
Stevens

0 3 6 12 Miles
N

Mustinka Watershed
HUC 09020102

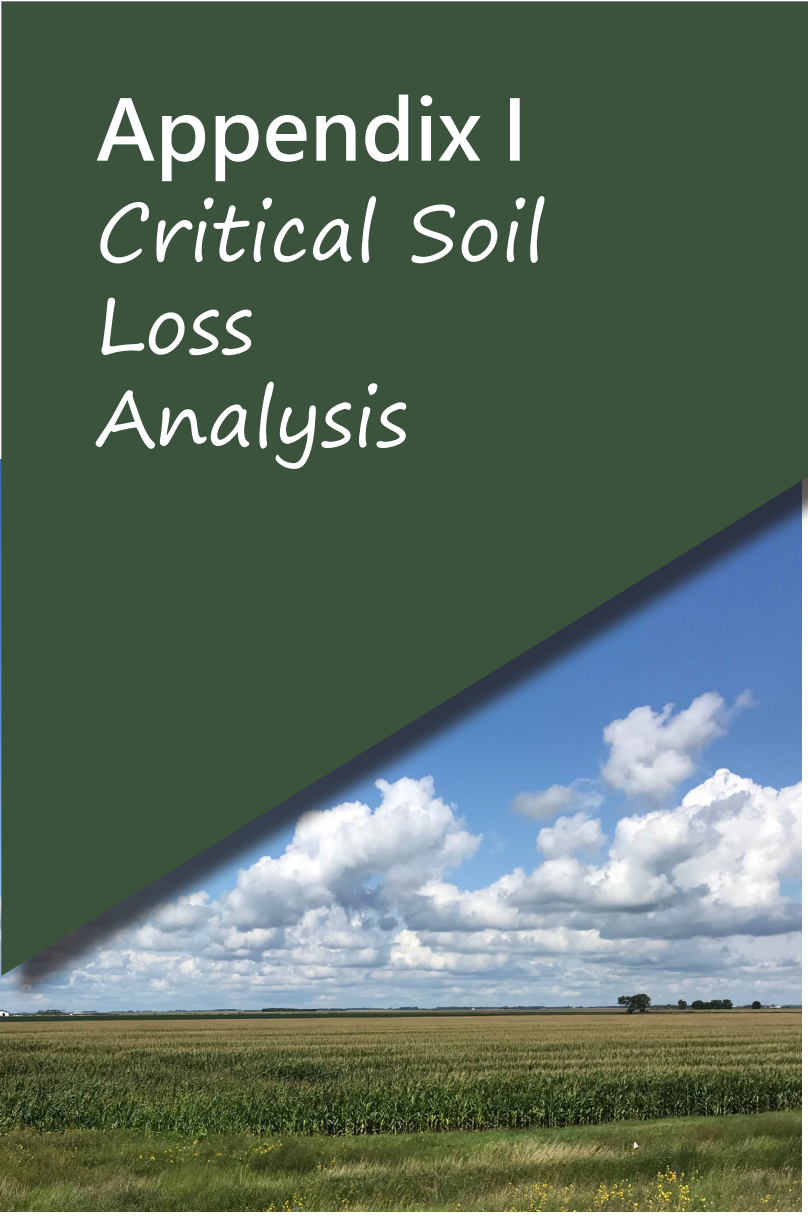
-506
26-0282-00
-580
-502
-518
-582
-510
-503
-557
-579
-514
-511
06-0139-00
06-0138-00

Wilkin
Otter Tail
Grant
Douglas
Richland
Traverse
Roberts
Stevens
Pope
Big Stone

0 3 6 12 Miles
N

Total Phosphorus, Total Suspended Solids
E coli
E coli, Total Phosphorus
E coli, Total Phosphorus, Total Suspended Solids
Nitrogen
Total Phosphorus
Total Phosphorus, Total Suspended Solids
Public Watercourses
Impaired Streams
Planning Regions
County Boundaries

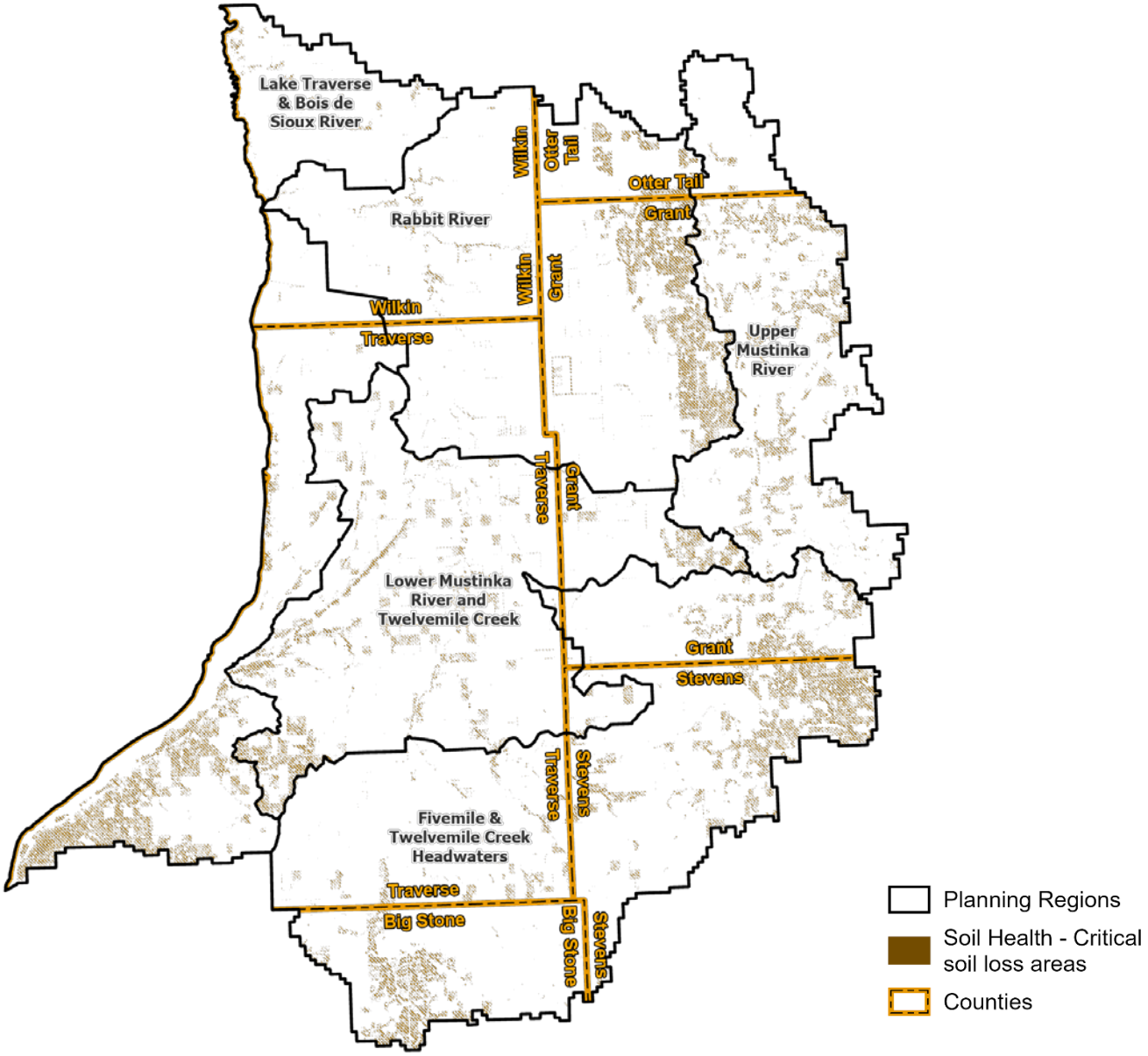
Appendix I
Critical Soil Loss Analysis



Critical Soil Loss

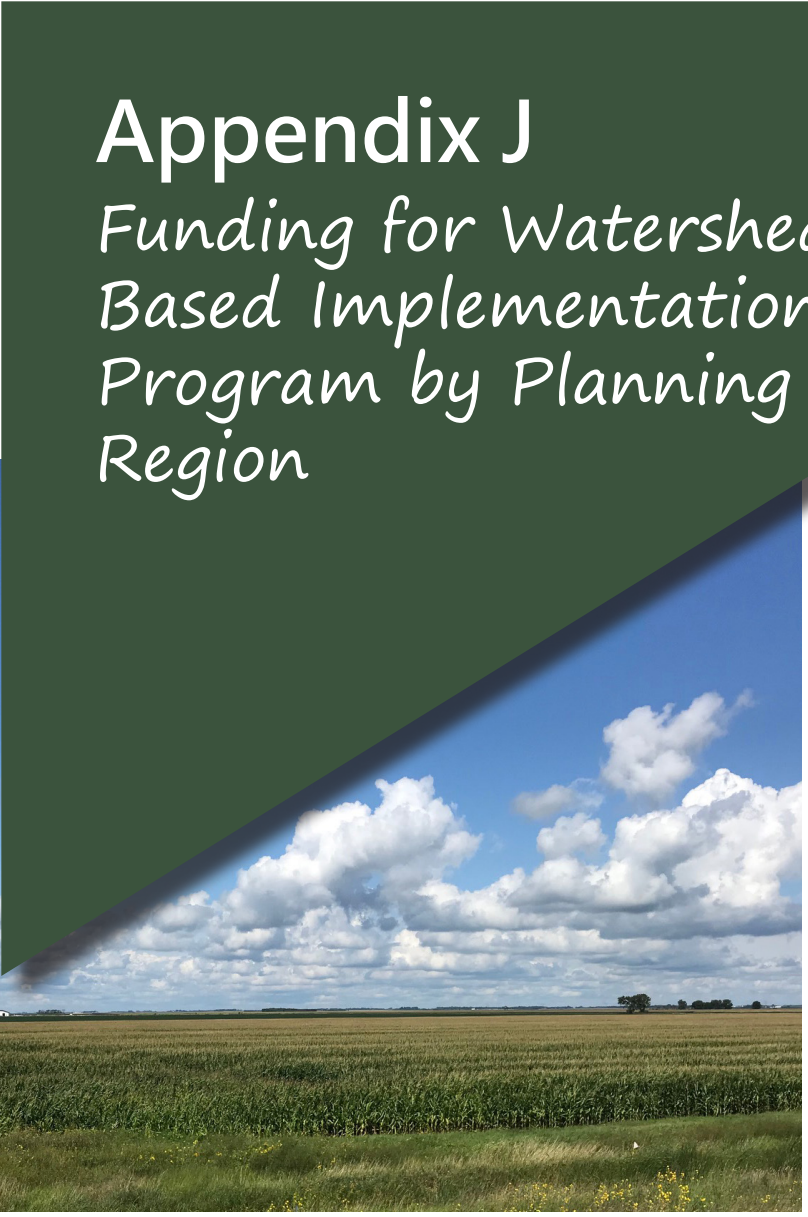
The critical soil loss analysis is used to identify areas on the landscape that have the highest soil erosion taking place. By locating these areas, planning partners can better identify areas to prioritize for protection and or restoration focused on soil health.

The critical soil loss analysis runs through a set of calculations on raster data output from the Prioritize, Target, and Measure Application (PTMApp). Sediment loss from the landscape is calculate in PTMApp and the critical soil loss analysis takes that information and attributes sediment loss from the landscape to common land units (CLUs). Soil loss is only calculated on land that is identified as pasture and agriculture from the NLCD landuse layer. For the Bois de Sioux-Mustinka CWMP area, the critical soil loss analysis was performed by planning region to provide the CLUs that contain the top 25% of the soil loss within each planning region.



Appendix J

Funding for Watershed-Based Implementation Program by Planning Region



	LAKE TRAVERSE	RABBIT	LOWER MUSTINKA	UPPER MUSTINKA	12-MILE CREEK	TOTAL
Weighted Percentage	16%	20%	18%	19%	27%	100%
Budget	$770,000	$1,003,000	$869,500	$927,000	$1,339,470	$4,900,500

	Groundwater Quality	Sediment	Unstable Channels	Public Flooding	Private Flooding	Altered Hydrology	Stormwater Mgmt	Ditch System Instability	Ditch System Inadequcy	Soil Health	Bacteria	Nutrient Loading	LAKE TRAVERSE	RABBIT	LOWER MUSTINKA	UPPER MUSTINKA	12-MILE CREEK	TOTAL %	
Projects and Practices												**TOTAL**	$ 391,000.00	$ 1,003,000.00	$ 348,000.00	$ 927,000.00	$ 895,000.00	$ 3,564,000.00	
1. Implement filtration practices (e.g. filter strips, grass waterways, etc) to control erosion and sediment runoff on-field. Staff time for CRP and grass programs.		●										●	9.0%	10.0%	10.0%	14.0%	21.0%	13.6%	
2. Implement storage practices (e.g. WASCOBS and drainage water management) to reduce erosion and increase water storage capacity. Potentially use these actions in combination with multipurpose drainage management actions.		○		●	●	●							15.0%	20.0%	20.0%	29.0%	21.0%	21.2%	
3. Implement protection practices (e.g. grade stabilization, streambank protection, and side water inlets) to reduce ditch/stream scouring and reduce edge-of-field and in-channel sediment loss. Potentially use these actions in combination with multipurpose drainage management actions and streambank restoration capital improvement projects.		●	●	○	○			○				●	22.0%	19.0%	27.0%	20.0%	21.0%	21.7%	
4. Implement soil management practices to improve soil structure, increase water retention, and reduce input needs. Example may include residue management (e.g. conservation- , no-, or strip-till management), crop rotations, cover crops, precision agriculture, Whole-Farm Management plans, and nutrient and manure management plans.		○				○				●		○	18.0%	21.0%	20.0%	20.0%	20.0%	19.9%	73%
6. Implement shoreline BMPs to reduce shoreline erosion and improve recreational and wildlife habitat, lakeshore owners.		○	●		○			○				○	10.0%	0.0%	0.0%	10.0%	10.0%	6.2%	
7. Implement mutipurpose drainage management practices (DITCH RETROFITS) to improve ditch system stability.		●		●	●	●		●	●			○	20.0%	25.5%	20.0%	0.0%	0.0%	11.9%	
9. Implement urban stormwater practices (e.g., rain gardens, rain barrels, etc.) on urban and commercial parcels.		○		○	○	○	○					○	0.0%	2.5%		5.0%	5.0%	2.8%	
10. Seal abandoned wells.	●												2.0%	1.0%	2.0%	1.0%	1.0%	1.3%	
11. Install fencing to restrict livestock access to identified unstable riparian areas and shorelines.		○	○								●	○	2.5%	0.0%	0.0%	0.0%	0.0%	0.4%	
12. Establish field windbreaks (CWF eligible and not identified in PTMapp), farm shelterbelts and living snow fences (not CWF eligible).		○								○		○	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	
													100%	100%	100%	100%	100%		

Capital Improvements												**TOTAL**	$ 379,000.00	$ -	$ 521,500.00	$ -	$ 436,000.00	$ 1,336,500.00	
Stream Restorations		●	●			●						○	49.2%	0.0%	60.0%	0.0%	33.0%	28.0%	27%
													Doran Creek Restoration		Twelvemile Creek Restoration		Fivemile Creek Restoration		

Goal Impact Key: 1 = indirect; 2 = direct / accomplishes goal

Appendix K
PTMApp Practices

Prioritize, Target, and Measure Application (PTMApp) Practices

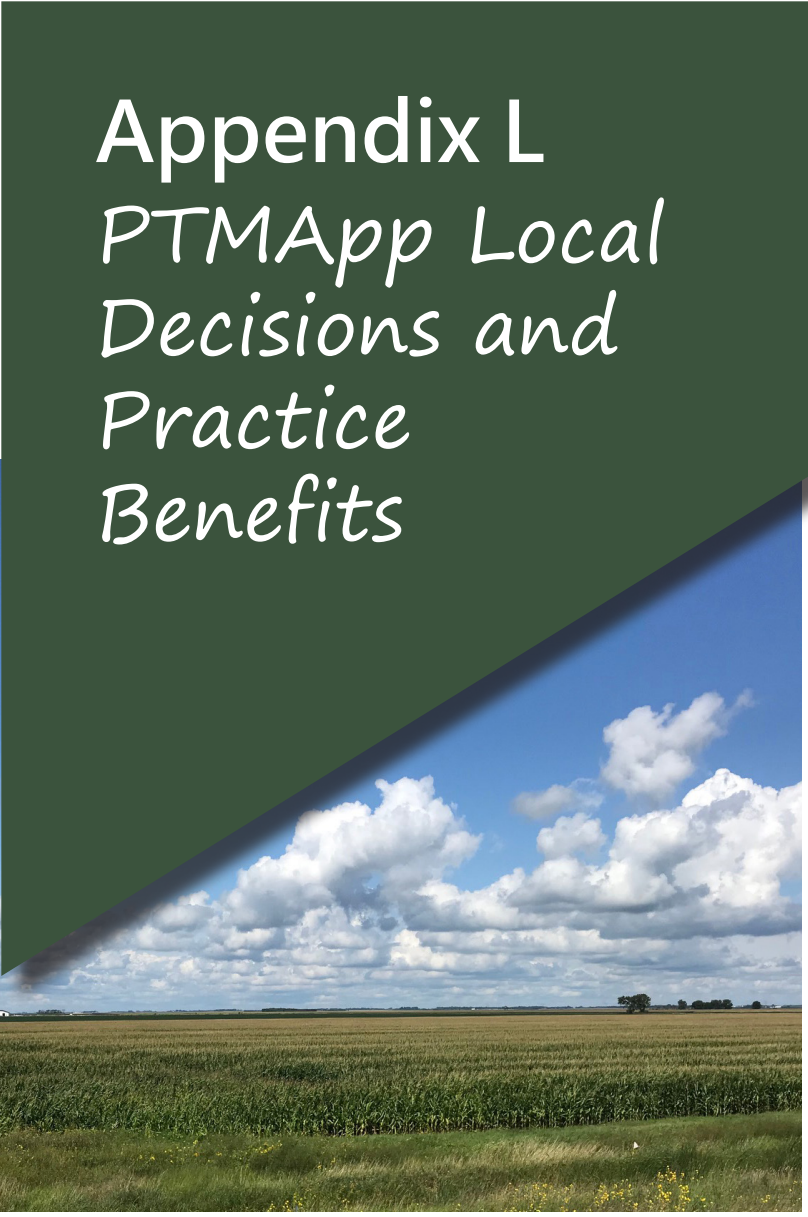
This plan leverages existing PTMApp data to identify where new practices are feasible, how much each practice will cost, what the estimated water quality benefit is, and how much progress implementation of a practice can make toward planning region goals.

PTMApp estimates existing pollutant loads and water quality benefit for a wide range of practices, as shown in the table below.

PTMApp Project or Practice	NRCS Code	PTMApp Treatment Group Category						
		Storage	*Filtration*	*Bio-filtration*	*Infiltration*	*Protection*	*Source Reduction*	*User Defined*
Alternative Tile Intake - Dense Pattern Tiling	606				x			
Alternative Tile Intake - Gravel Inlet	606		x					
Alternative Tile Intake - Other Blind Intake	606		x					
Alternative Tile Intake - Perforated Riser Intake	606	x						
Anaerobic Digester	366							x
Bioretention Basin	N/A			x				
Conservation Cover	327						x	
Conservation Crop Rotation	328						x	
Conservation Tillage	329						x	
Constructed Wetlands	N/A	x						
Contour Buffer Strips	332		x					
Contour Farming	330						x	
Cover Crop	340						x	
Critical Area Planting	342					x		
Culvert Sizing	N/A	x						
Dam	402	x						
Drainage Water Management	554	x						
Filter Strips	393		x					
Forage and Biomass Planting	512						x	
Grade Stabilization Structure	410					x		
Grassed Waterways and Swales	412		x			x		
Infiltration Trench	N/A				x			
Irrigation Water Management	442						x	
Lined Waterway or Outlet	468				x			
Multi-stage Ditch	N/A				x			
Nutrient Management	590						x	
Open Channel	582							x
Pest management	595							x

PTMApp Project or Practice	NRCS Code	PTMApp Treatment Group Category						
		Storage	*Filtration*	*Bio-filtration*	*Infiltration*	*Protection*	*Source Reduction*	*User Defined*
Pond for Water Use	378	x						
Prescribed Burning	338							x
Prescribed Grazing	556						x	
Riparian Forest Buffer	391		x					
Riparian herbaceous Cover	322		x					
Roof Runoff Management	558							x
Rotational Grazing	N/A						x	
Sediment Basin	350	x						
Saturated Buffer	N/A			x				
Septic System Improvement	N/A							x
Storm Water Retention Basins	N/A	x						
Stream Channel Stabilization	584					x		
Streambank and Shoreline Protection	580					x		
Strip-cropping	585					x		
Structure for Water Control	587	x						
Terrace	600		x					
Tree/Shrub Establishment	612					x		
Water and Sediment Control Basin	638	x						
Water Reuse	636							x
Wetland Creation	658	x						
Wetland Restoration	657	x						

Appendix L
PTMApp Local Decisions and Practice Benefits



Prioritize, Target, and Measure Application (PTMApp) Implementation Scenario Local Decisions

Decision	Implications	LOCAL DECISION
1. Criteria used to further screen practices.	Criteria are used to further screen practices considered technically feasible for implementation but are not practicable to implement.	Screen practices as shown in Table 1.
2. Which PTMApp treatment groups to include in the Implementation Scenario. The primary reason for eliminating one or more treatment groups could be a low likelihood of use as a conservation practice.	Primarily affects the estimated ability to achieve load reduction goals using structural conservation practices.	Include all PTMApp treatment groups
3. Method used to estimate practice costs. Options include the use of annual life cycle cost, EQIP cost, or some other cost.	Costs can represent the "cost" share or total cost. For example, EQIP is the government cost share.	Double EQIP Costs; Annualize soil management costs.
4. How to use planning regions within the watershed for the purposes of developing the Implementation Scenario.	Load reduction goals have been established for each planning region. The types, numbers, and processes for selecting conservation practices can vary across planning regions. The use of planning regions allows more "tailoring" of the plan regionally.	Spreading practices out according weighted average of area, sediment, and phosphorus contribution.
5. The spatial scale for the load goal and selecting the most cost-effective practices. Options include edge of field (flowline), catchment outlet, first downstream priority resource point, 12-digit HUC, 10-digit-HUC or 8-digit HUC.	The decision reflects the spatial scale for application of the load reduction goals. (Note: rarely is this identified from a policy perspective). For example, will the ability of the proposed BMPs to achieve the sediment, TP, and TN load reduction goal be assessed at the field edge or some other spatial scale? This decision also affects which BMPs are "selected" as best. The "best" practice locations tend to be near the location where the load reduction is desired. Using the edge of field will tend to spread practices more evenly across the landscape. Use of a planning region outlet will tend to concentrate the practices upstream of that location.	Group will use priority resource points, representing planning region outlets to set goals. The benefits of practices will be summarized both at the planning region outlet and the edge of the field. The "best" practices will be selected based on the highest load reduction at the edge of the field (spreads out practices within the planning region). Practices for the Projects and Practices Implementation Program will be capped at $250,000.

Decision	Implications	LOCAL DECISION
6. Parameters and method used to rank the "best" conservation practices. Options are one or more of the following: total phosphorus, total nitrogen, and sediment. These parameters can also be weighted when selecting the practices (e.g., equal weight for total phosphorus and total nitrogen reduction).	The "best" conservation practices will differ depending on which parameters are used, and whether they are weighted. Weighting can exclude some practices that largely remove a single parameter (e.g., woodchip bioreactors tend to remove nitrate-N but not P).	For all planning regions, Sediment 75% and TP 25% of rank.
7. Process for identifying the number of practices which will be included in the Implementation Scenario. Options include achieving the water quality reduction goal (load); dollars available to implement; capacity to implement; and reasonable practice cost range.	Decision ultimately affects the "cost(s)" of the Implementation Scenario and ability to achieve the load reduction goals.	Number of practices that can be afforded under the "baseline" Funding Level 1.
8. Types of practices selected for implementation scenario.	Experience shows that sometimes, practices are most cost-effective that do not reflect what types of practices are realistic for voluntary implementation.	Set fixed percentages based on budgets and types of practices practical for voluntary implementation.
9. The target for the percentage of cropland acres placed into non-structural practices (cover crop, conservation tillage, permanent cover) and whether the percentage should vary across the watershed (e.g., by planning region).	Experience shows that the source reduction practices tend to be most cost-effective. Affects the "mix" of non-structural and structural practices within the Implementation Scenario.	Set fixed percentages based on budgets and types of practices practical for voluntary implementation.
10. The budget for practices that are not included within PTMApp.	Some practices are not analyzed within PTMApp, but are still included in the draft targeted implementation schedule. Examples: Rental tillage equipment; easements; livestock access; field wind breaks; levees; ring dikes)	Set fixed percentages based on budgets and types of practices practical for voluntary implementation.

Table 1: Screening criteria recommended for the BdS-Mustinka 1W1P:

Table 1. Criteria used for screening PTMApp-Desktop BMP data.

			Remove BMPs with little runoff volume delivery or constituent removal efficiency				***Remove BMPs with low removal magnitudes at the edge-of-field***					
			Delivery and Efficiency Selection Criteria (value must be greater than)				**Reduction Magnitude Selection Criteria (value must be greater than)**					
Group Code	**Treatment Group**	**Total BMPs Generated**	**Percent of, 2-Year, 24-hour event treated**	**Sediment Reduction, %**	**TP Reduction*, %**	**TN Reduction*, %**	**Sediment Reduction @ Catchment Outlet, tons/year**	**TP Reduction @ Catchment Outlet, tons/year**	**TN Reduction @ Catchment Outlet, tons/year**	**BMPs Not Meeting Criteria**	**BMPs Remaining After Criteria Applied**	**% of Original BMPs Remaining**
1	Storage		50%	10%	10%	10%	0.25	0.25	0.5			
2	Filtration		50%	10%	10%	10%	0.25	0.25	0.5			
3	Biofiltration		50%	10%	10%	10%	0.25	0.25	0.5			
4	Infiltration		50%	10%	10%	10%	0.25	0.25	0.5			
5	Protection						0.25	0.25	0.5			
6	Source reduction						0.25	0.25	1			

* For the filtration treatment group, the upper quartile reduction was used. All other treatment groups used the median treatment efficiency.

PTMApp Implementation Scenario Practice Benefits

Lake Traverse & Bois de Sioux River

The table below shows the PTMApp results for the Lake Traverse & Bois de Sioux River Planning Region.

- Funding Level 1: Existing dollars
- Funding Level 2: Existing dollars + additional Watershed-Based Implementation Funding

BMP Treatment Group	Funding Level	Number of Practices	Total 10-Year Cost ($)	Values at Catchment Outlet			Values at Planning Region Outlet			Water storage (ac-ft)	Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
Storage	1	1	$ 50,097	30	11	345	18	10	300	6	3
Filtration	1	518	$ 1,436,248	1,446	350	9,585	165	99	2,699	0	1,515
Protection	1	1	$ 31,419	23	3	45	2	1	19	0	7
Source Reduction	1	-	$ -	121	32	252	27	20	168	0	228
Level 1 Total		**522**	**$ 1,517,763**	**1,620**	**396**	**10,226**	**211**	**130**	**3,186**	**6**	**1,752**
Storage	2	2	$ 108,324	59	23	688	21	16	490	12	5
Filtration	2	530	$ 1,472,820	1,465	356	9,748	168	101	2,771	0	1,553
Protection	2	2	$ 116,661	66	10	183	13	6	117	0	27
Source Reduction	2	3	$ -	165	47	380	31	26	224	0	343
Level 2 Total		**537**	**$ 1,697,805**	**1,756**	**436**	**10,999**	**234**	**149**	**3,602**	**12**	**1,929**

Rabbit River

The table below shows the PTMApp results for the Rabbit River Planning Region.

- Funding Level 1: Existing dollars
- Funding Level 2: Existing dollars + additional Watershed-Based Implementation Funding

BMP Treatment Group	Funding Level	Number of Practices	Total 10-Year Cost ($)	Values at Catchment Outlet			Values at Planning Region Outlet			Water storage (ac-ft)	Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
Storage	1	2	$ 251,041	134	32	932	10	12	348	29	15
Filtration	1	569	$ 1,533,853	2,143	498	13,357	150	103	2,781	0	1,618
Source Reduction	1	-	$ -	175	49	395	8	18	151	0	356
Level 1 Total		**574**	**$ 1,784,894**	**2,452**	**579**	**14,684**	**168**	**133**	**3,280**	**29**	**1,989**
Storage	2	4	$ 450,954	235	77	2,252	27	40	1,169	52	27
Filtration	2	609	$ 1,631,810	2,220	524	14,091	158	109	2,954	0	1,721
Protection	2	3	$ 192,836	226	16	305	29	9	170	0	45
Source Reduction	2	-	$ -	381	97	774	12	29	261	0	698
Level 2 Total		**622**	**$ 2,275,600**	**3,063**	**714**	**17,423**	**226**	**188**	**4,553**	**52**	**2,491**

Upper Mustinka River

The table below shows the PTMApp results for the Upper Mustinka River Planning Region.

- Funding Level 1: Existing dollars
- Funding Level 2: Existing dollars + additional Watershed-Based Implementation Funding

BMP Treatment Group	Funding Level	Number of Practices	Total 10-Year Cost ($)	Values at Catchment Outlet			Values at Planning Region Outlet			Water storage (ac-ft)	Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
Storage	1	4	$ 438,518	719	88	2,537	96	35	1,265	50	16
Filtration	1	260	$ 1,143,004	1,507	167	4,701	48	10	286	0	1,206
Source Reduction	1	-	$ -	407	50	401	30	13	132	0	361
Level 1 Total		**267**	**$ 1,581,522**	**2,634**	**305**	**7,639**	**174**	**58**	**1,682**	**50**	**1,582**
Storage	2	9	$ 703,428	1,238	153	4,351	199	68	2,219	81	24
Filtration	2	284	$ 1,279,238	1,580	178	5,000	50	10	299	0	1,349
Protection	2	3	$ 183,558	118	15	296	33	8	176	0	43
Source Reduction	2	-	$ -	766	92	738	63	25	256	0	665
Level 2 Total		**302**	**$ 2,166,224**	**3,703**	**438**	**10,385**	**346**	**111**	**2,951**	**81**	**2,081**

Lower Mustinka and Twelvemile Creek

The table below shows the PTMApp results for the Lower Mustinka and Twelvemile Creek Planning Region.

- Funding Level 1: Existing dollars
- Funding Level 2: Existing dollars + additional Watershed-Based Implementation Funding

BMP Treatment Group	Funding Level	Number of Practices	Total Cost ($)	Values at Catchment Outlet			Values at Planning Region Outlet			Water storage (ac-ft)	Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
Storage	1	2	$ 196,838	115	38	1,005	66	33	859	23	73
Filtration	1	675	$ 1,579,387	2,074	512	13,920	371	176	4,800	0	1,666
Protection	1	1	$ 32,341	16	4	46	9	3	39	0	8
Source Reduction	1	-	$ -	39	17	137	13	13	102	0	124
Level 1 Total		**679**	**$ 1,808,567**	**2,245**	**571**	**15,109**	**459**	**224**	**5,801**	**23**	**1,870**
Storage	2	3	$ 265,394	159	48	1,177	107	42	1,028	30	73
Filtration	2	692	$ 1,614,800	2,106	521	14,176	378	180	4,918	0	1,703
Protection	2	2	$ 124,542	61	11	195	41	10	175	0	29
Source Reduction	2	-	$ -	80	33	264	21	23	186	0	238
Level 2 Total		**699**	**$ 2,004,736**	**2,405**	**613**	**15,811**	**547**	**255**	**6,307**	**30**	**2,043**

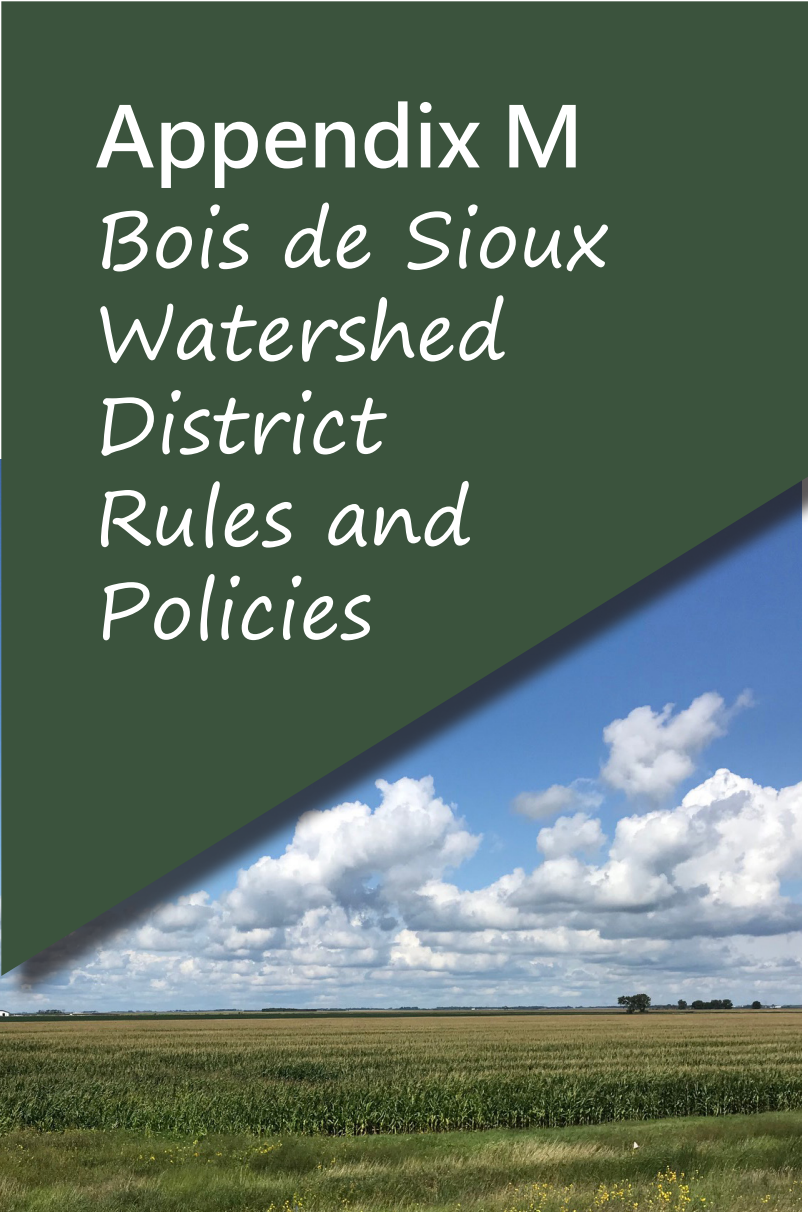
Fivemile and Twelvemile Creek Headwaters

The table below shows the PTMApp results for the Fivemile and Twelvemile Creek Headwaters Planning Region.

- Funding Level 1: Existing dollars
- Funding Level 2: Existing dollars + additional Watershed-Based Implementation Funding

BMP Treatment Group	Funding Level	Number of Practices	Total 10-Year Cost ($)	Values at Catchment Outlet			Values at Planning Region Outlet			Water storage (ac-ft)	Surface area (acres)
				Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)	Sediment Reduction (tons/yr.)	TP Reduction (lbs./yr.)	TN Reduction (lbs./yr.)		
Storage	1	2	$ 236,850	156	74	1,972	27	27	690	27	12
Filtration		780	$ 2,536,206	2,726	584	16,126	262	94	2,601	0	2,675
Source Reduction		-	$ -	91	13	105	11	4	46	0	94
Level 1 Total		**783**	**$ 2,773,057**	**2,973**	**671**	**18,203**	**300**	**125**	**3,337**	**27**	**2,781**
Storage	2	4	$ 429,156	334	99	2,596	34	31	854	49	16
Filtration		836	$ 2,719,129	2,852	615	16,984	277	101	2,777	0	2,868
Protection		3	$ 191,281	96	17	298	43	13	237	0	45
Source Reduction		-	$ -	329	52	419	29	14	157	0	377
Level 2 Total		**847**	**$ 3,339,566**	**3,611**	**782**	**20,296**	**382**	**158**	**4,025**	**49**	**3,306**

Appendix M
Bois de Sioux Watershed District Rules and Policies



2009 Revised RULES OF BOIS DE SIOUX WATERSHED DISTRICT

Section 1. Introduction and General Policy.

The rules of the Bois de Sioux Watershed District are to effectuate the purposes of Minnesota Statutes, Section 103D, and the authority of the Managers therein prescribed. These rules are deemed necessary to implement and make more specific the law administered by them.

If any part of these rules is for any reason held to be invalid, such decision shall not affect the validity of the remaining portion of these rules.

Changes to these rules may be made by the Managers. Any interested person may petition the Managers for a change in these rules.

If any rule is inconsistent with the provisions of Minnesota Statute, Section 103D, or other applicable law, the provisions of said Section 103D or other applicable law shall govern.

The Managers accept the responsibilities with which they are charged as a governing body. While there is no intention to usurp the authority or responsibilities of other agencies or governing bodies, neither will they shirk their responsibilities. They will cooperate to the fullest extent feasible with persons, groups, state and federal agencies and other governing bodies.

It is the intention of the Managers that no person shall be deprived or divested if any previously established beneficial use or right, by any rule of the District, without due process of law, and that all rules of the District shall be construed according to said intention.

It is the intention of the Managers to promote the use of the waters and related resources within the District in a provident and orderly manner so as to improve the general welfare and public health for the benefit of its present and future residents.

Section 2. Amendment or Rules.

The Managers shall comply with the following steps in amending rules:

A. A copy of any proposed amendment to the rules shall be submitted to each Manager at least thirty (30) days before its adoption by the Managers.

B. An amendment to the rules shall be adopted by a majority vote of the Managers.

C. The original copy of the rules and any amendments to the rules shall be kept in the files of the Managers, and in addition, copies shall be prepared for distribution to the County Auditors, County Commissioners, Soil and Water Conservation Districts, Farm Service Agencies, and Township Board Chairmen in the District, and any other interested persons requesting the same.

D. Every rule and amendment thereof adopted by the Managers shall have the force and effect of the law.

Section 3. Definitions.

For the purpose of these rules, certain words and terms are herein defined as follows:

A. District means the Bois de Sioux Watershed District.

B. Managers means the District Board of Managers.

C. Person means an individual, firm, partnership, association, or corporation, but does not include public or political subdivisions. It specifically includes, but is not limited to, landowners, occupants, contractors or equipment operators.

D. Public Corporation means a county, town, school district, or a political division or subdivision of the state or federal government.

E. Public Health includes any act or thing tending to improve the general sanitary conditions of the District.

F. General Welfare includes any act or thing tending to improve or benefit or contribute to the safety or well being of the general public or benefit the inhabitants of the District.

G. Work or Works means any construction, maintenance, repairs or improvements.

H. The word shall is mandatory, not permissive.

I. Drainage way means a natural or artificial channel or tile which provides a course for water flowing continuously or intermittently.

J. Legal drainage system means a watershed, county or joint county drainage system.

K. A plan is a map or drawing and supporting data for proposed works.

L. Maintenance, as referred to for dikes, drainage ditches and sewers, shall mean restoring the system as near as practicable to its original condition or as subsequently improved.

M. Normal high water mark means a mark delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape. Commonly, it is that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.

Section 4. Permits.

The requirement for a permit from the Managers for certain uses of water or works within the District is not intended to delay or inhibit development. Rather, the permits are needed so that the Managers are kept informed of planned projects, can advise and in some cases provide assistance, and to insure that developments of the natural resources are orderly and in accordance with the Overall Plan for the District.

A. The Board shall designate a person to serve as Permit Officer. Said Officer shall facilitate the permit review process, and have the authority to deem a permit application incomplete, to require the applicant provide additional information, and to use all Watershed resources, including the District Engineer, Attorney and individual Managers in the application Review. Said Officer shall either issue a permit, issue a permit with conditions, or deny the permit, giving written notice to the applicant.

B. No works or use requiring a permit shall be commenced prior to the issuance of the permit.

In addition to the remedies provided in Minnesota Statute 103D.545 and Section 8, infra, in those instances where work has been done before a permit is granted, the District may require that the property be returned to its original condition before considering the permit; and

The District shall require applicant pay an After-The-Fact permit fee in the amount of $250, plus the actual engineering and attorneys fees incurred by the District in dealing with the un-permitted work, as a condition to granting a permit.

C. Unless specified in the permit, work for which a permit is given must be completed within one (1) year. The District further requires, as a condition of all permits, that it be notified when an improvement is completed by returning a COMPLETION REPORT card.

D. If a permit application is denied or granted subject to conditions, the Applicant may, upon paying a permit hearing fee of $300, ask the Board to hold a hearing on the permit application. Notice of such hearing shall be given to all persons expressing an interest in the proposed project.

E. Any applicant or other person or public corporation dissatisfied with either the Permit Officer's decision, or the Boards decision on any permit application must appeal the said decision to the District Courts of the State of Minnesota within ninety (90) days from and after the date of it's issuance.

F. No fee shall be charged for a permit application except the fees hereinabove described.

G. Applications for a permit must be filed personally:
Bois de Sioux Watershed District
704 South Highway 75
Wheaton, MN 56296
(320) 563-4185/P
(320) 563-4987/F

H. The Permit Officer shall provide an application form setting forth the necessary information. This form must be completely and accurately filled out before the permit is deemed submitted.

I. The Board may issue district wide permits on an annual basis for specific

classes of projects where a standard design has been approved by the Board and where the Board is satisfied construction of such projects will be adequately supervised.

1. Each district wide permit shall be subject to such specific requirements as the Board may establish.

2. A hearing shall be held before any district wide permit is issued or renewed.

Section 5. Flood Control and Drainage.

(1) General Rules for the Disposal of Surface Water.

A. Every person shall use his land reasonably in disposing of surface water and may turn into a natural Drainage way all the surface water that would naturally drain there, but he may not burden a lower landowner with more water than reasonable under the circumstances.

B. Surface water shall not be artificially removed from the upper land to and across lower land without adequate provision being made on the lower land for its passage.

C. In order to reduce sediment transport, where feasible drainage shall be discharged through marsh lands, swamps, retention basins or other treatment facilities prior to release into the receiving bodies of public waters. Maximum utilization will be made of temporary storage areas or retention basins scattered throughout developing areas to maximize upstream storage and to reduce peak flows, erosion damage and drainage facility construction costs. Open drainage ditches shall make maximum use of vegetation to reduce channel erosion.

D. To control and alleviate erosion and the situation of the watercourses of the District:

1. All watercourses therein shall be constructed with a side slope, as determined by proper engineering practice, so as to reasonably minimize land and soil erosion, giving due consideration to the intended capacity of the watercourse, its depth, width and elevation, and the character of the soils through which the drain passes.

2. Water inlets, culvert openings and bridge approaches shall have adequate shoulder and bank protection in order to minimize land and soil erosion.

E. Any person who allows dirt to blow from his lands into a drainage is responsible for the removal of same.

F. Flood Control and Drainage (2, E. & F.) are interpreted so that ponds created solely by excavation are not reservoirs nor is the creation thereof reshaping of the surface topography. Therefore, the creation of ponds solely by excavation shall not require a watershed permit.

(2) A permit must be obtained from the Watershed District prior to any work being commenced for the following:

A. Any landowner, occupant, contractor or equipment operator shall be responsible to ascertain that a permit has been obtained before undertaking any of the work hereinafter described requiring a permit from the Board of Managers.

B. No person or public corporation shall cut an artificial Drainage way across a subwatershed and thereby deliver water into another subwatershed without a permit from the Managers.

C. No person or public corporation shall undertake to construct or improve any Drainage way without a permit from the Board of Managers. A permit is required for any deepening or enlarging of existing drainage ways. Any existing Drainage way may be cleaned of debris, cattails, and blown in or washed in sediment without a permit; but any cleaning that involves removing clay or virgin soils or changing the alignment, depth, or cross-section of the Drainage way requires a permit.

D. No person or public corporation shall construct, alter, or remove any dike without a permit from the Board of Managers.

E. No person or public corporation shall undertake the construction, removal or abandonment of any reservoir for the impoundment of water without a permit from the Managers; nor shall any works be done which would alter the effectiveness of a reservoir without a permit from the Managers.

F. No person or public corporation shall undertake the practice of land forming, which is the reshaping of the surface topography but which does not include the common farming practice of land leveling, on a given tract of land without a permit from the Managers.

G. No Wetland types 3, 4, 5 and 8, as described by Circular 39, Wetlands of the United States, published by the United States Department of the Interior, shall be drained without a permit from the Managers.

H. Construction of new drainage ditches or improvements to existing public drainage ditches shall be administered by the Managers. Plans and specifications for such projects shall be filed with the Watershed District. Maintenance and repair of public drainage systems as permitted by Chapter 103E, Minnesota State Statutes, may be made by ditch authorities without a permit, provided the Board of Managers have been given copies of the plans and specifications for said ditch. The Board of Managers shall be notified of the proposed work prior to the commencement thereof.

I. No person or public corporation shall install or alter any drainage structure which will change the elevation and/or capacity of the structure without obtaining a permit from the Board of Managers.

Section 6. Related Ordinances.

The Managers will cooperate with public corporations and state and federal agencies in the application of ordinances and rules concerning water and related resources within the District.

A. Copies of proposed county, municipal and town ordinances relating to surface water drainage, land use zoning, shore land use and flood plain zoning, as applied to changes within the flood plain, shall be submitted to the Manager thirty (30) days prior to the first public hearing date for review and comment.

B. Ordinances relating to surface water drainage, land use zoning, shore land use and flood plain zoning shall be submitted to the Managers within forty-five (45) days after passage.

Section 7. Alteration of Natural Drainage Way, Lakes and Wetland.

Management of natural drainage ways, lakes, wetlands and their abutting land should be done in such a way so as to reduce their deterioration and to maximize their value for the general welfare of the District.

A. No change may be made in the bed, banks or shores of natural drainage ways, lakes or wetlands without a permit from the Managers.

Section 8. Enforcement.

Any provision of these Rules or an order or stipulation agreement made, or any permit issued, by the Board of Managers of this Watershed District, may be enforced by criminal prosecution, injunction pursuant to Section 103D.545, of the Minnesota Statutes, action to compel performance, restoration, abatement, and other appropriate action.

A violation of these Rules or any order or stipulation agreement made, or a permit issued by the Board of Managers of this Watershed District, is a misdemeanor in accordance with Section 103D.545 of the Minnesota Statutes.

Adopted by the Board of Managers of the Bois de Sioux Watershed District this 20th day of August, 2009.

_____

Secretary, Bois de Sioux Watershed District

Amendment to
Bois de Sioux Watershed District Overall Plan
(May 2003)

INSERT ON PAGE 99 AS PARTS V.C, D, E and F:

C. LAND ACQUISITION

A primary purpose of the District is to reduce damaging flood flows (Overall Plan, pages 1-2). To this end, it has sought to construct flood damage reduction projects since its inception in 1988 (Overall Plan, page 32). One of the recommended methods for reducing flood flows is impoundments. (Overall Plan, page 35)

These are land-intensive projects. Land use within the District is devoted almost entirely to agriculture (Overall Plan, page 18). One challenge the District faces is the necessity to locate retention projects on agricultural lands. Throughout the District's existence, the demand for agricultural land within the District has exceeded the supply.

Under the Watershed Law, chapter 103D, the District has the authority to "acquire by gift, purchase, taking under the procedures of this chapter, or by the power of eminent domain, necessary real and personal property" within District boundaries. Minn. Stat.§103D.335, subd. 11. Property may be acquired for any watershed purpose under Minnesota Statutes §103D.201. The District may hold and manage real property for conservation purposes, for the purpose of locating projects of the District, in anticipation of projects, or for multiple water resource management purposes, all of which the District considers necessary to accomplish its purposes and the goals of its Overall Plan. The District may acquire and hold a fee interest, an easement, or other property rights as the board of managers determines may allow the District to achieve its plan goals. The District also may enter into contracts regarding real property including options, contracts for deed, leases and assignments. Pursuant to this authority, the District will acquire property interests for projects and, in particular, in anticipation of projects.

The planning work performed by the District is typically on a subwatershed basis. Especially with respect to water quantity, the most important planning is to establish subwatershed flow reduction or storage goals, rather than specific project locations. In addition to the plan itself, which outlines goals for the District's 10 subwatersheds, the "Application of the Flow Reduction Strategy in the Bois de Sioux Watershed" (June 4, 2010), sets storage goals specifically within the Lake Traverse and Rabbit River basins. See Appendix 12. Table 1 of this Flow Reduction Strategy identifies potential impoundment sites. It is important to note that, because of the District's topography and the regional nature of the plan goals, the potential impoundment sites, or locations for other water quantity or quality projects, should be considered illustrative but not the only possible sites for these projects. Thus, there are multiple sites where impoundment projects would be feasible and beneficial. The more critical objective is to achieve the overall retention goals in each subwatershed.

The District has a strong preference to work cooperatively with landowners in order to site projects that accomplish its goals. Rather than identify a project location and then attempt to

acquire the land at that location, the District chooses to establish criteria for the location, setting and type of land that is likely to support an effective project, and to encourage property owners interested in selling or granting easements on their land to come forward. A project that rests on a cooperative relationship with property owners is more likely to have general support and avoid unproductive controversy, delay and potential legal challenge. Even where the District engineer and the District have identified multiple impoundment sites, project development has not proceeded for lack of a landowner willing to sell needed property. When land does become available, the District often must act quickly if it wishes to acquire the land for potential project use.

Accordingly, the District will acquire property interests for projects as follows:

1. The District strongly prefers to rely on willing landowners to supply land and easements through negotiated arms-length transactions.

2. The District will evaluate a potential acquisition by considering whether the land has characteristics that make it likely to be suited for project needs in that subwatershed, whether the price is fair, and the District's ability to avoid financial loss in the event a project using that land does not go forward.

3. For each subwatershed, as a part of its project planning activities the District will prepare land acquisition guidelines that identify the extent of land rights the District may need for projects and the characteristics of the land needed, including general location, acreage, topography, soils and any other features that would determine the land's physical suitability for District purposes. These guidelines will be publicly available and will be used by the board of managers to judge the soundness of an anticipatory acquisition. The guidelines will also acknowledge that the managers retain the ability to make case-by-case judgments. The District may also consult its technical advisory committee or the Red River Basin Flood Damage Reduction Work Group in developing these guidelines.

4. The District will obtain an appraisal before acquisition or disposition, except in very limited circumstances, such as cases where the tracts of land are small and the District determines that it is appropriate to determine benefits and damages pursuant to Minnesota Statutes Section 103D.721. The District may also utilize auction bidding to acquire property where the District has established a maximum price through review of recent area land sales. The District will dispose of excess lands by auction or through other competitive process.

5. Occasionally, the District may find it prudent and necessary to acquire lands that will not be located within the project itself. The District may use such lands, when so requested, to trade for lands that are located within the project. The District will dispose of property not needed for projects in a way that avoids unnecessary holding costs and illiquidity of assets.

6. The District generally will obtain fee title to the necessary property for its projects. In each case the managers will judge the cost and financial risk to the District in purchasing

land rights before full project definition and a formal decision to proceed with a project. The District will look to structure an acquisition to limit risk, through means such as buying an option, leasing lands consistent with project needs, preserving compatible uses by an underlying fee owner and disposing of land rights not needed for a project. For each acquisition, the District will prepare a management plan to describe how the District will minimize land holding costs and liabilities, and maximize water resource outcomes, until such time as the project is constructed.

7. The District acknowledges that it may in rare circumstances find it necessary to acquire land and easements for projects through all authorized means, including eminent domain, in the event project priorities so require.

D. PROJECT FUNDING

In addition to the project funding authorities available to watershed districts pursuant to Minnesota Statutes Chapter 103D, the District has several other important funding sources for its projects.

The District is a member of the Red River Watershed Management Board (RRWMB), a joint powers body of watershed districts located in the Red River Basin. The RRWMB levies an additional ad valorem tax on real property authorized by special legislation, which may not exceed 0.04836 percent of the taxable market value of all property within the district. The proceeds of one half of this levy is to be used for the development, construction, and maintenance of projects and programs of benefit to the District. The proceeds of the remaining one-half of this levy is credited to the general fund of the Red River watershed management board and is to be used for funding projects and programs of benefit to the Red River basin. It is the District's policy to seek RRWMB funding for any eligible project, as many of its projects also provide benefit to the Red River basin. The procedures to do so are set forth in the RRWMB's Application Procedures for Funding Flood Damage Reduction Projects and Related Programs. The District also utilizes the project planning and review procedures established by the December 9, 1998 mediation agreement of the Red River Basin Flood Damage Reduction Work Group.

The District may also receive funding for its projects from the State of Minnesota, such as the Department of Natural Resources Flood Damage Reduction program, and other state sources.

E. PROCEDURE FOR ESTABLISHING PROJECTS

The District primarily establishes projects by resolution of the board of managers pursuant to Minnesota Statutes-Section 103D.601, although it occasionally receives petitions for projects as discussed in Section V.A above. Section 103D.601, Subdivision 1, requires adoption of the resolution by a majority of the managers that finds:

(1) the project is financed by grants totaling at least 50 percent of the estimated project cost; and

(2) the engineer's estimate of costs to parties affected by the watershed district, including assessments against benefited properties but excluding state, federal, or other grants, is not more than $750,000 for the project.

The District considers its own property tax levies or assessments to be subject to the $750,000 limitation, and considers the funding sources from the RRWMB levy to be sources that are not subject to the $750,000 limitation.

Promptly after purchasing property suitable for a project, the district will direct the district engineer to prepare a preliminary report and advise the managers whether the proposed project is feasible, and estimate the cost of the project. The District will then hold a hearing pursuant to 103D.601, unless it reasonably believes it will receive a petition. If, after the hearing, the managers determine that the proposed project promotes the public interest and welfare and is practicable and in conformity with the watershed management plan of the watershed district, the managers must adopt a final resolution approving the project and identify the proceeding by name and number. Then the proceeding must continue as provided for a project initiated by a petition. However, the District's projects will typically be considered basic water management projects as identified in the watershed management plan, or Overall Plan, and therefore it is appropriate to proceed under Section 103D.605

There is likely to be considerable engineering work to be done before the exact design of the project is developed and there may be additional lands needed other than those the Watershed District is able to initially purchase. Therefore, the planning process may extend over a substantial number of years. During this time, the District will attempt to acquire the remaining property identified as necessary and beneficial for the proposed project. The district will give published notice of and hold an informal public meeting every six months to discuss the status of its identified projects so as to provide information to the public during this development period. It may also hold public hearings on individual projects so as to keep the public informed of developments.

Again, the District will typically not assess for benefits, so will not utilize the assessment procedures. The District will follow the project team process which incorporates early permit coordination with state and federal agencies. The District will proceed to obtain the engineer's final report, the reports from the Department of Natural Resources and the Board of Soil and Water Resources, together will all the necessary permits, and thereafter schedule a final hearing pursuant to Section 103D.605. The District will conduct the final hearing to consider whether to establish the project, and make findings and order the project upon finding that the project will be conducive to public health, promote the general welfare, be incompliance with the watershed management plan and with Chapter 103D. If at the time of the final hearing, the District has not been able to purchase all of the necessary real property, it will direct the commencement of eminent domain proceedings pursuant to Minnesota Statutes Chapter 117, and include this direction in the order. Upon making such findings, the managers will order the establishment of the project, and order the engineer to proceed with making the necessary surveys and preparing plans and specifications that are needed to construct the project and report the results of the surveys and plans to the managers. The final hearing shall be recessed as necessary until the

court order is issued approving the public purpose and authorizing the taking pursuant to Section 117.075, and until the engineer's report and the bids are received.

The District also develops and coordinates its projects as appropriate in accordance with the comprehensive watershed planning and project review and permitting processes of the Red River Basin Flood Damage Reduction Work Group Agreement of December 9, 1998 ("Mediation Agreement"), as it relies on the Red Board for funding.

F. FUNDING PROJECT MAINTENANCE

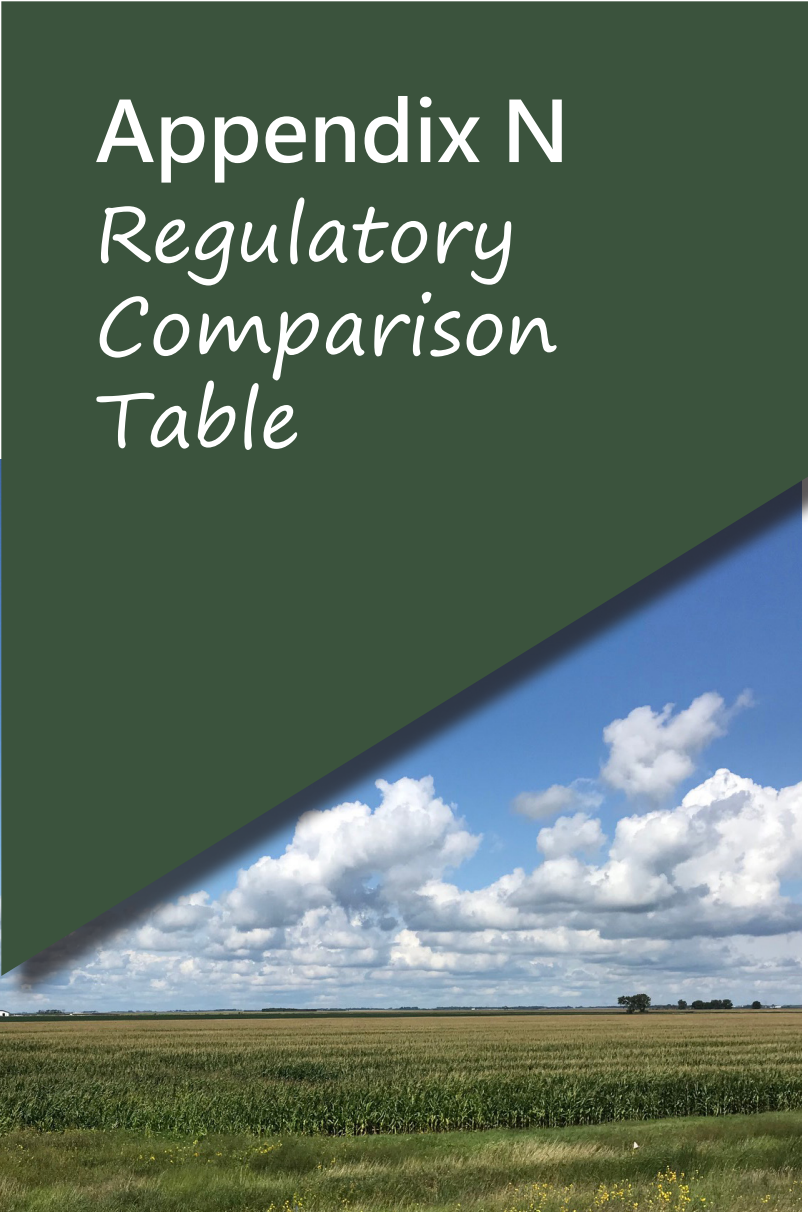
Minnesota Statutes Section 103D.631 provides for a maintenance fund and describes how it is to be funded: "the managers may assess all the parcels of property and municipal corporations previously assessed for benefits in proceedings for the construction or implementation of the project, to establish a maintenance fund for the project." As stated above, the District typically would not fund a project by assessing parcels for benefits. The RRWMB levy described above provides that the proceeds from that levy may be used for project maintenance.

Much of the agricultural land the District has acquired is not intended to be part of the project's permanent flood pool and will remain suitable for farming in most years. The District also owns land dedicated to projects that have yet to be constructed. The local population strongly supports the District making this land available to agriculture producers.

The District has determined that it is appropriate to utilize this land rental income to fund its project maintenance obligations. Therefor the District leases out the available cropable acres it owns on bids and places the rental income it receives in its maintenance fund. The District's policy is to have these rental receipts be the primary source of funding for maintenance, augmented as necessary with the RRWMB levy. The District has established a single project maintenance fund accordingly, rather than maintain separate funds for each project.

The District understands it is not to lease out lands purchased with State of Minnesota bonding funds unless the purchase of those lands included acknowledgement for leasing as part of the purchase price for the land, or such leasing arrangement is otherwise consistent with formal rulings of Minnesota Management and Budget and the Internal Revenue Service.

Appendix N
Regulatory Comparison Table

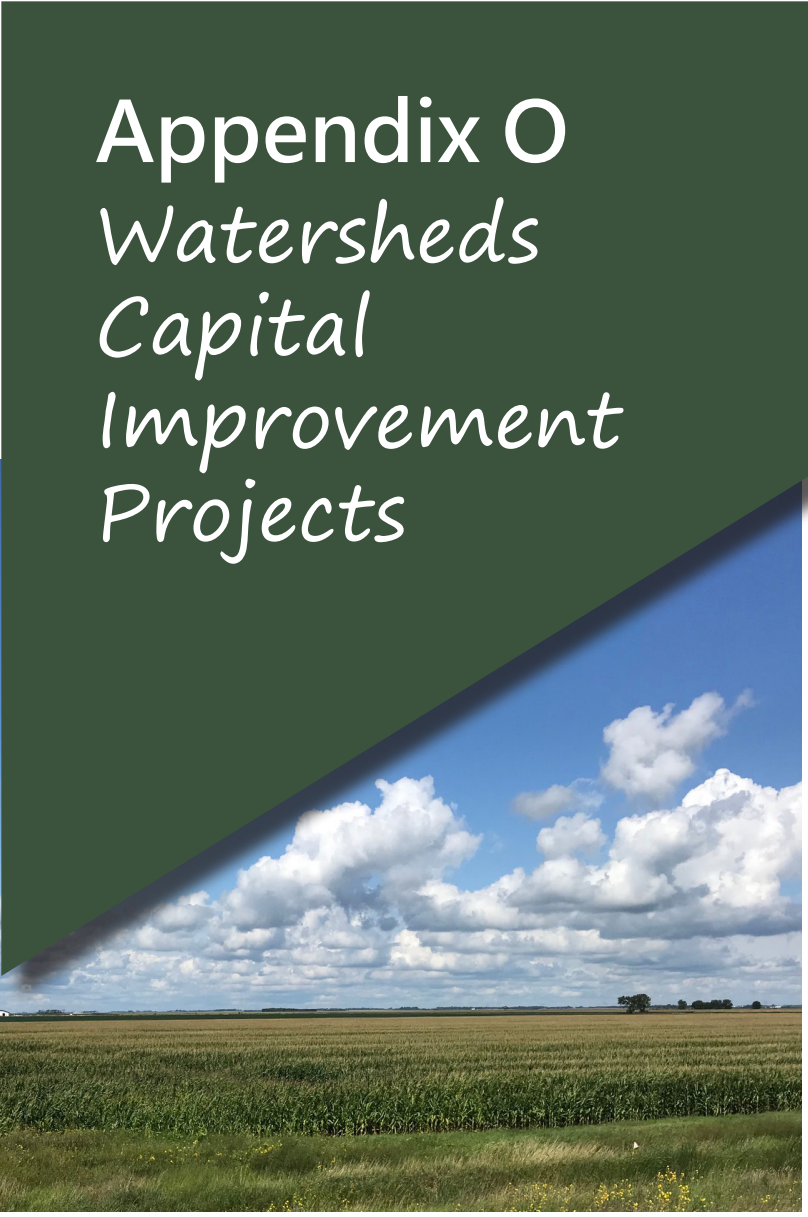


Local Regulation and Enforcement by Entity

Statute, Ordinance, or Rule Name	Big Stone		Grant		Otter Tail		Stevens		Traverse		Wilkin		BdSWD	
	Admin.	Reference	Admin.	Reference	Admin.	Reference	Admin.	Reference	Admin.	Reference	Admin.	Reference	Admin.	Reference
Shoreland Management	Big Stone County Environmental Services	Zoning Ordinance and MN Rules Chapter 6120.2500-6120.3900	Grant County Office of Land Management	Shoreland Management Ordinance	Land & Resource Management Department	County Shoreland Management Ordinance	Stevens County Environmental Service/Planning & Zoning	Stevens County Zoning Ordinance – Section 7	Traverse County - Hometown Planning	Traverse Co. Shoreland Ordinance Sect. 22 and MN Rules Chapter 6120.2500-6120.3900	Wilkin County Environmental Office	County Land Use Ordinance: Section 23	Bois de Sioux Watershed District	See Permit Application
Floodplain Management	Big Stone County Environmental Services	Big Stone County Zoning Ordinance and MN Rules Chapter 6120.5000-6120.6200	Grant County Office of Land Management	Floodplain Management Ordinance	N/A	N/A	Stevens County Environmental Service/Planning & Zoning	Stevens County Floodplain Management Ordinance	Traverse County - Hometown Planning	Traverse Co. Floodplain Ordinance 21 and MN Rules Chapter 6120.5000-6120.6200	Wilkin County Environmental Office	County Land Use Ordinance: Section 22	N/A	N/A
Subsurface Sewage Treatment Systems (SSTS)	Big Stone County Environmental Services	Big Stone County SSTS Ordinance and MN Rules Chapter 7080-7081	Grant County Office of Land Management	Subsurface Sewage Treatment Systems Management	Land & Resource Management Department	Sanitation Code for Subsurface Sewage Treatment Systems Ordinance	Stevens County Environmental Service/Planning & Zoning	Stevens County SSTS Ordinance	Traverse Co. via Traverse SWCD (Joint Powers Agreement)	Traverse Co. Land Use Ordinances Section 20 and MN Rules Chapter 7080-7081	Wilkin County Environmental Office	County Land Use Ordinance: Section 21	N/A	N/A
Solid Waste Management	Big Stone County Environmental Services	Big Stone County Solid Waste Ordinance	Grant County Coordinator	Solid Waste Management Ordinance	County Solid Waste Department	County Solid Waste Ordinance	Stevens County Environmental Service/Planning & Zoning	Stevens County Solid Waste Management Ordinance	Traverse County - Solid Waste/Veterans Services	Traverse Co. Ordinances	Wilkin County Environmental Office	Wilkin County Solid Waste Comp Plan	N/A	N/A
Hazard Management	Big Stone County Environmental Services	Big Stone County Emergency Management	Grant County Emergency Management	N/A	Emergency Management Department	Emergency Management Ordinance	Stevens County Emergency Management Department	N/A	Traverse County Emergency Mgr.	Emergency Management – All Hazard Mitigation Plans	Wilkin County Emergency Management	Wilkin County Hazard Mitigation Plan & Wilkin County Emergency Operations Plan	N/A	N/A
Feedlots	Big Stone County Environmental Services	MPCA Delegated Authority to County per MN Rules 7020	MPCA	MN Rules Chapter 7020	MPCA	MN Rules Chapter 7020	Stevens County Environmental Service/Planning & Zoning	MPCA Delegated Authority to County per MN Rules 7020	Traverse Co. via Traverse SWCD (Joint Powers Agreement)	MN Rules Chapter 7020 and Traverse Co. Land Use Ordinances Section 23	MPCA	County Land Use Ordinance: Section 15	N/A	N/A

										Traverse SWCD – Delegated Authority to Traverse County				
Buffers	Big Stone County Environmental Services	Big Stone County Buffer Ordinance and MN Statute § 103F.48	Protected Waters: Grant County Office of Land Management; Public Drainage Systems: County Hwy. Dept. (County Ditches) & BDSWD (BDWSD Ditches) Landowner assistance and compliance: Grant SWCD	Protected Waters: Grant County Shoreland Management Ordinance County Ditches: Public Drainage System Buffer Ordinance of Grant County, Minnesota BDSWD Ditches: BDSWD Buffer Rule	SWCD, Land & Resource Management	Buffer Ordinance	Stevens County Environmental Service/Planning & Zoning	Stevens County Zoning Ordinance – Section 14	Traverse County - Hometown Planning	Traverse Co. Buffer Ordinance and MN Statute §103F.48	Wilkin County Environmental Office	Wilkin County Buffer Ordinance	Bois de Sioux Watershed District	Section 9
Wetland Conservation Act	Big Stone County Environmental Services	MN Rules Chapter 8420	Grant County Office of Land Management with assistance from Grant SWCD	N/A	Land & Resource Management Department (LGU), SWCD	MN Rules Chapter 8420	Stevens SWCD	Delegated Authority to Stevens SWCD per MN Rules Chapter 8420	Traverse Co. via Traverse SWCD (Joint Powers Agreement)	MN Rules Chapter 8420 Traverse County c/o SWCD Staff Administrator	Wilkin County SWCD	MOU with Wilkin SWCD	N/A	N/A
Aquatic Invasive Species	Big Stone County Environmental Services	MN Rules Chapter 477A.19	N/A	N/A	Land & Resource Management	MN Rules Chapter 84D, 477A	Stevens SWCD	N/A	Traverse Co. Sheriff's Dept.	N/A	Wilkin County SWCD	MOU with Wilkin SWCD	N/A	N/A
Construction Erosion Control	Big Stone County Environmental Services	Shoreland Management Ordinance	Grant County Office of Land Management	Shoreland Management Ordinance	Land & Resource Management	Shoreland Management Ordinance	N/A	N/A	Traverse County - Hometown Planning	MN Rules Chapter 7090 MPCA	Wilkin County Environmental Office	County Land Use Ordinance: Section 19	N/A	N/A
Bluffland Protection	Big Stone County Environmental Services	Shoreland Management Ordinance	Grant County Office of Land Management	Shoreland Management Ordinance	Land & Resource Management	Shoreland Management Ordinance	N/A	N/A	Traverse County - Hometown Planning	Traverse County Land Use Ordinances	Wilkin County Environmental Office	County Land Use Ordinance	N/A	N/A
Wellhead Protection	Big Stone County Environmental Services	Big Stone County Water Plan	N/A	N/A	Public Health	Public Water Supply Ordinance	N/A	N/A	N/A	N/A	N/A	Local Wellhead Protection Plans	N/A	N/A

Appendix O
Watersheds Capital Improvement Projects

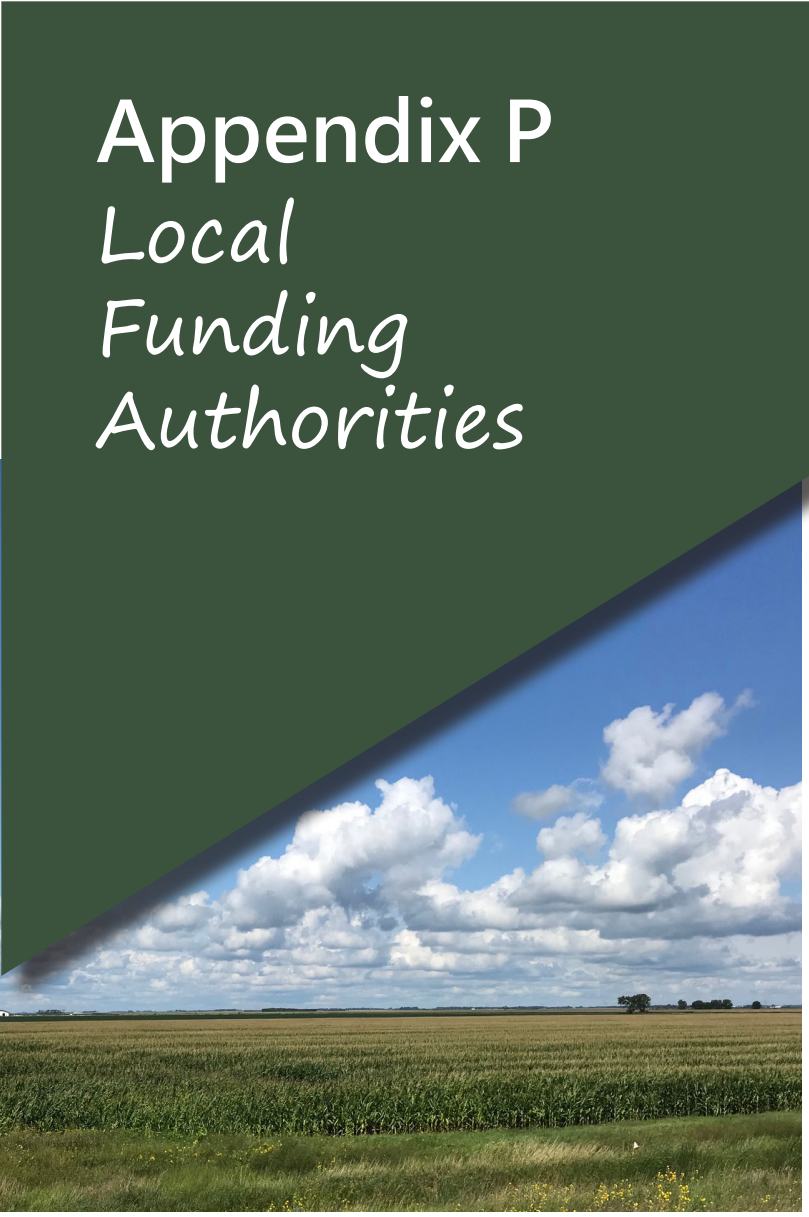


Project	Planning Region	Groundwater Quality	Sediment	Unstable Channels	Public Flooding	Private Flooding	Altered Hydrology	Stormwater Mgmt	Ditch System Instability	Ditch System Inadequacy	Soil Health	Bacteria	Nutrient Loading	Total Estimated Cost*	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Sediment (tons/yr)	Phosphorus (lbs/yr)
Judicial Ditch #11 Main	Lake Traverse & BdS River		●		●	●			●	●			O	$2,289,000											420	117
Judicial Ditch #6	Rabbit River		●		●	●			●	●			O	$1,193,000	$86,000	$86,000									370	70
Wilkin County Ditch Sub #1	Lake Traverse & BdS River		●		●	●			●	●			O	$1,448,000		$104,000	$104,000								450	90
Wilkin County Ditch #35	Lake Traverse & BdS River		●		●	●			●	●			O	$852,000			$61,500	$61,500							260	50
Traverse County Ditch #37 Main	Lower Mustinka and Twelve MC		●		●	●			●	●			O	$937,000			$67,500	$67,500							290	60
Traverse County Ditch #8	Lower Mustinka and Twelve MC		●		●	●			●	●			O	$852,000		$61,500	$61,500								260	50
Judicial Ditch #12 Main	Rabbit River		●		●	●			●	●			O	$2,385,000				$171,500	$171,500						730	140
Judicial Ditch #12 Lat 1	Rabbit River		●		●	●			●	●			O	$511,000				$37,000	$37,000						160	30
Miscellaneous 103E Ditches	Not Specified		●		●	●			●	●			O	$6,813,000					$164,000.00	$164,000	$164,000	$164,000	$164,000	$164,000.00	2,080	390
Lake Traverse Water Quality Imp. Project #1	Lake Traverse & BdS River		●	●					●				O	$3,500,000	$325,000	$500,000	$175,000								2,250	
Doran Creek Rehabilitation	Lake Traverse & BdS River		●	●			●						O	$7,500,000			$375,000	$375,000							890	170
Fivemile Creek Rebilitation	Twelve Mile Creek Headwaters		●	●			●						O	$4,410,000				$220,500	$220,500						520	100
Twelvemile Creek Rebilitation	Lower Mustinka and Twelve MC		●	●			●						O	$5,292,000							$132,300	$132,300	$132,300	$132,300	630	120
Samantha & Elbow Lake Project	Upper Mustinka River				●	●	●							$500,000											Not calculated	
Big Lake Project	Twelve Mile Creek Headwaters				●	●	●							$1,000,000											Not calculated	
Mustinka Corridor	Upper Mustinka River				●	●								$400,000											Not calculated	
Redpath Project	Lower Mustinka and Twelve MC		●	●	●	●	●		●	●			O	$24,000,000											Not calculated	
Western 32	Rabbit River		●	O	●	●	●						O	$5,000,000											Not calculated	
Moonshine Lakebed & 24/13	Twelve Mile Creek Headwaters		●	O	●	●	●						O	$1,500,000											Not calculated	
E. Branch Twelvemile Creek/Eldorado 7	Lower Mustinka and Twelve MC		●	O	●	●	●						O	$7,000,000											Not calculated	
														$77,382,000	**$411,000**	**$751,500**	**$844,500**	**$933,000**	**$593,000**	**$164,000**	**$296,300**	**$296,300**	**$296,300**	**$296,300**	**9,310**	**1,387**

Note: Nitrogen removal / assimilation benefits were not calculated but will be realized by the projects that have nutrient removal benefits

	Funding Needed	Sediment	Phosphorous
Lake Traverse & BdS River	$2,081,000	4,270	427
Rabbit River	$589,000	1,260	240
Lower Mustinka and Twelve MC	$787,200	1,180	230
Upper Mustinka River	Funding Not Sought		
Twelve Mile Creek Headwaters	$441,000	520	100
Not Specified	$984,000.00	2,080	390
	$4,882,200	**9,310**	**1,387**

Appendix P
Local Funding Authorities



Local Funding Authorities

Purpose: *This table provides an overview of Minnesota statutes and laws that provide authorities to local governments to fund water management projects, to be used by local governments while exploring funding options for locally funded water projects. Does not include fees, fines, or wetland banking, grants, etc. This is not a legal document and should not be considered comprehensive, complete, or authoritative.*

note: "metro" refers to Anoka, Carver, Dakota, Hennepin, Ramsey, and Washington counties or watershed organizations in the 7-county metro area.

Citation	Applies to	Summary *(please see details in the full text of each provision)*
§40A.152	Counties (metro)	Money from the county conservation account (see chapter 287) must be spent by the county to reimburse the county and taxing jurisdictions within the county for revenue lost under the conservation tax credit under §273.119 or the valuation of agricultural preserves under §473H.10. Money remaining in the account after reimbursement may be spent on: 1) agricultural land preservation and conservation planning and implementation of official controls under this chapter or chapter 473H; 2) soil conservation activities and enforcement of soil loss ordinances; 3) incentives for landowners who create exclusive agricultural use zones; 4) payments to municipalities within the county for the purposes of clauses 1-3.
§103B.241	Watershed districts & watershed management organizations (metro)	May levy a tax to pay for plan preparation costs & projects in the adopted plan necessary to implement the Metropolitan Water Management Program.
§103B.245	Watershed districts & watershed management organizations (metro)	May establish a watershed management tax district within the watershed to pay the costs of: planning required under §§103B.231 and 103B.235, the capital costs of water management facilities described in the capital improvement program of the plans, and normal & routine maintenance of the facilities.
§103B.251	Watershed districts & watershed management organizations (metro), counties	May certify for payment by the county all or any part of the cost of a capital improvement contained in the capital improvement program of plans developed in accordance with §103B.231. Counties may issue general obligation bonds to pay all or part of the cost of project. The county may pay the principal and interest on the bonds by levying a tax on all property located in the watershed or subwatershed in which the bonds are issued. Loans from counties to watershed districts for the purposes of implementing this section are not subject to the loan limit set forth in §103D.335.

Citation	Applies to	Summary *(please see details in the full text of each provision)*
§103B.331 Subdivisions 3 & 4	Counties	(3) May charge users for services provided by the county necessary to implement the local water management plan.
		(4) May establish one or more special taxing districts within the county and issue bonds to finance capital improvements under the Comprehensive Local Water Management Act. After adoption of the resolution, a county may annually levy a tax on all taxable property in the district.
§103B.335	Counties, municipalities, or townships	May levy a tax to implement the Comprehensive Local Water Management Act or a comprehensive watershed management plan (§103B.3363). A county may levy amounts needed to pay the reasonable costs to SWCDs and WDs of administering and implementing priority programs identified in an approved & adopted plan or comprehensive watershed management plan.
§103B.555 Subdivisions 1 & 3	Counties	(1) May establish a Lake Improvement District and impose service charges on the users of lake improvement district services within the district. May levy an ad valorem tax solely on property within the lake improvement district for projects of special benefit to the district; may impose or issue any combination of service charges, special assessments, obligations, and taxes.
		(3) A tax under Subd. 1 may be in addition to amounts levied on all taxable property in the county for the same/similar purposes.
§103C.331 Subdivision 16	County boards on behalf of soil and water conservation districts	May levy an annual tax on all taxable real property in the district for the amount that the board determines is necessary to meet the requirements of the district.
§103D.335	Watershed districts	A watershed district has the power to incur debts, liabilities, and obligations and to provide for assessments and to issue certificates, warrants, and bonds.
§103D.601	Watershed districts	May set up special taxing districts via petition to conduct larger, Capital Improvement Projects (CIP). The costs to the affected parties cannot exceed $750,000.
§103D.615	Watershed districts	May declare an emergency and order that work be done without a contract. The cost of work undertaken without a contract may be assessed against benefitted properties or raised by an ad valorem tax levy if the cost is not more than 25% of the most recent administrative ad valorem levy and the work is found to be of common benefit to the watershed district.

Citation	Applies to	Summary *(please see details in the full text of each provision)*
§103D.729	Watershed districts	May establish a water management district or districts in the territory within the watershed to collect revenues and pay the costs of projects initiated under §§103B.231, 103D.601, 103D.605, 103D.611, or 103D.730. (Guidelines for creating water management districts)
§103D.901	Watershed districts	County auditors assess the amount specified in an assessment statement filed by managers. The county may issue bonds (§103E.635). An assessment may not be levied against a benefited property in excess of the amount of benefits received.
§103D.905 Subdivisions 2,3, 7-9	Watershed districts	Established funds for watershed districts (not a complete list – see full statute language): **Organizational expense fund** - consisting of an ad valorem tax levy, shall be used for organizational expenses and preparation of the watershed management plan for projects. **General fund** - consisting of an ad valorem tax levy, shall be used for general administrative expenses and for the construction or implementation and maintenance of projects of common benefit to the watershed district. May levy a tax not to exceed 0.00798 percent of estimated market value to pay the cost attributable to projects initiated by petition. **Repair and maintenance funds** - established under §103D.631, Subd. 2. **Survey and data acquisition fund** - consists of the proceeds of a property tax that can be levied only once every 5 years and may not exceed 0.02418 percent of estimated market value. **Project tax levy** - a WD may levy a tax: 1. To pay the costs of projects undertaken by the WD which are to be funded, in whole or in part, with the proceeds of grants or construction or implementation loans under the Clean Water Partnership Law; 2. To pay the principal of, or premium or administrative surcharge (if any), and interest on, the bonds and notes issued by the WD pursuant to §103F.725; 3. To repay the construction or implementation loans under the Clean Water Partnership Law.
§103E.011 Subdivision 5	Drainage authorities	A drainage authority can accept and use external sources of funds together with assessments from benefited landowners in the watershed of the drainage system for the purposes of flood control, wetland restoration, or water quality improvements.
§103E.015 Subdivision 1a	Drainage authorities	When planning a "drainage project" or petitioned repair, the drainage authority must investigate the potential use of external sources of funding, including early coordination for funding and technical assistance with other applicable local government units.
§103E.601 §103E.635 §103E.641	Drainage authorities	Funding of all costs for constructed "**drainage projects"** are apportioned to benefited properties within the drainage system pro rata on the basis of the benefits determined (§103E.601). After the contract for the construction of a drainage project is awarded, the board of an affected county may issue bonds of the county

Citation	Applies to	Summary *(please see details in the full text of each provision)*
		in an amount necessary to pay the cost of establishing and constructing the drainage project. (§103E.635). Drainage authorities may issue drainage funding bonds (§103E.641).
§103E.728 §103E.731 §103E.735	Drainage authorities	Costs for drainage system **repairs** are apportioned pro rata on all benefited properties of record. The drainage authority may charge an additional assessment on property that is in violation of §103E.021 (ditch buffers) or a county soil loss ordinance (§103E.728). If there is not enough money in the drainage system account to make a repair, the board shall assess the costs of the repairs on all property and entities that have been assessed benefits for the drainage system (§103E.731). To create a repair fund for a drainage system to be used only for repairs, the drainage authority may apportion and assess an amount against all property and entities benefited by the drainage system, including property not originally assessed and subsequently found to be benefited according to law. (§103E.735).
Chapter 287	Counties	Counties participating in the agricultural land preservation program impose a fee of $5 per transaction on the recording or registration of a mortgage or deed that is subject to tax under §§287.05 and 287.21.
Chapter 365A	Towns	Townships may create subordinate service districts with special taxing authority. Requires a petition signed by at least 50 percent of the property owners in the part of the town proposed for the subordinate service district.
§373.475	Counties	A county board must deposit the money received from the sale of land under Laws 1998, chapter 389, article 16, section 31, subd. 3, into an environmental trust fund. The county board may spend interest earned on the principal only for purposes related to the improvement of natural resources.
Chapter 429	Municipalities	May levy special assessments against properties benefitting from special services (including curbs, gutters and storm sewer, sanitary sewers, holding ponds, and treatment plants).
§444.075	Municipalities	May collect stormwater utility fees to build, repair, operate & maintain stormwater management systems.
§462.358 Subdivision 2b(c)	Municipalities	May accept a cash fee for lots created in a subdivision or redevelopment that will be served by municipal sanitary sewer and water service or community septic and private wells. May charge dedication fees for the acquisition and development or improvement of wetlands and open space based on an approved parks and open space plan.
M. L. 1998, Chapter 389 Article 3, Section 29	Red River Watershed Management Board	Watershed Districts that are members of the Red River Watershed Management Board may levy an ad valorem tax not to exceed 0.04836 percent of the taxable market value of all property within their district. This levy is in excess of levies authorized by §103D.905.