

## Rapid Watershed Assessment

### Two Rivers

(MN) HUC: 09020312



Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best actions to achieve their goals.

## Introduction

The Two Rivers 8-Digit Hydrologic Unit Code (HUC) subbasin is part of the Red River Basin in northwestern Minnesota. The watershed occurs in the Glacial Lake Agassiz Plains and Northern Minnesota Wetlands Level III EPA Ecoregions.

The greater Red River basin characteristically has a poorly defined floodplain and low gradient that combine with extensive drainage, widespread conversion of tallgrass prairie to farmland, and urban/suburban development to leave the basin subject to frequent floods that affect urban and rural infrastructure and agricultural production.

The main resource concerns in the watershed are wind erosion, surface water quality, nutrient, wetland and pasture management, water quantity management, and wildlife habitat. Many of the resource concerns relate to flooding and increasing sediment and pollutant loadings to surface waters.



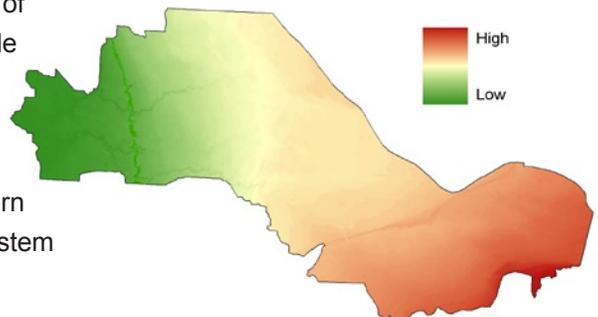
### County Totals

<b>County</b>	<b>Acres in HUC</b>	<b>% HUC</b>
Kittson	367,712	61.7%
Roseau	221,794	37.2%
Marshall	6,844	1.1%
<b>Total acres:</b>	<b>596,350</b>	<b>100%</b>

## Physical Description

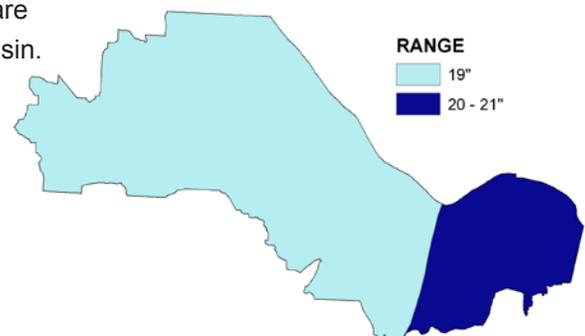
The Two Rivers actually consists of three branches – the North, Middle and South Branch. The South Branch arises southeast of Badger, Minnesota and flows in a westerly direction. The Middle Branch drainage area begins east of the Kittson & Roseau County line and travels through the central portion of Kittson County, outletting into the South Branch just east of the city of Hallock. The North Branch drainage area begins in northwestern Roseau County, and joins the South Branch to form the main stem three miles east of where it outlets into the Red River.

**Relief**



Precipitation in the watershed ranges from 19 to 21 inches annually. Above-normal amounts of precipitation in the late fall of the year or from May to October lead to high levels of soil moisture, periodically producing the snow-melt and summer floods that are known to affect the further reaches of the overall Red River Basin.

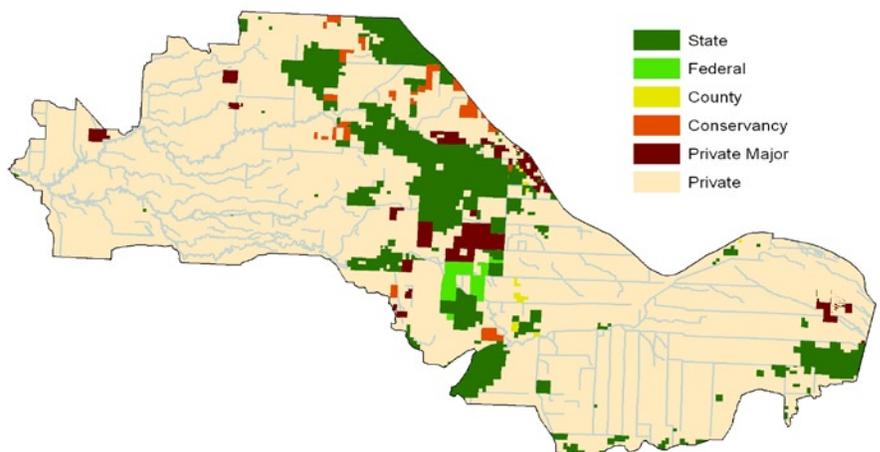
**Average Precipitation**



Predominate land uses / land covers are Row Crops (65%), Wetlands (15%), Forest (10%), Grass/Pasture/Hay (5%), and Residential/Commercial Development (4%). Agricultural land use in the basin accounts for approximately seventy five percent of the overall watershed acres.

## Ownership\* <sup>1</sup>

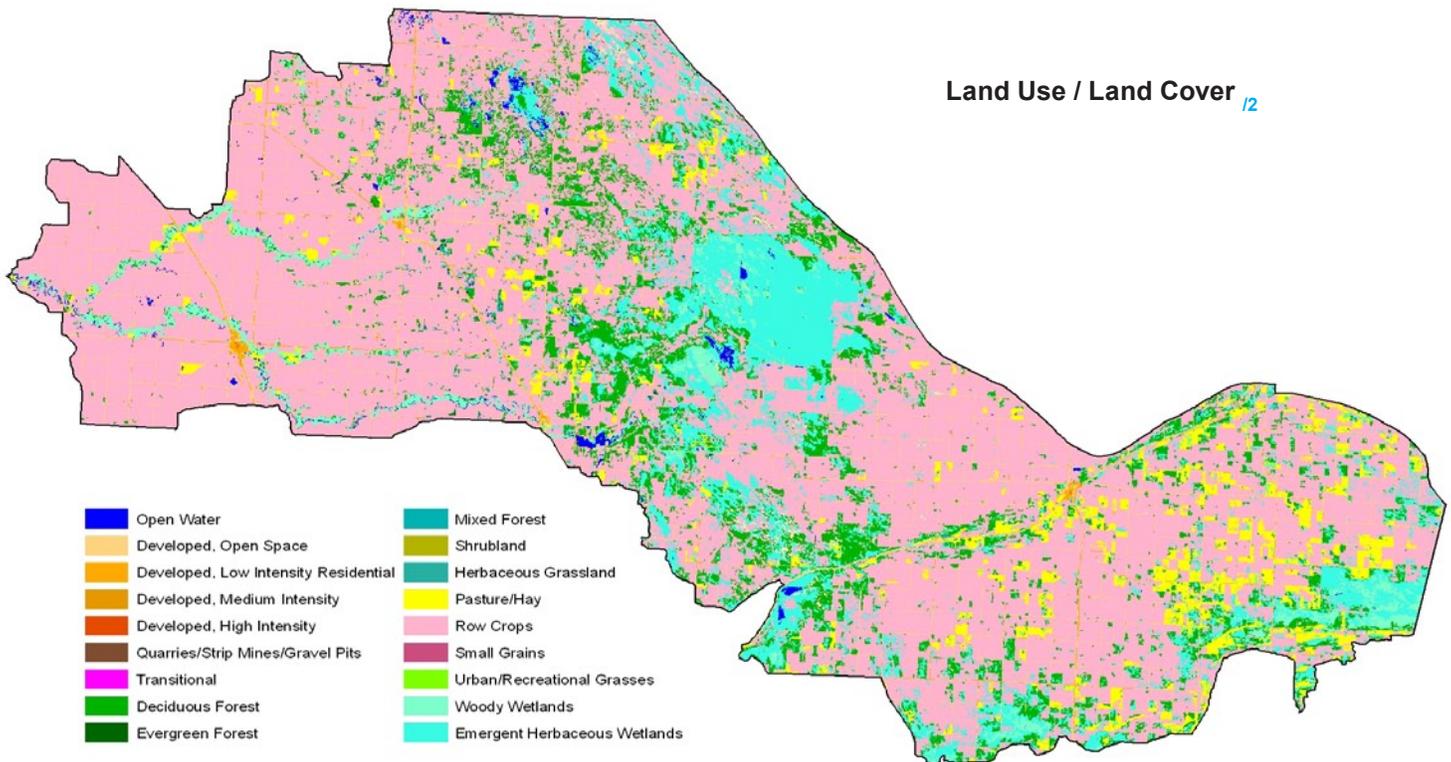
Ownership Type	Acres	% HUC
Conservancy	6,290	1.1
County	971	0.2
Federal	4,477	0.8
State	78,979	13.2
Other	-	-
Tribal	-	-
Private Major	14,059	2.4
Private	491,574	82.4
<b>Total Acres:</b>	<b>596,350</b>	<b>100</b>



\* Ownership totals derived from 2007 MN DNR GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

## Ownership / Land Use

The Two Rivers watershed covers an area of 596,350 acres. Approximately eighty two percent of the land in the watershed is owned by private landholders (491,574 acres). The second largest ownership type is State, with approximately 78,980 acres (13%) followed by Private-Major (corporate) land holdings of 14,059 acres (2.4%), Conservancy lands amounting to 6,290 acres (1.1%), and Federal with nearly 4,780 acres (0.8%). County lands comprise the smallest ownership class with 971 acres (0.2%). Land use by ownership type is represented in the table below.



## Ownership / Land Use

<sup>1/3</sup>

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	% Public	Acres	% Private	Acres	% Tribal		
Forest	15,524	2.6%	44,170	7.4%	0	0.0%	59,693	10.0%
Grass, etc	354	0.1%	30,169	5.1%	0	0.0%	30,523	5.1%
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Row Crops	24,330	4.1%	361,650	60.6%	0	0.0%	385,980	64.7%
Shrub etc	1,809	0.3%	1,822	0.3%	0	0.0%	3,631	0.6%
Wetlands	39,152	6.6%	48,472	8.1%	0	0.0%	87,623	14.7%
Residential/Commercial	1,300	0.2%	24,141	4.0%	0	0.0%	25,441	4.3%
Open Water*	1,795	0.3%	1,637	0.3%	0	0.0%	3,432	0.6%

\* ownership undetermined

\*\* includes private-major

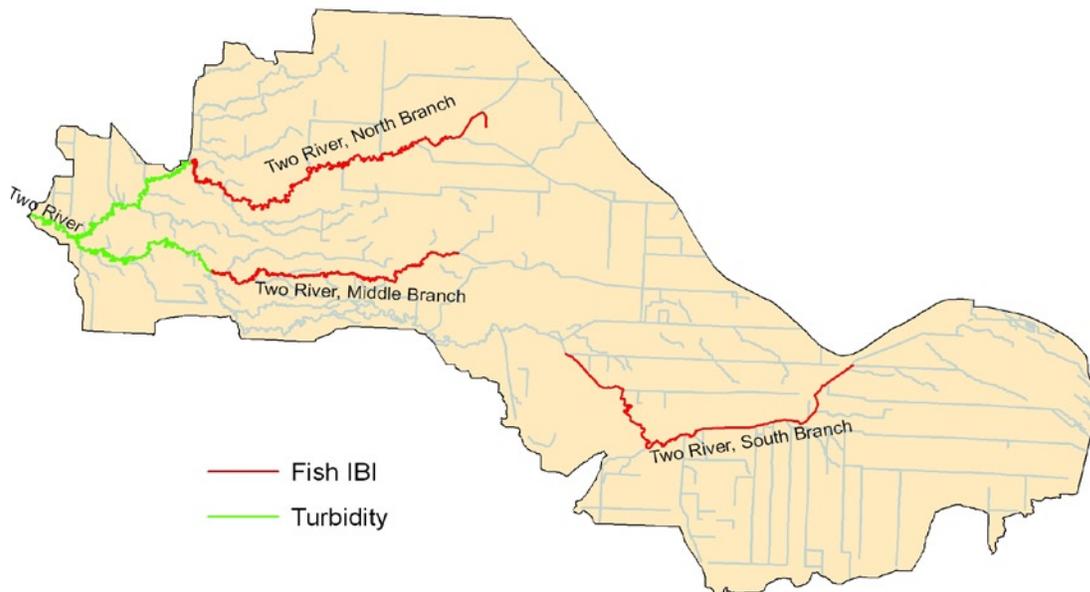
<b>Watershed Totals:</b>	<b>84,264</b>	<b>14.13%</b>	<b>512,061</b>	<b>85.9%</b>	<b>0</b>	<b>0.0%</b>	<b>596,350</b>	<b>100%</b>
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**Physical Description (continued)**

		ACRES	cu. ft/sec	
<b>Stream Flow Data</b>	USGS 05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN	<b>2008 Avg.</b>	41.3	
		<b>May – Sept. Avg.</b>	52.4	
		<b>ACRES/MILES</b>	<b>PERCENT</b>	
<b>Stream Data<sup>14</sup></b> (*Percent of Total HUC Stream Miles)	Total Miles – Major (100K Hydro GIS Layer)	811.3	---	
	303d/TMDL Listed Streams (DEQ)	146.2	18.0%	
<b>Riparian Land Cover/Land Use<sup>15</sup></b> (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	<b>Land Use Type</b>	<b>Acres</b>	<b>Percent</b>	
	Forest	1,362	7.0%	
	Grain Crops	0	0.0%	
	Grass, etc	674	3.4%	
	Orchards	0	0.0%	
	Row Crops	10,990	56.2%	
	Shrub etc	45	0.2%	
	Wetlands	3,642	18.6%	
	Residential/Commercial	2,289	11.7%	
	Open Water*	549	2.8%	
	<b>Total Buffer Acres:</b>	<b>19,551</b>	<b>100%</b>	
<b>Crop and Pastureland Land Capability Class<sup>16</sup></b> (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	<b>1 – slight limitations</b>	0	0%	
	<b>2 – moderate limitations</b>	162,300	58%	
	<b>3 – severe limitations</b>	41,700	15%	
	<b>4 – very severe limitations</b>	71,300	25%	
	<b>5 – no erosion hazard, but other limitations</b>	0	0%	
	<b>6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest</b>	5,700	2%	
	<b>7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat</b>	0	0%	
	<b>8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply</b>	0	0%	
		<b>Total NRI Crop &amp; Pasture Lands</b>	<b>281,000</b>	<b>-</b>
	<b>TYPE OF LAND</b>	<b>ACRES</b>	<b>% of Crop Lands</b>	<b>% of HUC</b>
<b>Irrigated Lands<sup>17</sup></b> (2002 NASS Estimates)	<b>Cultivated Cropland / Pastureland</b>	136	<0.1%	<0.1%
	<b>Uncultivated Cropland</b>	0	0%	0%
	<b>Total Irrigated Lands</b>	136	<0.1%	<0.1%

## Assessment of Waters

Section 303(d) of the Clean Water Act states that water bodies with impaired use(s) must be placed on a state's impaired waters list. A water body is "Impaired" or polluted when it fails to meet one or more of the Federal Clean Water Act's water quality standards. Federal Standards exist for basic pollutants such as sediment, bacteria, nutrients, and mercury. The Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to identify and restore impaired waters. 2008 303d listed waters are represented below.



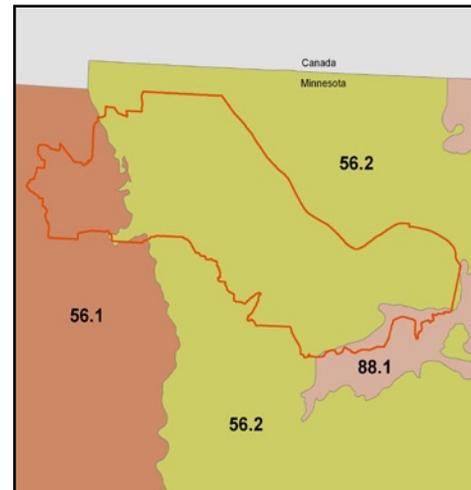
Listed Stream	Impairment	Affected Use
Two River M Br Two R to N Br Two R	Turbidity	Aquatic Life
Two River, Middle Branch CD 23 to S Br Two R	Fish IBI	Aquatic Life
Two River, North Branch Headwaters to Little Joe R	Fish IBI	Aquatic Life
Two River, South Branch Unnamed ditch to Lateral Ditch 2	Fish IBI	Aquatic Life
Two River, North Branch Little Joe R to Two R	Turbidity	Aquatic Life
Two River N Br Two R to Red R	Turbidity	Aquatic Life

## Common Resource Areas

The Snake River watershed occurs in three Common Resource Areas, 56.1, 56.2 and 88.1. <sup>19</sup>

A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area (General Manual Title 450 Subpart C 401.21)

Common Resource Areas are created by subdividing MLRAs by resource concerns, soil groups, hydrologic units, resource use, topography, other landscape features, and human considerations affecting use and treatment needs.



Only the major CRA units are described.
   
 For further information, go to:
   
<http://soils.usda.gov/survey/geography/cra.html>

**56.1 Red River Valley:** The Red River Valley (Glacial Lake Agassiz) is an extremely flat landscape composed of thick lacustrine sediments. Soils range from silty to clayey in texture. Most soils have a high water table and are very productive. Saline soils exist in places. Most areas are farmed with main crops being small grain, sugar beets, and soybeans. The native vegetation was tall grass prairie. Primary resource concerns are soil erosion and deposition by wind.

**56.2 Glacial Lake Agassiz Basin:** This area is a complex of sandy beach material, stratified interbeach material, lacustrine silts and lake washed glacial till. Soils range from excessively drained on ridges to very poorly drained basins. Many areas have been partially drained. The main crops are small grain, soybeans and hay. Native vegetation was mixed tall and short grass prairie with scattered woodland and brush. Primary resource concerns are wind erosion, doughiness on sandy soils and wetness in low lying and seepy areas.

**88.1 Northern Minnesota Glacial Lake Basins:** Nearly level to gently sloping areas formed in lake washed till, lacustrine and organic soil material. Generally the soils are silty, clayey and loamy with small amounts of sandy and gravelly soils on beach ridges.

Timber land is the main use. Scattered cropland and grazing land for beef and dairy are present. Cropland is used mostly for small grain, silage and hay. Resource concerns include management of excessive wetness, short growing season, pasture management, and water quality.

Visit the online Web Soil Survey at
   
<http://websoilsurvey.nrcs.usda.gov> for official and
   
 current USDA soil information as viewable maps and
   
 tables. Visit the Soil Data Mart at
   
<http://soildatamart.usda.gov> to download SSURGO
   
 certified soil tabular and spatial data.

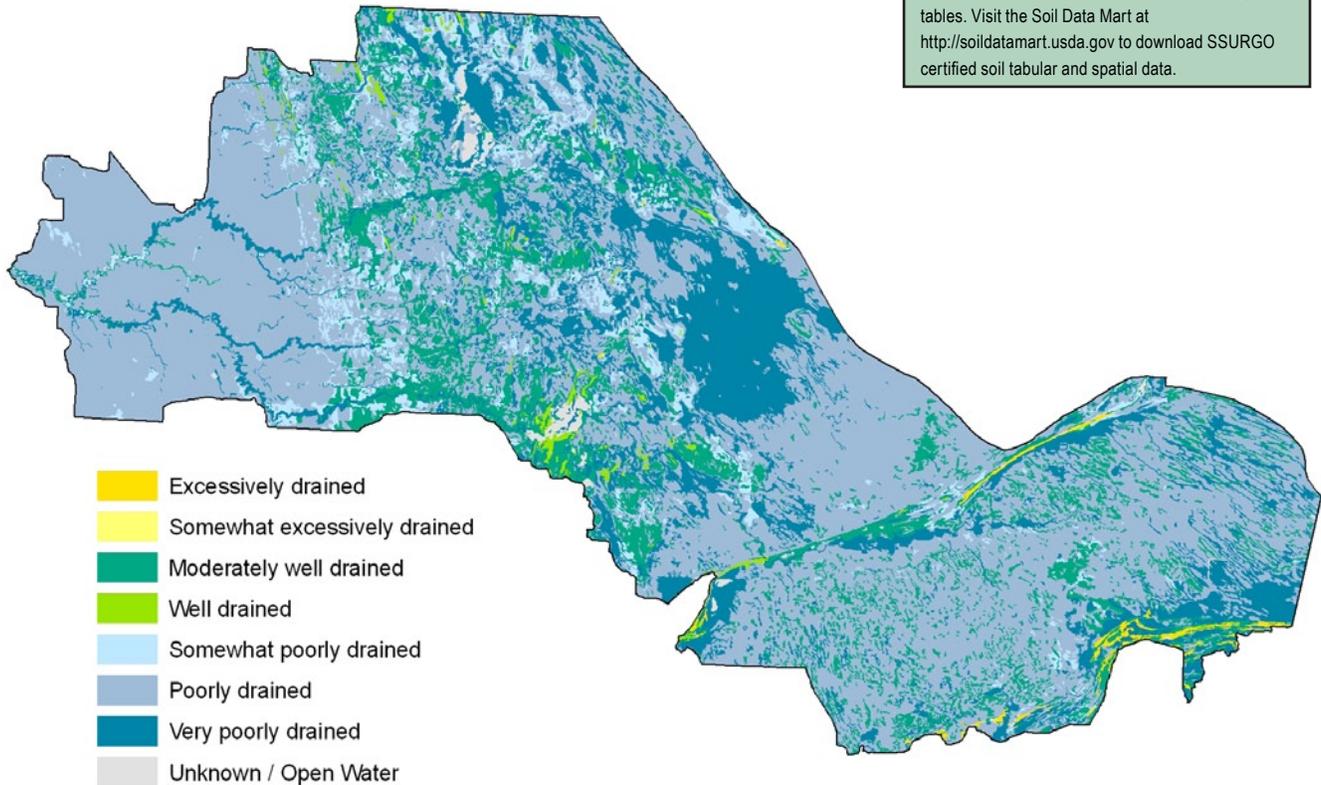
## Drainage Classification <sup>/10</sup>

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil.

Seven classes of natural soil drainage are recognized—excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”



Visit the online Web Soil Survey at <http://websoilsurvey.nrcs.usda.gov> for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at <http://soildatamart.usda.gov> to download SSURGO certified soil tabular and spatial data.



## Farmland Classification <sup>10</sup>

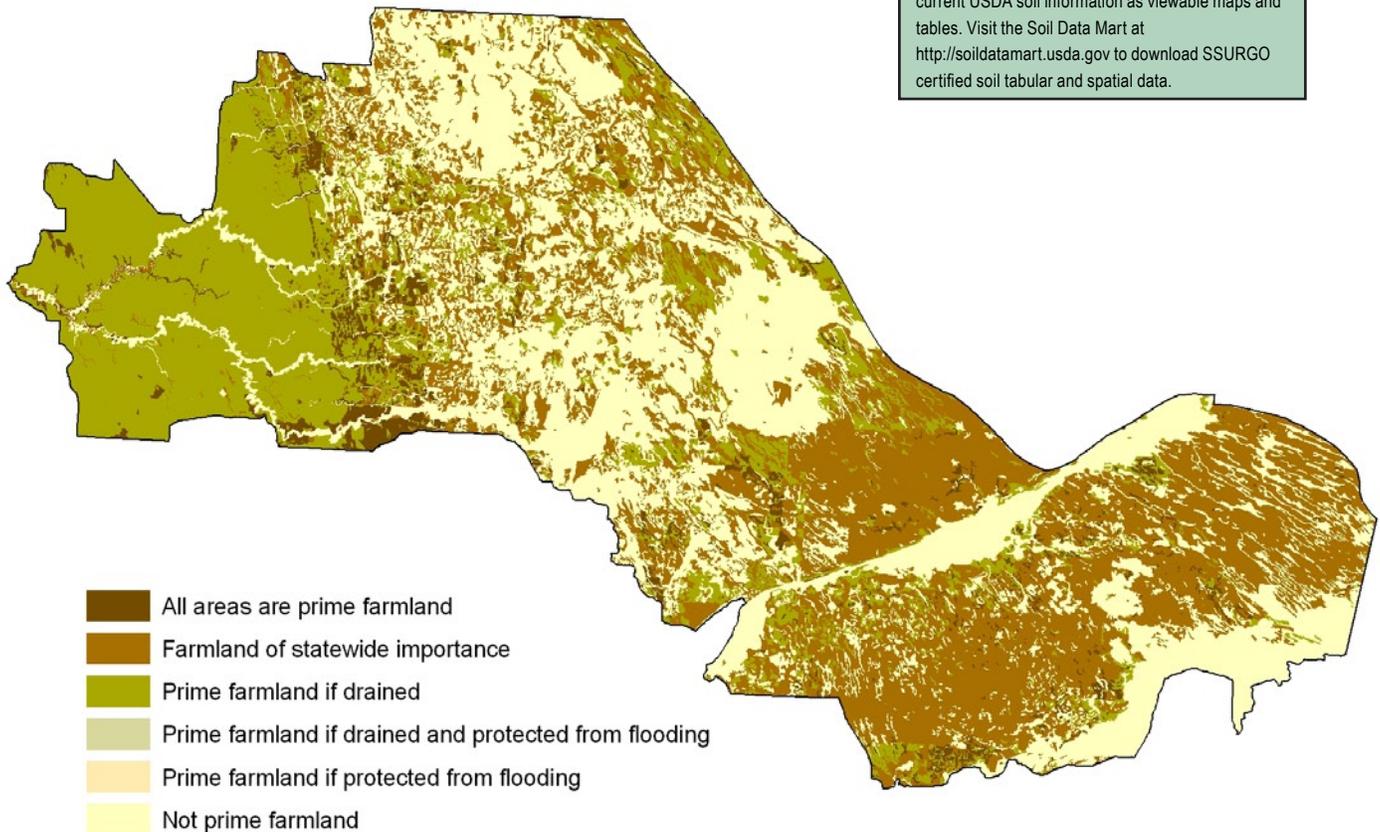
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland.

Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No 21, January 31, 1978.



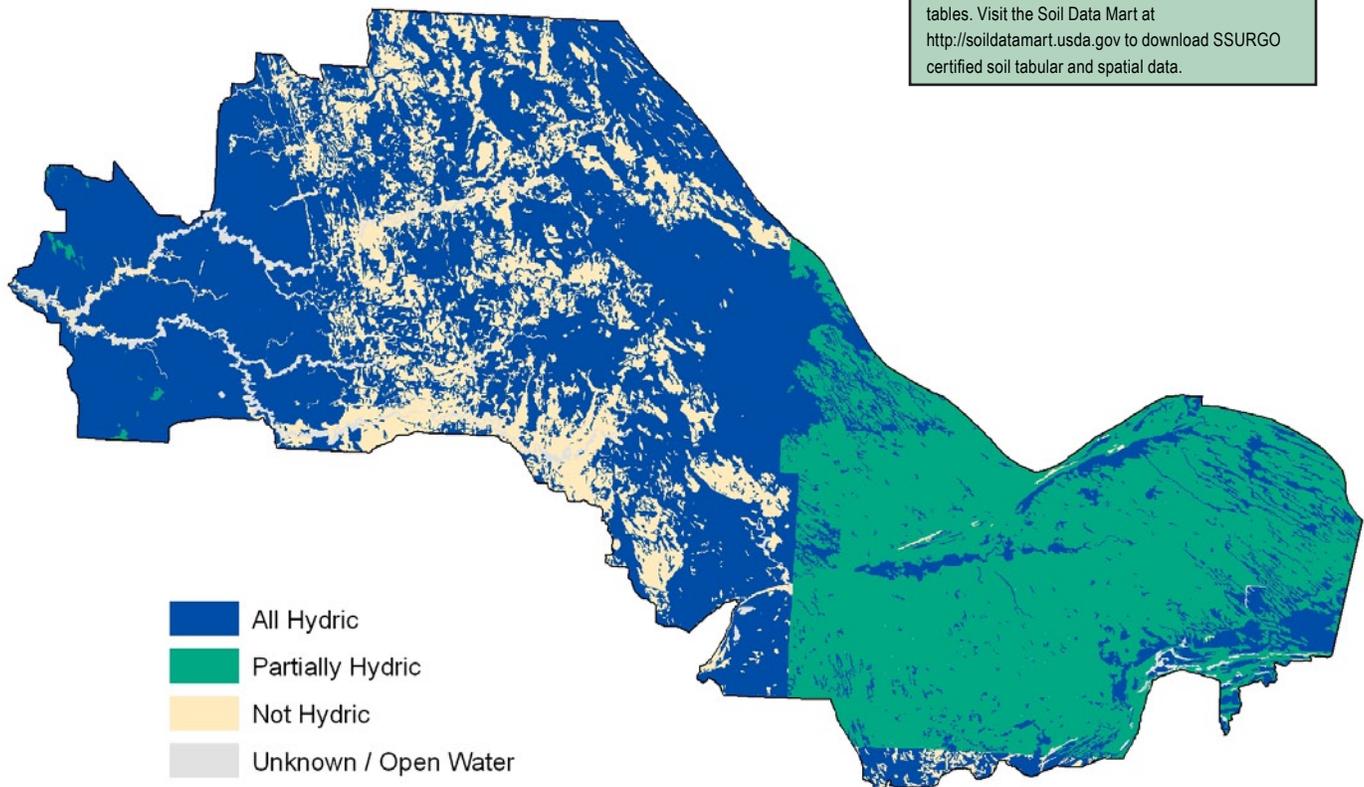
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## Hydric Soils <sup>710</sup>

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions of non-hydric soils in the higher positions on the landform. Map units of dominantly non-hydric soils may therefore have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as “soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.



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*Note: Historical Hydric Soil Determination Standards, scale, and methodology can vary on a county-to-county basis, leading to irregularities in thematic maps representing hydric soil determinations.*

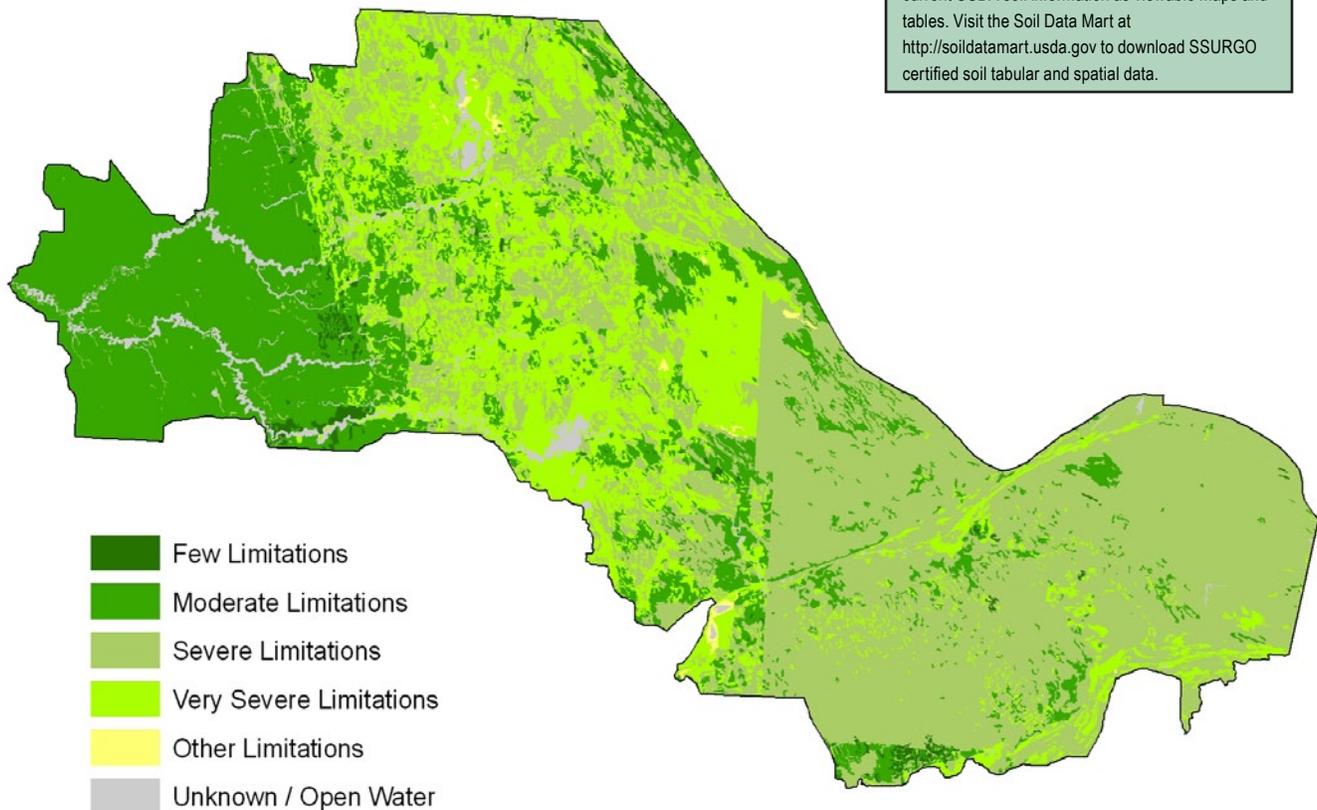
## Land Capability Classification <sup>10</sup>

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

The criteria used in grouping the soils does not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.



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*Note: Historical Land Capability Classification Standards, scale, and methodology can vary on a county-to-county basis, leading to irregularities in thematic maps representing land capability class.*

**Performance Results System and Other Data**

Watershed Name: Two Rivers				Watershed Number: 9020312						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	92,611	142,337	0	5,128	5,203	N/A	7,354	15,239	18,865	286,737
Total Conservation Systems Applied (acres)	35,000	36,321	0	9,700	9,700	N/A	4,498	6,069	14,379	115,667
<b>Conservation Practices</b>										
Total Waste Management (313) (numbers)	0	0	0	0	0	0	0	0	0	0
Riparian Forest Buffers (391) (acres)	0	0	70	0	9	0	0	6	0	85
Erosion Control Total Soil Saved (tons/year)	0	461,510	73,557	111,865	122,120	N/A	N/A	N/A	N/A	769,052
Total Nutrient Management (590) (Acres)	0	0	0	1,719	0	0	650	650	460	3,479
Pest Management Systems Applied (595A) (Acres)	0	0	0	0	0	0	0	0	275	275
Prescribed Grazing 528a (acres)	0	0	0	74	951	231	0	0	0	1,256
Tree & Shrub Establishment (612) (acres)	0	106	441	622	390	21	0	66	0	1,646
Residue Management (329A-C) (acres)	0	0	0	0	770	310	310	1,190	620	3,200
Total Wildlife Habitat (644 - 645) (acres)	37	38,521	15,548	10,141	9,546	2,680	10,141	4,027	24,971	115,612
Total Wetlands Created, Restored, or Enhanced (acres)	0	4,466	4,322	2,508	4,532	1,694	458	1,652	13	19,645
<b>Acres enrolled in Farmbill Programs</b>										
Conservation Reserve Program	35,000	36,304	18,618	9,650	6,017	N/A	3,597	3,993	12,082	125,261
Wetlands Reserve Program	0	0	0	0	0	N/A	0	0	0	0
Environmental Quality Incentives Program	0	0	0	0	1,972	N/A	590	1,311	2,218	6,091
Wildlife Habitat Incentive Program	0	0	0	0	0	N/A	0	0	0	0
Farmland Protection Program	0	0	0	0	0	N/A	0	0	0	0

**THREATENED AND ENDANGERED SPECIES OF THE BASIN** <sup>14</sup>

NRCS assists in the conservation of threatened and endangered species and avoids or prevents activities detrimental to such species. NRCS' concern for these species includes the species listed by the Secretary of the Interior (as published in the Federal Register) and species designated by state agencies.



The following is a list of threatened, endangered, candidate species and species of special concern that occur in the subbasin.

Scientific Name	Common Name	Type	Scientific Name	Common Name	Type
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	Zoological	<i>Hesperia dacotae</i>	Dakota Skipper	Zoological
<i>Androsace septentrionalis</i> ssp. <i>puberulenta</i>	Northern Androsace	Botanical	<i>Hudsonia tomentosa</i>	Beach-heather	Botanical
<i>Antennaria parvifolia</i>	Small-leaved Pussytoes	Botanical	<i>Juniperus horizontalis</i>	Creeping Juniper	Botanical
<i>Arabis holboellii</i> var. <i>retrofracta</i>	Holboell's Rock-cress	Botanical	<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Asio flammeus</i>	Short-eared Owl	Zoological	<i>Limosa fedoa</i>	Marbled Godwit	Zoological
<i>Botrychium campestre</i>	Prairie Moonwort	Botanical	<i>Limosella aquatica</i>	Mudwort	Botanical
<i>Botrychium gallicomontanum</i>	Frenchman's Bluff Moonwort	Botanical	<i>Marpissa grata</i>	A Jumping Spider	Zoological
<i>Botrychium simplex</i>	Least Moonwort	Botanical	<i>Microtus ochrogaster</i>	Prairie Vole	Zoological
<i>Calamagrostis montanensis</i>	Plains Reedgrass	Botanical	<i>Oarisma garita</i>	Garita Skipper	Zoological
<i>Carex garberi</i>	Garber's Sedge	Botanical	<i>Oarisma powesheik</i>	Powesheik Skipper	Zoological
<i>Carex hallii</i>	Hall's Sedge	Botanical	<i>Orobanche fasciculata</i>	Clustered Broomrape	Botanical
<i>Carex obtusata</i>	Blunt Sedge	Botanical	<i>Orobanche ludoviciana</i>	Louisiana Broomrape	Botanical
<i>Carex xerantica</i>	Dry Sedge	Botanical	<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Cladium mariscoides</i>	Twig-rush	Botanical	<i>Platanthera praeclara</i>	Western Prairie Fringed Orchid	Botanical
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological	<i>Podiceps auritus</i>	Horned Grebe	Zoological
<i>Cypripedium candidum</i>	Small White Lady's-slipper	Botanical	<i>Salicornia rubra</i>	Red Saltwort	Botanical
<i>Eleocharis quinqueflora</i>	Few-flowered Spike-rush	Botanical	<i>Salix maccalliana</i>	Mccall's Willow	Botanical
<i>Gaillardia aristata</i>	Blanket-flower	Botanical	<i>Scirpus clintonii</i>	Clinton's Bulrush	Botanical
<i>Gentiana affinis</i>	Northern Gentian	Botanical	<i>Silene drummondii</i>	Drummond's Campion	Botanical
<i>Gentianella amarella</i> ssp. <i>acuta</i>	Felwort	Botanical	<i>Stellaria longipes</i>	Long-stalked Chickweed	Botanical
<i>Glaux maritima</i>	Sea Milkwort	Botanical	<i>Sterna forsteri</i>	Forster's Tern	Zoological
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological	<i>Thomomys talpoides</i>	Northern Pocket Gopher	Zoological
<i>Helictotrichon hookeri</i>	Oat-grass	Botanical	<i>Trimorpha lonchophylla</i>	Shortray Fleabane	Botanical
<i>Hesperia comma assiniboia</i>	Assiniboia Skipper	Zoological			

## RESOURCE CONCERNS

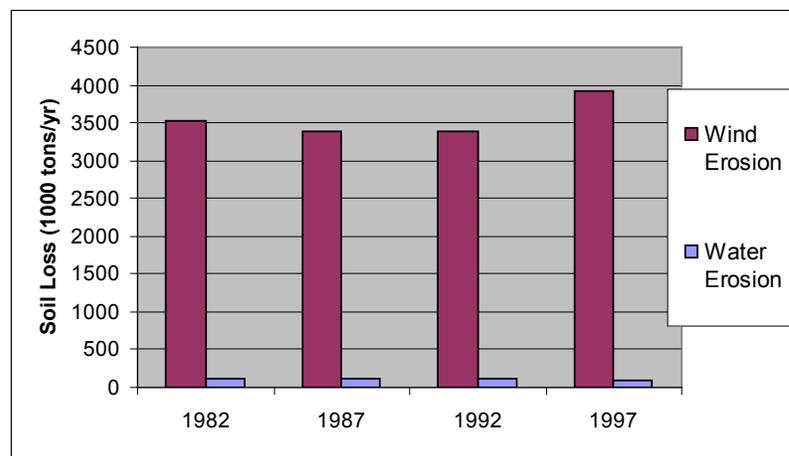
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- Soil Quality; Excessive Wind Erosion.** Soil loss from high and constant wind is considerable. Though there has been recent progress in this area, reduction of Wind erosion continues to be a pressing concern in western areas approaching the Red River Valley.
- Flood Damage Reduction.** Local districts recognize that annual flood damage is a main concern. Concerns over flooding in the basin include tiling practices, drainage management, stormwater conveyence, protection of city and private sewer systems, property damage, excessive erosion and sedimentation.
- Surface and Ground Water Quality; Nutrients, Priority Pollutants.** Reduction of priority pollutants and sediments in surface waters is a priority issue throughout the watershed. Excessive amounts of sediments, nutrients, and bacteria degrade the water quality causing a fish community with depressed populations and limited diversity. Increased levels of phosphorus and chlorophyll-a are reaching area water as impervious surface and tilled area increase and natural buffers disappear.
- Wildlife Habitat.** Given the fragmentation caused by increased development, and agricultural land use there are few to no natural corridors of natural habitat for wildlife. Districts recognize the need for the protection and enhancement of wildlife corridors and potential for connecting public lands.
- Wetland Management.** Due to documented development pressures within shoreland and agricultural areas, priority should be given to preserving the wetlands within 1000 feet of a lake or 300 feet of a river. Restoration of wetlands, dam repair and placing flood-prone lands in CRP/RIM all serve to lessen the impact of flooding and sedimentation, and improve drainage.



### NRI Soil Loss Estimates<sup>13</sup>

- Sheet and rill erosion rates on crop and pasture land decreased by approximately 12,100 tons (11%) between 1982 and 1997.
- NRI estimates indicate wind erosion on crop and pasture land increased by approximately 401,000 tons (11%) between 1982 and 1997.



## Socioeconomic and Agricultural Data (Relevant)

Population estimates for the subbasin indicate that approximately 5,000 people reside in the area. Median household income throughout the district is \$34,025 yearly, roughly 73% of the national average. Figures show an unemployment rate of 6.1% for the basin, and approximately 9% of the residents in the watershed live below the national poverty level.



Data indicates there are 611 farms in the watershed. Of the 553 operators in the basin, fifty six percent are full time producers not reliant on off-farm income. Approximately thirty seven percent of the operations are less than 180 acres in size, forty four percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres. Average farm size in the basin is 188 acres.

<b>(MN) HUC# 9020312</b>		<b>Total Acres:</b>	<b>596,350</b>
<b>Population Data*</b>	Watershed Population	5,015	
	Unemployment Rate	6.1%	
	Median Household Income	34,025	
	% below poverty level	9%	
	Median Value of Home	54,567	
<b>Farm Data</b>	# of Farms	611	
	# of Operators	553	<b>Percent</b>
	# of Full Time Operators	308	56%
	# of Part Time Operators	245	44%
	<b>Total Cropland Acres</b>	<b>372,555</b>	<b>62.5%</b>
<b>Farm Size</b>	1 to 49 Acres	151	9%
	50 to 179 Acres	486	28%
	180 to 499 Acres	496	29%
	500 to 999 Acres	254	15%
	1,000 Acres or more	348	20%
	<b>Average Farm Size</b>	<b>188</b>	
<b>Livestock &amp; Poultry</b>	Cattle - Beef	1,917	2%
	Cattle - Dairy	478	0%
	Chicken	800	1%
	Swine	1,544	1%
	Turkey	56,308	46%
	Other	62,293	51%
	<b>Animal Count Total:</b>	<b>123,339</b>	
	<b>Total Permitted AFOs:</b>	<b>25</b>	
<b>Chemicals (Acres Applied)</b>	Insecticides	17,044	
	Herbicides	146,407	
	Wormicides	4,632	
	Fruiticides	1,118	
	<b>Total Acres Treated</b>	<b>169,201</b>	
	<b>% State Chemical Totals</b>	<b>1.2%</b>	

\* Adjusted by percent of HUC in the county or by percent of block group area in the HUC, depending on the level of data available

## Watershed Projects, Plans and Monitoring

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- **Ross #7 Impoundment**  
Two Rivers Watershed District
- **Springbrook PL 566 Planning and Design**  
MN USDA NRCS
- **Red River Basin Turbidity TMDL Study**  
MPCA, Red River Basin Water Quality Team
- **Red River Basin Riparian Project**  
Red River RC&D
- **Horseshoe Lake Project**  
Two Rivers Watershed District
- **Nererson Impound and Modification Project**  
Two Rivers Watershed District
- **Red River Water Management Consortium**  
USDA, UND EERC, Red River Basin Citizens
- **Red River Basin Water Quality Work Plan**  
Minnesota Pollution Control Agency
- **Red River Valley Water Supply Project**  
Red River International Joint Commission
- **Red River Basin Water Quality Monitoring Project**  
Red River Basin Commission
- **Red River Basin Mapping Initiative**  
International Water Institute, Red River Stakeholders
- **USGS Sediment to Streams Study - Red River Basin**  
USGS, Minnesota Pollution Control Agency

\* Have a watershed project you'd like to see included? Submit suggestions online @ <http://www.mn.nrcs.usda.gov/technical/rwa/>

## Conservation Districts, Organizations & Partners

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- **Kittson SWCD**  
410 S 5th St Ste 106, Hallock, MN 56728  
Phone: (218)942-2619
- **Marshall SWCD**  
PO Box 74, Warren, MN 56772  
Phone: (218) 745-5010
- **Minnesota NRCS - USDA**  
375 Jackson Street, Suite 600 St Paul, MN 55101  
On the Web: [www.mn.nrcs.usda.gov](http://www.mn.nrcs.usda.gov)
- **North Central Minnesota Joint Powers Board**  
3217 Bemidji Ave N, Bemidji, MN  
Phone (218) 755-4339
- **Roseau SWCD**  
502 - 7th St SW, Ste 8, Roseau, MN 56751  
Phone (218) 463-1903
- **Red River Basin Riparian Project**  
516 Cooper Ave Grafton, ND 58237  
Phone (701) 352-3550
- **Two Rivers Watershed District**  
410 South 5th St #112 Hallock, MN 56728  
Phone (218) 843-3333
- **Red River Basin Commission**  
119th 5th St. P.O. Box 66 Moorhead, MN 56561  
[www.redriverbasincommission.org](http://www.redriverbasincommission.org)

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## Footnotes / Bibliography

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1. Ownership Layer – Source: MN Stewardship Data: Minnesota Department of Natural Resources, Section of Wildlife, BRW, Inc, 2007. This is the complete GAP Stewardship database containing land ownership information for the entire state of Minnesota. Date of source material is variable and ranges from 1976 to 2007, although a date range of 1983 to 1985 predominates. Land interest is expressed only when some organization owns or administers more than 50% of a forty except where DNR could create sub-forty accuracy polygons.
2. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS); Publication date: 19990631; Title: Minnesota Land Cover Data Set, Edition: 1; Geospatial data presentation form: Raster digital data; Publisher: U.S. Geological Survey, Sioux Falls, SD, USA.
3. Ownership layer classes grouped to calculate Public ownership vs. Private and Tribal ownership by Minnesota NRCS Rapid Watershed Assessment Staff. Land cover / Land use data was then extracted from the National Landcover Dataset Classification System and related to ownership class polygons.
4. USGS 1:100,000 Hydrography Layer .This data set represents all features coded as ‘rivers’ on the USGS 1:100,000-scale DLG Hydrography data set. This current version was converted to ARC/INFO by the Land Management Information Center and edge-matched across map sheet boundaries. Minnesota DNR made further modifications to the files, verified lake feature identifiers, and created a state layer from the separate 100k data. The Hydro 100k layer was compared to MPCA’s 303(d) data to derive percentage of listed waters.
5. Land Cover / Land Use / Hydro 100k Buffer. Using the 100k Hydrology dataset, All streams within HUC were spatially buffered to a distance of 100 ft. National Landcover Dataset attributes were extracted for the spatial buffer to demonstrate the vegetation and landuse in vulnerable areas adjacent to waterways.
6. Land Capability Class. ESTIMATES FROM THE 1997 NRI DATABASE (REVISED DECEMBER 2000) REPLACE ALL PREVIOUS REPORTS AND ESTIMATES. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. All definitions are available in the glossary. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: <http://www.nrcs.usda.gov/technical/NRI/>
7. 2002 NASS Irrigated Land Estimates. Irrigated land: Land that shows evidence of being irrigated during the year of the inventory or during two or more years out of the last four years. Water is supplied to crops by ditches, pipes, or other conduits. Water spreading is not considered irrigation; it is recorded as a conservation practice. For more information: <http://www.agcensus.usda.gov/>
8. 303(d) Stream data. Minnesota’s Final Impaired Waters (per Section 303(d) Clean Water Act), 2008. Data obtained from Minnesota Pollution Control Agency (MPCA). The Minnesota Pollution Control Agency (MPCA) helps protect state water by monitoring quality, setting standards and controlling inputs through the development of TMDL plans. <http://www.pca.state.mn.us/water/tmdl/index.html#maps>.

## Footnotes / Bibliography (continued)

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9. National Coordinated Common Resource Area (CRA) Geographic Database. A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area

10. Soil Survey Geographic Database (SSURGO) Tabular and spatial data obtained from NRCS Soil Data Mart at <http://soildatamart.nrcs.gov>. Publication dates vary by county. Component and layer tables were linked to the spatial data via SDV 5.1 and ARCGIS 9.1 to derive the soil classifications presented in these examples. Highly Erodible Land Classification Data obtained from USDA/NRCS EFOTG Section II, County Soil Data. HEL classifications, where provided, were appended to SSURGO spatial data via an ARCEdit session. Addendum and publication dates vary by county.

11. Lands removed from production through farm bill programs. County enrollment derived from the following: CRP Acres: [www.fsa.usda.gov/crpstorpt/07Approved/r1sumyr/mn.htm](http://www.fsa.usda.gov/crpstorpt/07Approved/r1sumyr/mn.htm) (7/30/04). CREP Acres: <http://www.bwsr.state.mn.us/easements/crep/easementssummary.html> (7/31/03). WRP Acres: NRCS (8/16/04). Data were obtained by county and adjusted by percent of HUC in the county.

12. Socioeconomic and Agricultural Census Data were taken from the U.S. Population Census, 2000 and 2002 Agricultural Census and adjusted by percent of HUC in the county or by percent of zip code area in the HUC, depending on the level of data available. Unemployment statistics obtained from the Bureau of Labor Statistics - Labor Force Data by County, 2006 Annual Averages <http://www.bls.gov> Data were also taken from MPCA AFO/CAFO counts provided by county for 2005.

13. 1997 NRI Estimates for sheet and rill erosion (WEQ & USLE). The NRI estimates sheet and rill erosion together using the Universal Soil Loss Equation (USLE). The Revised Universal Soil Loss Equation (RUSLE) was not used in the 1997 NRI. RUSLE was not available for previous inventories, therefore the use of USLE was continued to preserve the trending capacity of the NRI database. Wind erosion is estimated using the Wind Erosion Equation (WEQ). For further information visit <http://www.mn.nrcs.usda.gov/technical/nri/findings/erosion.htm>

14. Federally listed endangered and threatened species counts obtained from NRCS Field Office Technical Guide, Section II, Threatened and Endangered List. <http://www.nrcs.usda.gov/Technical/efotg/>. Essential fish habitat as established by Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265, as amended through October 11, 1996 <http://www.nmfs.noaa.gov/sfa/magact/>

15. Watershed Projects, Plans, Monitoring. Natural Resources Conservation Service, Watershed Projects Planned and Authorized, <http://www.nrcs.usda.gov/programs/watershed/Purpose>.