

## Rapid Watershed Assessment

### Lower Red River

(MN/ND) HUC: 09020311



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.

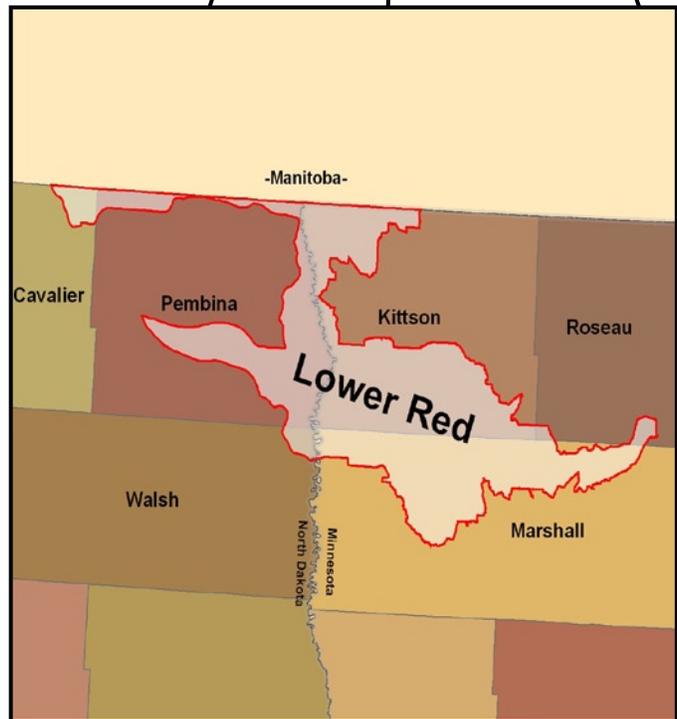
## Introduction

The Lower Red River 8-Digit Hydrologic Unit Code (HUC) subbasin is part of the Red River Basin in northwestern Minnesota and northeastern North Dakota. The watershed occurs in the Glacial Lake Agassiz Plain Level III Ecoregion.

Initially formed by the confluence of the Bois de Sioux and Ottertail Rivers, the Red River flows north across the plains of glacial Lake Agassiz forming much of the border of Minnesota and North Dakota, continuing on to Manitoba and flowing into Lake Winnipeg.

The Red River 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 and water erosion, nutrient management, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many of the resource concerns relate directly to flooding and increased sediment and pollutant loadings to surface waters.



### County Totals

County	Acres in HUC	% HUC
Pembina	194,679	24.3%
Cavalier	18,418	2.3%
Walsh	11,710	1.5%
Kittson	316,202	39.5%
Roseau	10,732	1.3%
Marshall	248,758	31.1%
<b>Total acres:</b>	<b>800,391</b>	<b>100%</b>

## Physical Description

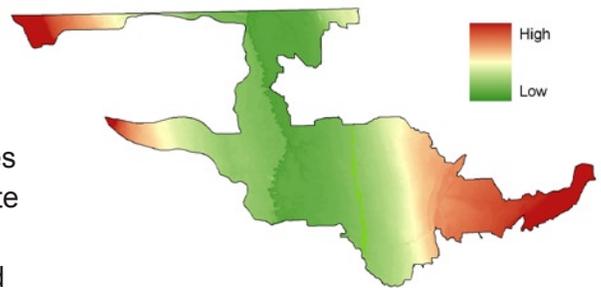
The Red River begins its course just below Wahpeton, North Dakota at an elevation of 943 feet above mean sea level (msl). The river descends a mere 190 feet over the 175+ mile journey between its origin and the Canadian border.

Precipitation in the watershed ranges from 17 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 region.

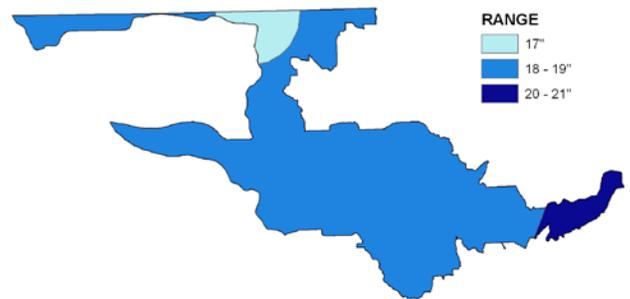
Predominate land uses / land covers are Row Crops (80.6%), Wetlands (5.5%), Forest (5.2%), Residential/ Commercial Development (5.1%) and Grass/Pasture/Hay (2.4%). Land use within the watershed is largely agricultural, accounting for nearly 83% of the overall watershed acres.

Development pressure is moderate in the basin, with occasional farms being parceled out for development, recreation or country homes.

Relief / Elevation

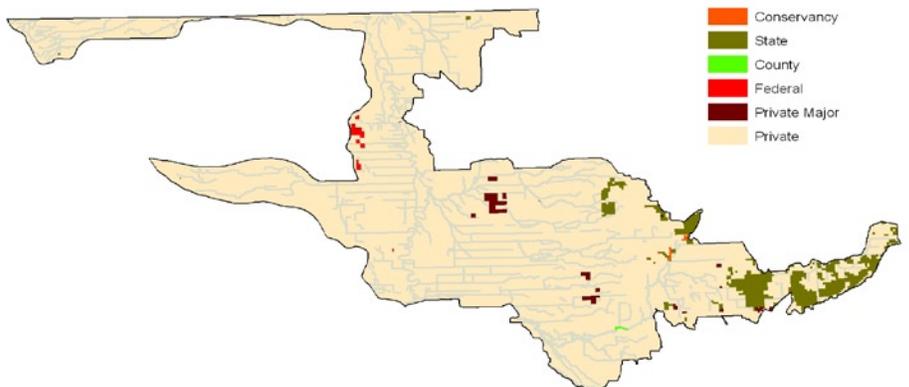


Average Precipitation



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

Ownership Type	Acres	% HUC
Conservancy	528	0.1
County	237	0.0
Federal	1,945	0.2
State	34,855	4.4
Other	-	-
Tribal	-	-
Private Major	5,592	0.7
Private	757,234	94.6
<b>Total Acres:</b>	<b>800,391</b>	<b>100</b>

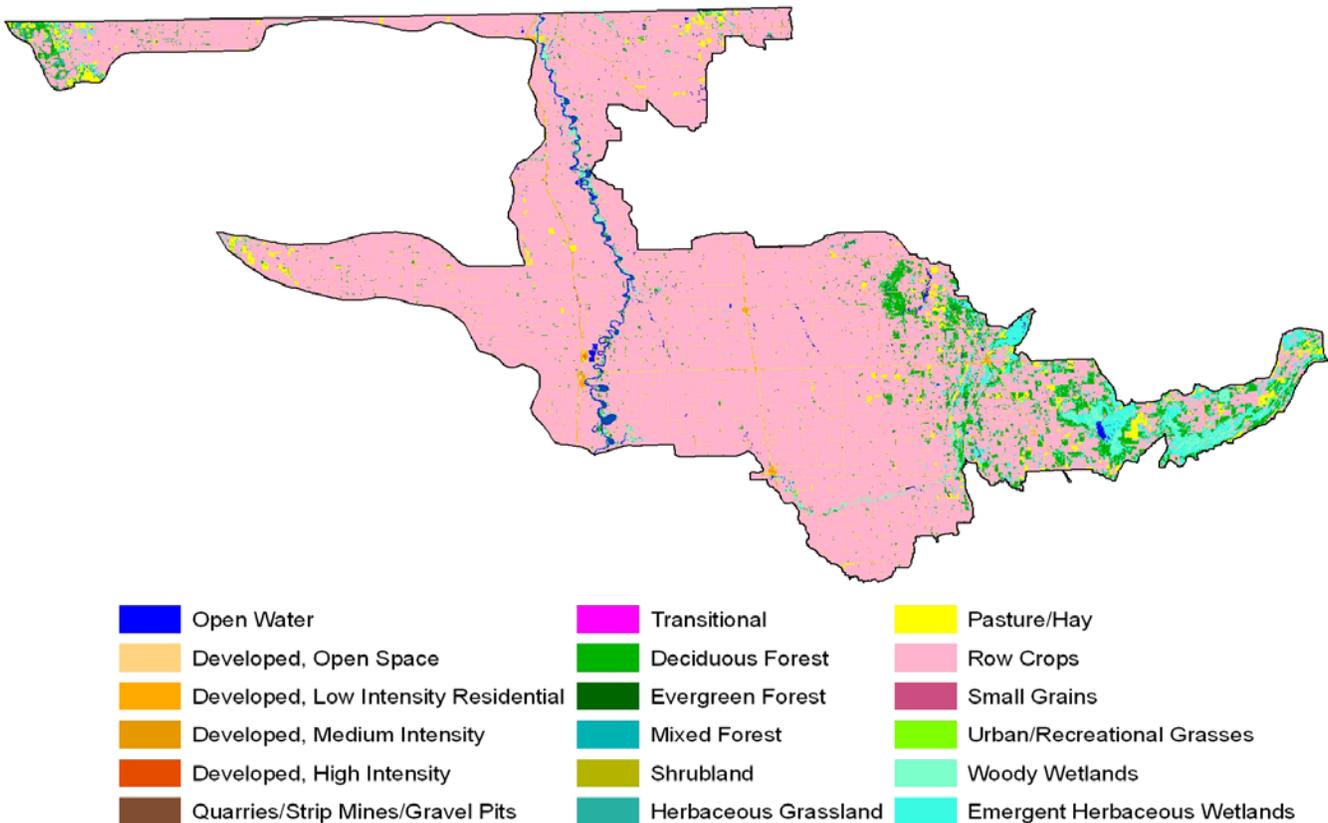


\* Ownership totals derived from MN and ND GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

## Ownership / Land Use

The Lower Red watershed covers an area of 800,391 acres. Over ninety four percent of the land in the watershed is held by private landowners (757,234 acres). The second largest ownership type is State with approximately 34,855 acres (4.4%), followed by Private-Major (Corporate) land holdings amounting to 5,592 acres (0.7%), Federal with 1,945 acres (0.2%), and Conservancy with 528 acres (0.1%). County lands comprise the smallest ownership class, with 237 acres. Land use by ownership type is represented in the table below.

Land Use / Land Cover <sup>12</sup>



Ownership / Land Use <sup>13</sup>

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	% Public	Acres	% Private	Acres	% Tribal		
Forest	10,346	1.3%	30,925	3.9%	0	0.0%	41,271	5.2%
Grass, etc	592	0.1%	18,960	2.4%	0	0.0%	19,552	2.4%
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Row Crops	5,207	0.7%	640,199	80.0%	0	0.0%	645,406	80.6%
Shrub etc	327	0.0%	675	0.1%	0	0.0%	1,002	0.1%
Wetlands	18,767	2.3%	24,954	3.1%	0	0.0%	43,722	5.5%
Residential/Commercial	680	0.1%	40,055	5.0%	0	0.0%	40,735	5.1%
Open Water*	743	0.1%	6,146	0.8%	0	0.0%	6,889	0.9%
<b>Watershed Totals:</b>	<b>36,662</b>	<b>4.58%</b>	<b>761,916</b>	<b>95.2%</b>	<b>0</b>	<b>0.0%</b>	<b>800,391</b>	<b>100%</b>

\* ownership undetermined

\*\* includes private-major

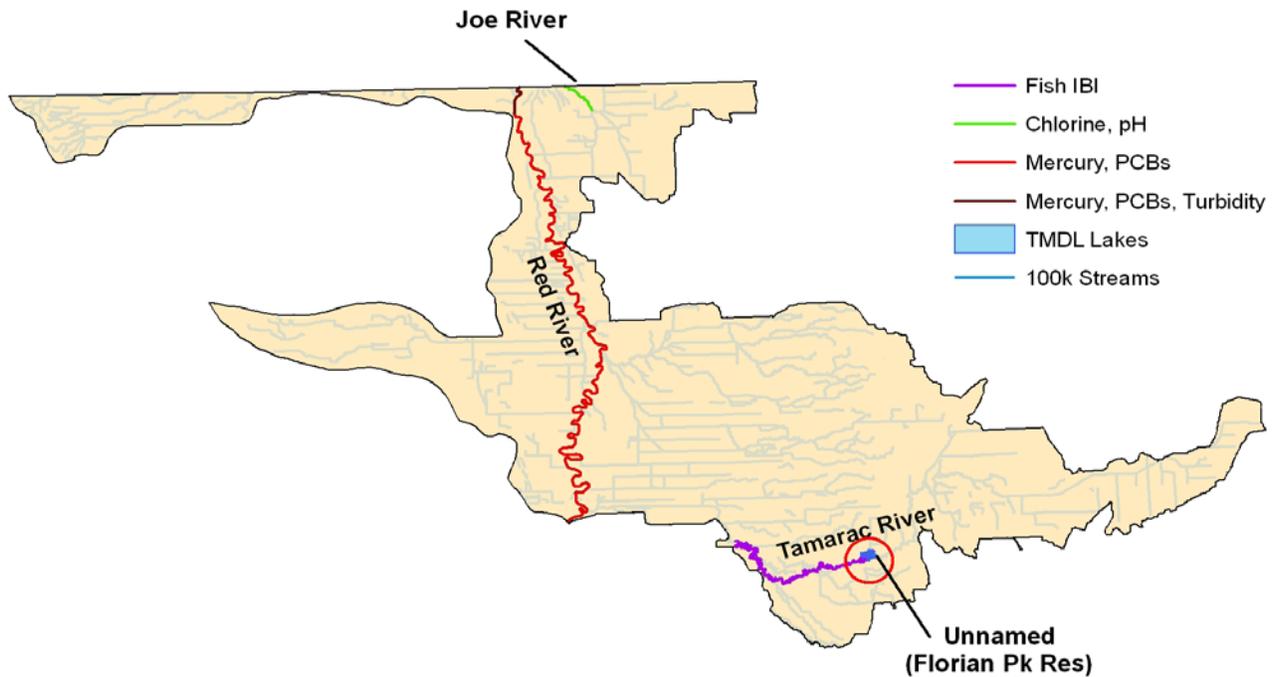
**Physical Description (continued)**

			cu. ft/sec	
<b>Stream Flow Data</b>	USGS 05092000 RED RIVER OF THE NORTH AT DRAYTON, ND	<b>2008 Avg.</b>	3123	
		<b>May – Sept. Avg.</b>	4580	
<b>Stream Data<sup>14</sup></b> (*Percent of Total HUC Stream Miles)		<b>MILES</b>	<b>PERCENT</b>	
	Total Miles – Major (100K Hydro GIS Layer)	1185	---	
	303d/TMDL Listed Streams (DEQ)	41.6	3.5%	
<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	1,216	4.3%	
	Grain Crops	0	0.0%	
	Grass, etc	543	1.9%	
	Orchards	0	0.0%	
	Row Crops	20,106	71.2%	
	Shrub etc	19	0.1%	
	Wetlands	1,683	6.0%	
	Residential/Commercial	3,036	10.7%	
	Open Water*	1,648	5.8%	
	<b>Total Buffer Acres:</b>	<b>28,251</b>	100%	
<b>Crop and Pastureland Land Capability Class<sup>16</sup></b> (Croplands & Pasturelands Only) (2002 NASS Croplands extracted from Non-Irrigated Land Capabuiltiy Class)	<b>1 – slight limitations</b>	3,764	0.7%	
	<b>2 – moderate limitations</b>	448,479	78.5%	
	<b>3 – severe limitations</b>	60,077	10.5%	
	<b>4 – very severe limitations</b>	51,681	9.0%	
	<b>5 – no erosion hazard, but other limitations</b>	0	0.0%	
	<b>6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest</b>	7,093	1.2%	
	<b>7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat</b>	0	0.0%	
	<b>8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply</b>	0	0.0%	
	<b>Total NASS Crop &amp; Pasture Land</b>	<b>571,094</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>	2,636	0.5%	0.3%
	<b>Uncultivated Cropland</b>	0	0%	0%
	<b>Total Irrigated Lands</b>	<b>2,636</b>	<b>0.5%</b>	<b>0.3%</b>

## 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 states to identify and restore impaired waters.

### 303d Listed Waters - Lower Red River Watershed <sup>/8</sup>



Waterbody Name	Impairment	Affected Use
JOE RIVER; SALT COULEE TO CANADIAN BORDER	CHLORIDE; PH	AQUATIC LIFE
RED RIVER OF THE NORTH; DRAYTON DAM TO UNNAMED CR	MERCURY, PCBs	AQUATIC CONSUMPTION
RED RIVER OF THE NORTH; PARK R (ND) TO TAMARACK R	MERCURY, PCBs	AQUATIC CONSUMPTION
RED RIVER OF THE NORTH; PEMBINA R (ND) TO CANADIAN BORDER	MERCURY, PCBs, TURBIDITY	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; TAMARAC R TO DRAYTON DAM	MERCURY, PCBs	AQUATIC CONSUMPTION
RED RIVER OF THE NORTH; TWO R TO PEMBINA R (ND)	MERCURY, PCBs	AQUATIC CONSUMPTION
RED RIVER OF THE NORTH; UNNAMED CR TO TWO R	MERCURY, PCBs	AQUATIC CONSUMPTION
TAMARAC RIVER; RESERVOIR SOUTH OF FLORIAN TO STEPHEN DAM	FISH IBI	AQUATIC LIFE
UNNAMED LAKE (FLORIAN PK RESERVOIR)	MERCURY	AQUATIC CONSUMPTION

## Common Resource Areas

The Lower Red watershed encompasses four Common Resource Areas, CRA 55A.1, 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.

### **55A.1 Northern Black Glaciated Drift Plain:**

The Northern Black Glaciated Drift Plain is a nearly level to undulating landscape composed of glacial till and lacustrine sediments. Temporary and seasonal wetlands are numerous throughout the area. Agriculture is limited by a very short growing season and the coldest January temperatures in Northern Plains.

### **56.1 Red River Valley:**

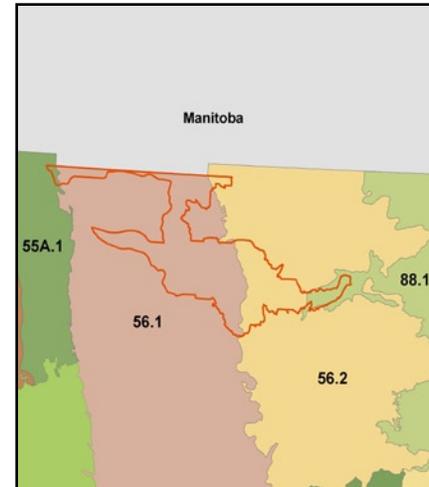
The Red River Valley (Glacial Lake Agassiz) is an extremely flat landscape composed of thick lacustrine sediments. Soils range from silty to clayey in texture. Most soils have a high water table and are very productive. Saline soils exist in places. Most areas are farmed with main crops being small grain, 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, droughtiness 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.



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

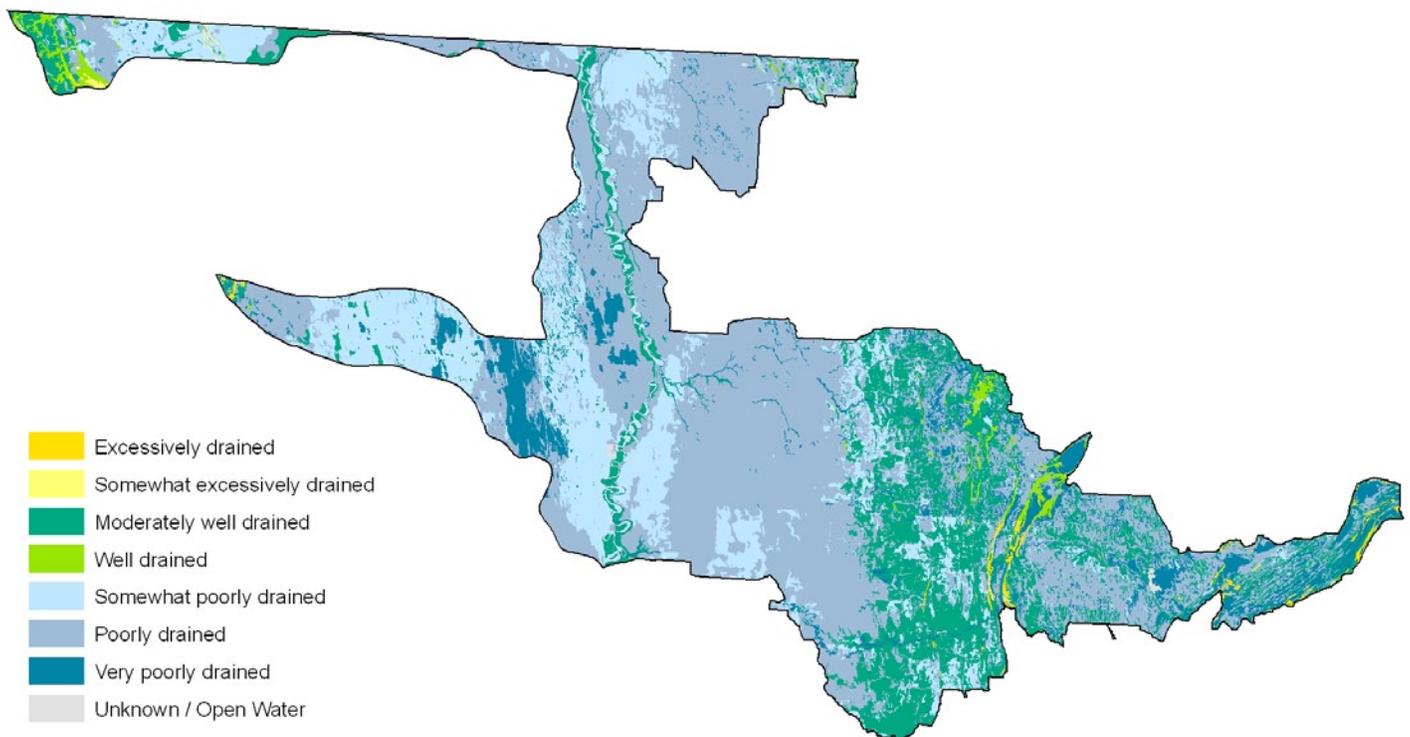
Visit the online Web Soil Survey at  
<http://websoilsurvey.nrcs.usda.gov> for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at  
<http://soildatamart.usda.gov> to download SSURGO certified soil tabular and spatial data.

## Drainage Classification

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.”



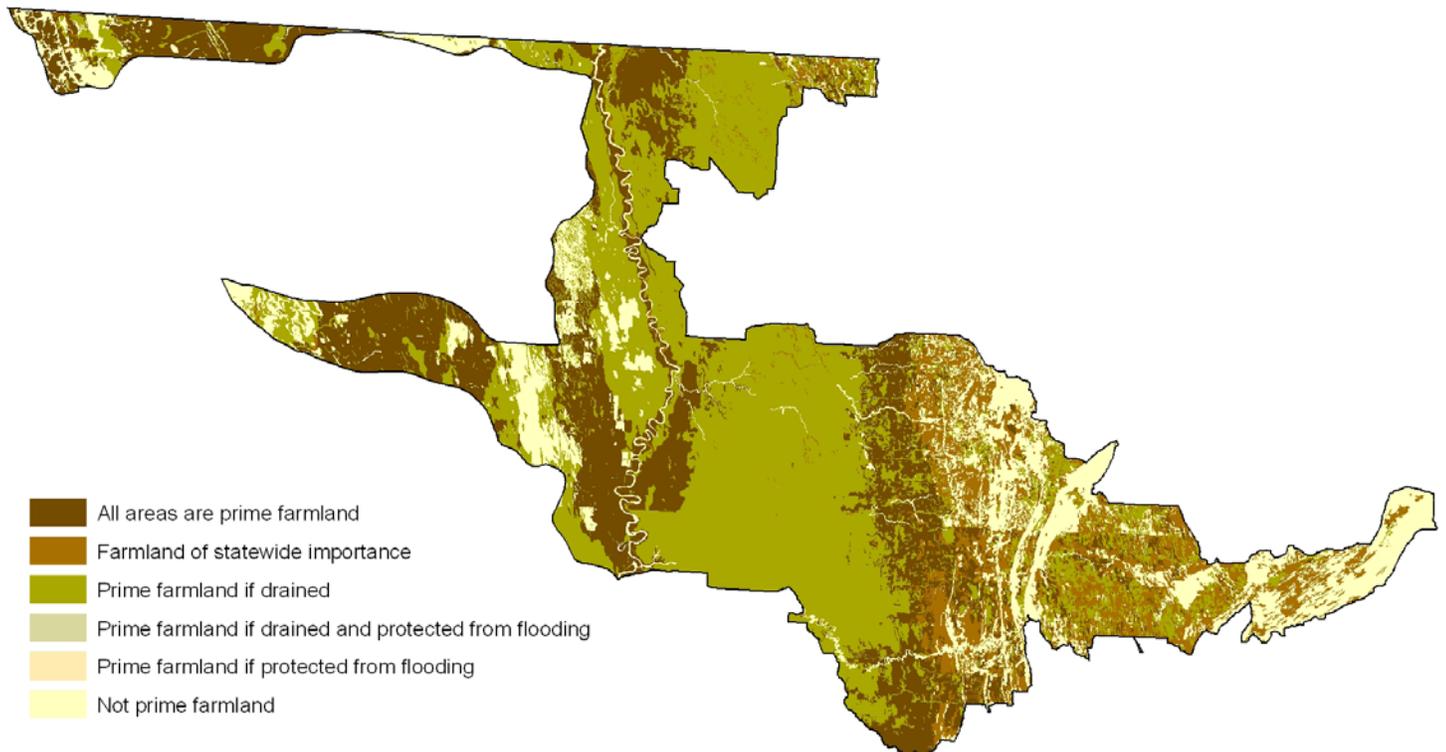
Visit the online Web Soil Survey at
   
<http://websoilsurvey.nrcs.usda.gov> for official
   
 and current USDA soil information as viewable
   
 maps and tables. Visit the Soil Data Mart at
   
<http://soildatamart.usda.gov> to download
   
 SSURGO certified soil tabular and spatial data.

## Farmland Classification

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.



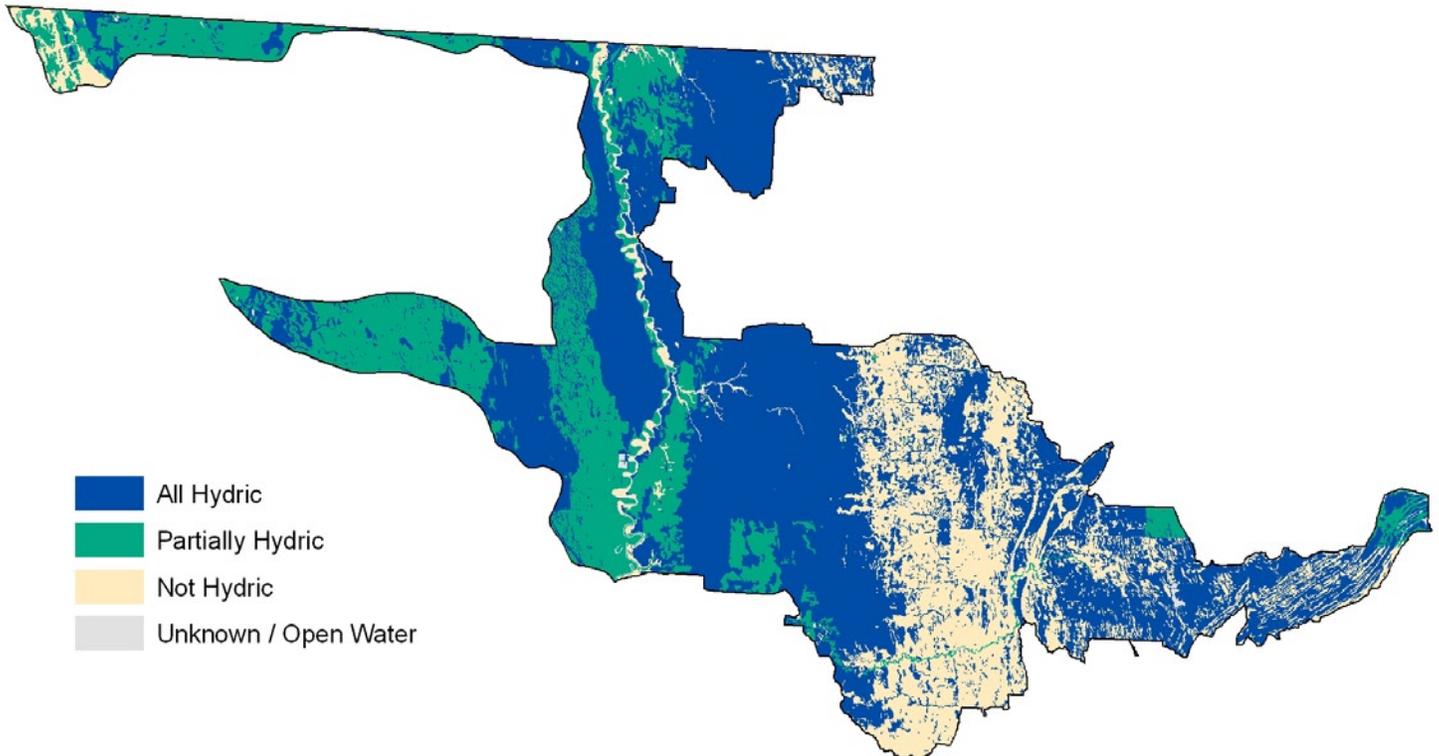
Visit the online Web Soil Survey at <http://websoilsurvey.nrcs.usda.gov> for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at <http://soildatamart.usda.gov> to download SSURGO certified soil tabular and spatial data.

## Hydric Soils

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 nonhydric 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.

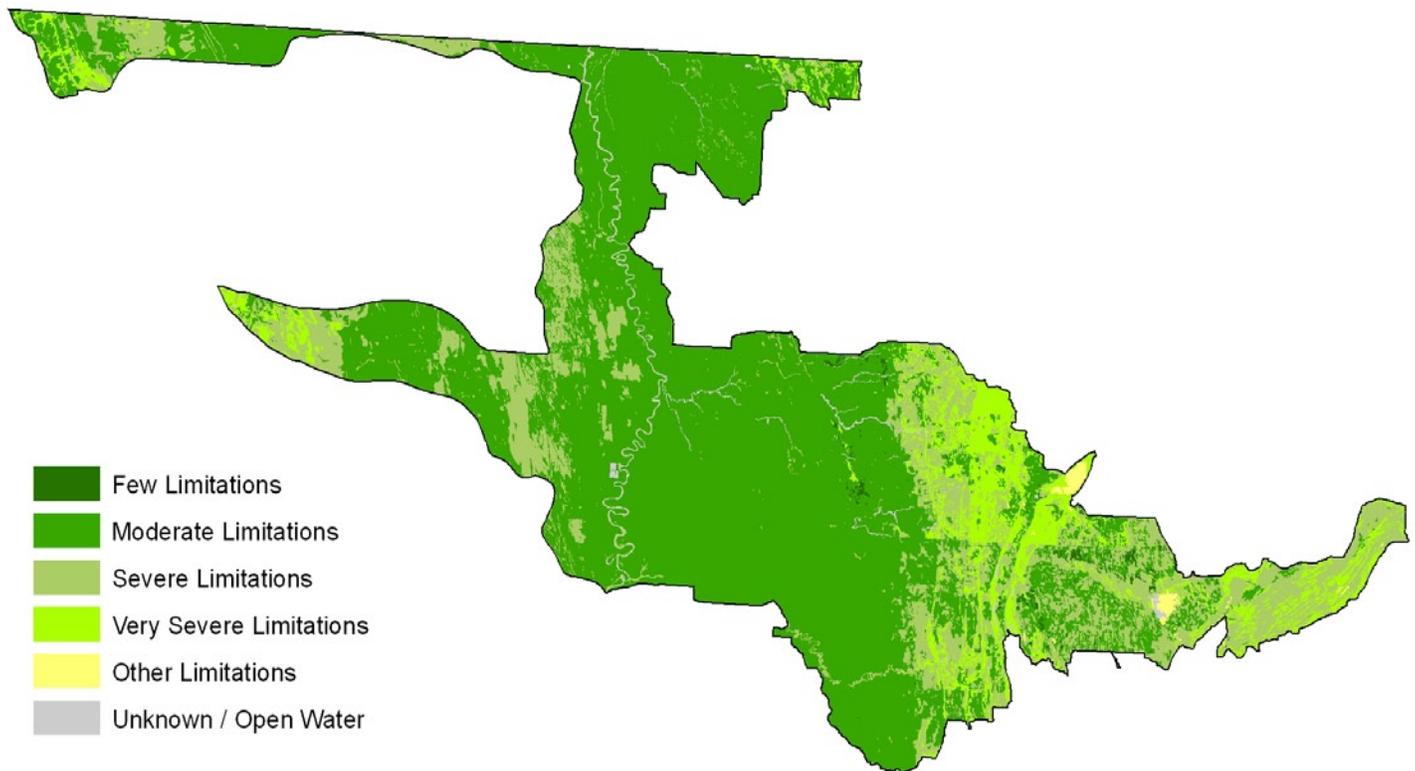


Visit the online Web Soil Survey at <http://websoilsurvey.nrcs.usda.gov> for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at <http://soildatamart.usda.gov> to download SSURGO certified soil tabular and spatial data.

## Land Capability Classification

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.



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.

## Performance Results System and Other Data

Watershed Name: Lower Red				Watershed Number: 9020311						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL (MN)
Total Conservation Systems Planned (acres)	23,000	44,396	0	3,584	7,666	N/A	6,144	11,231	23,573	119,594
Total Conservation Systems Applied (acres)	0	29,325	0	10,734	10,734	N/A	9,231	8,922	20,139	89,085
<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	29	7	1	1	0	7	0	45
Erosion Control Total Soil Saved (tons/year)	14,000	382,276	41,250	140,889	102,697	N/A	N/A	N/A	N/A	681,112
Total Nutrient Management (590) (Acres)	0	0	38	4,142	0	1,312	2,208	2,208	3,803	13,711
Pest Management Systems Applied (595A) (Acres)	0	0	0	0	0	0	0	500	1,184	1,684
Prescribed Grazing 528a (acres)	0	0	0	128	45	65	0	0	0	238
Tree & Shrub Establishment (612) (acres)	0	449	53	376	115	2	3	27	22	1,047
Residue Management (329A-C) (acres)	0	0	0	0	1,335	750	750	2,324	514	5,673
Total Wildlife Habitat (644 - 645) (acres)	14,000	40,366	10,242	8,944	5,855	1,095	8,944	2,993	12,859	105,298
Total Wetlands Created, Restored, or Enhanced (acres)	0	1,912	3,367	676	1,918	629	1,103	213	192	10,010
<b>Acres enrolled in Farmbill Programs</b>										
Conservation Reserve Program	0	27,480	10,381	10,673	4,264	N/A	3,308	4,609	12,764	73,479
Wetlands Reserve Program	0	0	0	0	0	N/A	76	0	256	332
Environmental Quality Incentives Program	0	0	0	0	1,153	N/A	5,837	3,208	5,175	15,373
Wildlife Habitat Incentive Program	0	0	0	0	0	N/A	0	17	0	17
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 Minnesota portion of the subbasin.

Scientific Name	Common Name	Type
<i>Acipenser fulvescens</i>	Lake Sturgeon	Zoological
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	Zoological
<i>Androsace septentrionalis</i> ssp. <i>puberulenta</i>	Northern Androsace	Botanical
<i>Antennaria parvifolia</i>	Small-leaved Pussytoes	Botanical
<i>Calamagrostis montanensis</i>	Plains Reedgrass	Botanical
<i>Carex garberi</i>	Garber's Sedge	Botanical
<i>Carex hallii</i>	Hall's Sedge	Botanical
<i>Carex obtusata</i>	Blunt Sedge	Botanical
<i>Carex scirpoidea</i>	Northern Singlespike Sedge	Botanical
<i>Carex xerantica</i>	Dry Sedge	Botanical
<i>Cicindela fulgida westbournei</i>	Crimson Saltflat Tiger Beetle, westbournei subspecies	Zoological
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological
<i>Cygnus buccinator</i>	Trumpeter Swan	Zoological
<i>Cyripedium candidum</i>	Small White Lady's-slipper	Botanical
<i>Eleocharis quinqueflora</i>	Few-flowered Spike-rush	Botanical
<i>Gaillardia aristata</i>	Blanket-flower	Botanical
<i>Glaux maritima</i>	Sea Milkwort	Botanical
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Helictotrichon hookeri</i>	Oat-grass	Botanical
<i>Hesperia comma assiniboia</i>	Assiniboia Skipper	Zoological
<i>Hesperia dacotae</i>	Dakota Skipper	Zoological
<i>Larus pipixcan</i>	Franklin's Gull	Zoological
<i>Ligumia recta</i>	Black Sandshell	Zoological
<i>Limosa fedoa</i>	Marbled Godwit	Zoological
<i>Limosella aquatica</i>	Mudwort	Botanical
<i>Minuartia dawsonensis</i>	Rock Sandwort	Botanical
<i>Oarisma powesheik</i>	Powesheik Skipper	Zoological
<i>Orobanche ludoviciana</i>	Louisiana Broomrape	Botanical
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Salicornia rubra</i>	Red Saltwort	Botanical
<i>Salix maccalliana</i>	Mccall's Willow	Botanical
<i>Stellaria longipes</i>	Long-stalked Chickweed	Botanical
<i>Thomomys talpoides</i>	Northern Pocket Gopher	Zoological
<i>Trimorpha lonchophylla</i>	Shortray Fleabane	Botanical

## RESOURCE CONCERNS

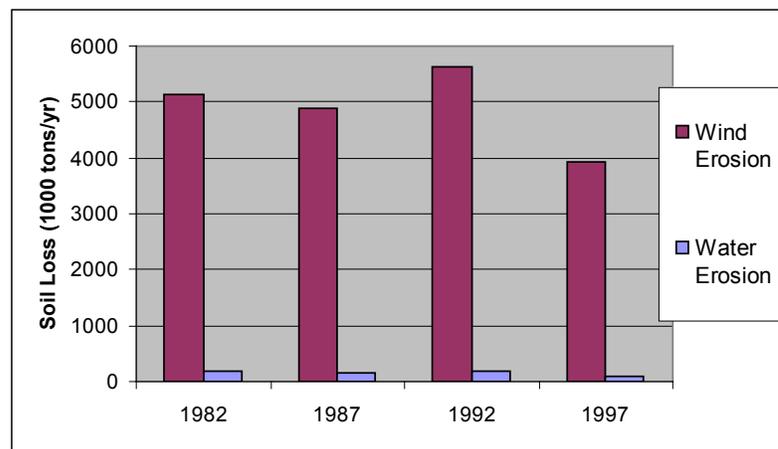
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- **Soil Quality; Excessive Erosion:** Erosion and deposition are concerns in the basin. Retention of water on the landscape, cover crops, buffers, conservation tillage and considering agricultural impacts significantly improve flooding and erosion.
- **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 remains a pressing concern in the Red River Valley.
- **Flood Damage Reduction.** Local districts recognize that annual flood damage is a major 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 lakes as impervious surface increases and natural buffers disappear.
- **Nutrient Management:** Installation of waste control systems on high priority feedlots, identification and replacement of failing or non-compliant individual septic systems.
- **Wildlife Habitat.** Given the fragmentation caused by 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 Prairie and Wetland areas throughout the watershed.
- **Wetland Management.** Due to documented issues within riparian 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>

- NRI Estimates for Sheet and Rill erosion rates on crop and pasture land decreased by approximately 75,600 tons (42%) between 1982 and 1997.
- NRI estimates indicate wind erosion on crop and pasture land decreased by approximately twenty four percent between 1982 and 1997.



## Socioeconomic and Agricultural Data (Relevant)

Population estimates indicate that approximately 7,000 people reside in the basin. Median household income is \$35,686 yearly, roughly 77% of the national average. Figures show an unemployment rate of 5.4%, and approximately 9% of the residents in the watershed live below the national poverty level.



There are an estimated 778 farms in the watershed. Of the 715 operators in the basin, sixty three percent are full time producers not reliant on off-farm income. Approximately thirty three percent of the operations are less than 180 acres in size, forty percent are from 180 to 1000 acres in size, and twenty seven percent of the farms are greater than 1000 acres. Average farm size in the basin is 148 acres.

<b>(MN) HUC# 9020311</b>		<b>Total Acres:</b>	<b>800,391</b>
<b>Population Data *</b>	Watershed Population	7,009	
	Unemployment Rate	5.4%	
	Median Household Income	35,686	
	% below poverty level	9%	
	Median Value of Home	51,650	
<b>Farm Data</b>	# of Farms	778	
	# of Operators	715	<b>Percent</b>
	# of Full Time Operators	453	63%
	# of Part Time Operators	262	37%
	<b>Total Cropland Acres</b>	<b>571,094</b>	<b>71.4%</b>
<b>Farm Size</b>	1 to 49 Acres	110	8%
	50 to 179 Acres	364	25%
	180 to 499 Acres	386	26%
	500 to 999 Acres	208	14%
	1,000 Acres or more	394	27%
	<b>Average Farm Size</b>	<b>148</b>	
<b>Livestock &amp; Poultry</b>	Cattle - Beef	2,586	14%
	Cattle - Dairy	356	2%
	Chicken	884	5%
	Swine	2,190	12%
	Turkey	2,724	15%
	Other	9,842	53%
	<b>Animal Count Total:</b>	<b>18,583</b>	
	<b>Total Permitted AFOs:</b>	<b>146</b>	
<b>Chemicals MN (Acres Applied)</b>	Insecticides	16,036	
	Herbicides	160,495	
	Wormicides	5,662	
	Fruiticides	961	
	<b>Total Acres Treated</b>	<b>183,154</b>	
	<b>% State Chemical Totals</b>	<b>1.3%</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

---

- **Flood Damage Reduction Planning**  
Red River Basin Commission
- **Waffle Flood Mitigation Project**  
Energy & Environmental Research Center, UND
- **North Dakota Unified Watershed Assessment**  
North Dakota Dept of Health, NRCS
- **Rural Ring Dike Project**  
Local Districts, MN DNR
- **Drayton Aquatic Ecosystem Restoration Study**  
US Army Corps of Engineers
- **Pembina River Basin Study**  
US Army Corps of Engineers
- **Red River Basin Riparian Project**  
Red River RC&D
- **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
- **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

---

- **Cavalier Soil Conservation District**  
800 9th Ave E, Suite B Langdon, ND 58249  
Phone (701) 256-2484
- **Kittson SWCD**  
410 S 5th St Ste 106, Hallock, MN 56728  
Phone (218) 843-2619
- **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 Dakota NRCS - USDA**  
220 E Rosser Avenue # 270 Bismarck, ND 58501  
Phone (701) 530-2000
- **Marshall SWCD**  
Post Office Box 74, Warren, MN 56772  
Phone: (218) 745-5010
- **Pembina Soil Conservation District**  
600 Division Ave S, Box 476 Cavalier, ND 58271  
Phone: (701) 265-3131
- **International Joint Commission - Canadian Section**  
234 Laurier Ave., W. Ottawa, ON K1P 66 CAN  
Phone: (613) 995-0194
- **Red River Basin Commission**  
119th 5th St. P.O. Box 66 Moorhead, MN 56561  
[www.redriverbasincommission.org](http://www.redriverbasincommission.org)
- **Red River RC&D**  
516 cooper Ave, Suite 101 Grafton, ND 58237  
Phone (701) 352-0127
- **Roseau SWCD**  
502 - 7th St SW, Ste 8, Roseau, MN 56751  
Phone: (218) 463-1903
- **Walsh Co Three Rivers Soil Conservation District**  
417 Park Street West, Suite 1 Park River, ND 58270  
Phone: (701) 284-7466
- **West Central Minnesota Joint Powers Board**  
809 SE 8th St, Detroit Lakes, MN 56501  
Phone (218) 847-9392

---

## Footnotes / Bibliography

---

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. ND: Gap Stewardship, North Dakota Stewardship and Conservation Status, USGS, Northern Prairie Wildlife Research Center, October 2003.
2. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS); Publication date 20010631; Title: National 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. The Hydro 100k layer was compared to EPA'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), 2006. Data obtained from Minnesota Pollution Control Agency (MPCA), and 2006 North Dakota Waters listed with the United States Environmental Protection Agency.

## Footnotes / Bibliography (continued)

---

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 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, 2008 Annual Averages <http://www.bls.gov> Data were also taken from MPCA AFO/CAFO counts provided by county for 2007.

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>. Additional information on included projects and planning can be obtained from the listed party.