

Rapid Watershed Assessment

Roseau

(MN) HUC: 09020314



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 Minnesota portion of the Roseau 8-digit Hydrological Unit Code (HUC) Subbasin is 774,197 acres in size. There are an additional 594,560 acres occurring across the US Border in Canada.

The watershed is situated in two ecoregions. All but a relatively small part of the central portion of the watershed lies in the Northern Minnesota Wetlands ecoregion, and the central portion of the watershed is located in the Red River Valley ecoregion.

According to the Minnesota Pollution Control Agency, the watershed is the most severely impacted by flooding in the Red River Basin. Annual average flood damage (in 1996 dollars) in the watershed was estimated at \$4,867,903 with 91.7% of the damage being rural. The watershed suffers 24.4% of flood damages occurring in the Red River Basin, outside of damages occurring along the main stem of the Red River.

Resource concerns include improved drainage for crop production, grazing management of forest and grassland, water/wind erosion and water quality impacts. Additional resource concerns include management of excessive wetness, short growing season, and pasture management.



County Totals

County	Acres in HUC	% HUC
Lake of the Woods	26,062	3.4%
Kittson	23,347	3.0%
Roseau	692,278	89.4%
Marshall	9,827	1.3%
Beltrami	22,683	2.9%
Total acres:	774,197	100%

Physical Description

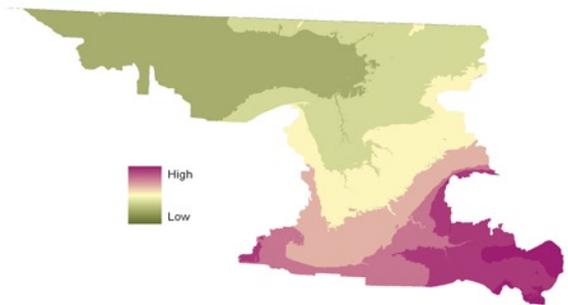
Elevation in the watershed is approximately 1,250 feet above mean sea level (msl) at the headwaters, and about 780 feet above msl at the mouth of the Roseau River.

The entire watershed was once covered by Glacial Lake Agassiz. When the Lake receded, it left behind a level plain containing beach ridges and remnant lakes. A buried aquifer underlies an area along the Roseau River in the northeastern portion of the watershed. Ground water supplies are plentiful in the watershed. Recharge occurs in the higher sandy soils in the southern portion of the watershed, and discharge occurs in lower areas and to streams.

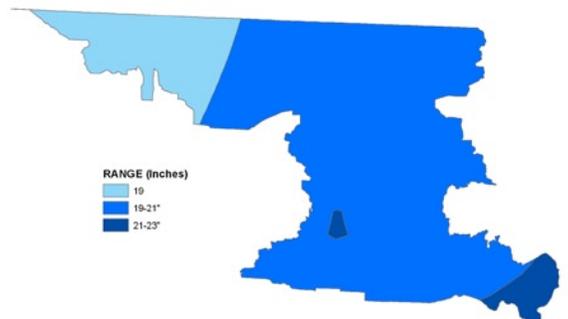
Precipitation in the watershed ranges from 19 to 23 inches annually. Though many areas are highly erodible land, the majority of land within this watershed is not highly erodible, and is well to moderately well suited to agricultural uses. Predominate land use / land cover is wetlands (43%), followed by row crops (27%), and Grass / Pasture / Hay (9.8%).

Predominate land uses / land covers in the basin are Row Crops (37%), Wetlands (32%) Forest (17%), Grass/Pasture/Hay (9%), and Residential / Commercial Development (3%). Agricultural land use in the basin accounts for slightly less than fifty percent of the watershed's acres.

Relief

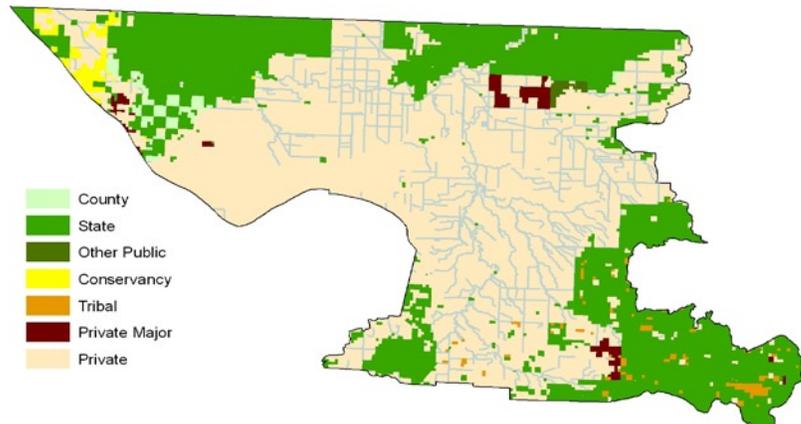


Average Precipitation



Ownership* ¹

Ownership Type	Acres	% HUC
Conservancy	8,052	1.0
County	8,108	1.0
Federal	-	-
State	266,794	34.5
Other	2,131	0.3
Tribal	6,477	0.8
Private Major	8,899	1.1
Private	473,737	61.2
Total Acres:	774,197	100

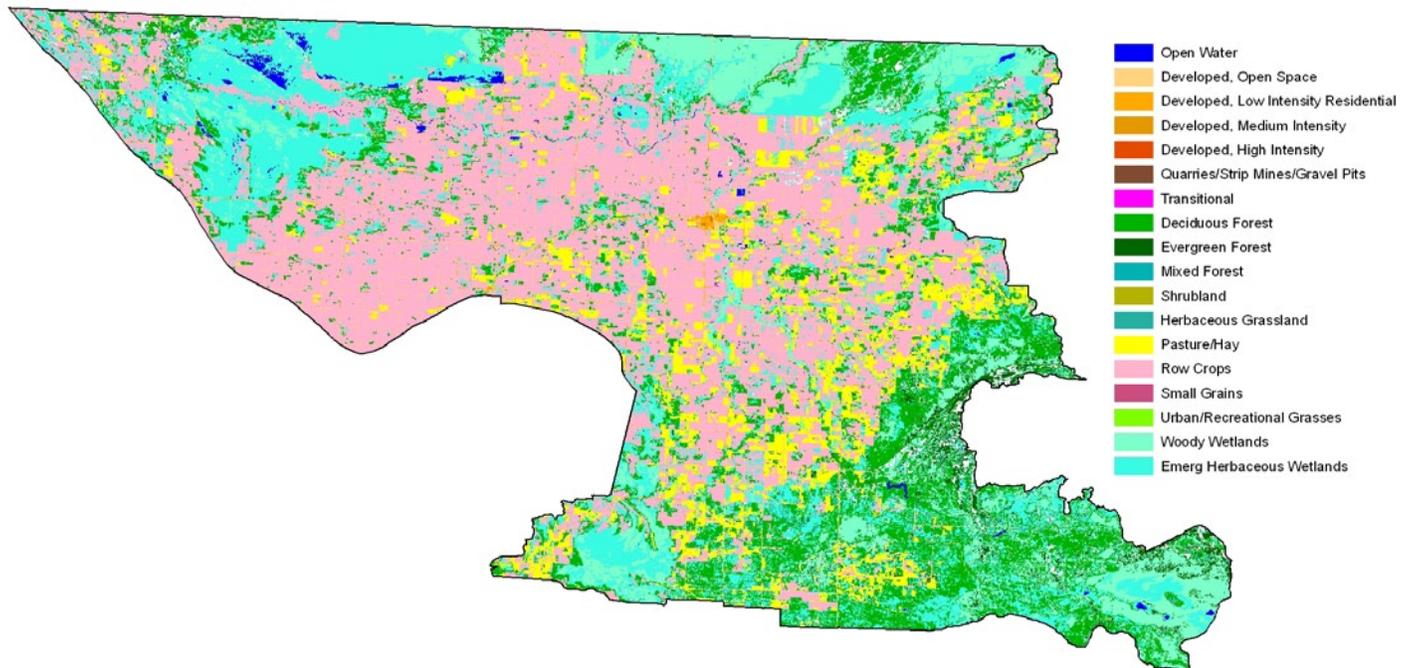


* Ownership totals derived from 2007 MN DNR GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Roseau watershed covers an area of 774,197 acres. Approximately sixty one percent of the land in the watershed is owned by private landholders (473,737 acres). The second largest ownership type is State, with approximately 266,800 acres (35%) followed by Private-Major (corporate) land holdings of 8,900 acres (1.1%), County with 8,110 acres (1.0%), Conservancy lands amounting to 8,052 acres (1.0%), and Tribal with nearly 6,480 acres (0.8%). There are also 2,130 acres of miscellaneous “Other” Public lands (0.3%). Land use by ownership type is represented in the table below.

Land Use / Land Cover ²



Ownership / Land Use ³

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	% Public	Acres	% Private	Acres	% Tribal		
Forest	67,872	8.8%	57,073	7.4%	2,414	0.3%	127,359	16.5%
Grass, etc	2,559	0.3%	67,199	8.7%	93	0.0%	69,851	9.0%
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Row Crops	19,844	2.6%	268,988	34.7%	86	0.0%	288,918	37.3%
Shrub etc	6,579	0.8%	3,255	0.4%	261	0.0%	10,095	1.3%
Wetlands	174,450	22.5%	69,659	9.0%	3,474	0.4%	247,584	32.0%
Residential/Commercial	2,096	0.3%	23,414	3.0%	30	0.0%	25,540	3.3%
Open Water*	3,506	0.5%	1,223	0.2%	115	0.0%	4,844	0.6%

* ownership undetermined

** includes private-major

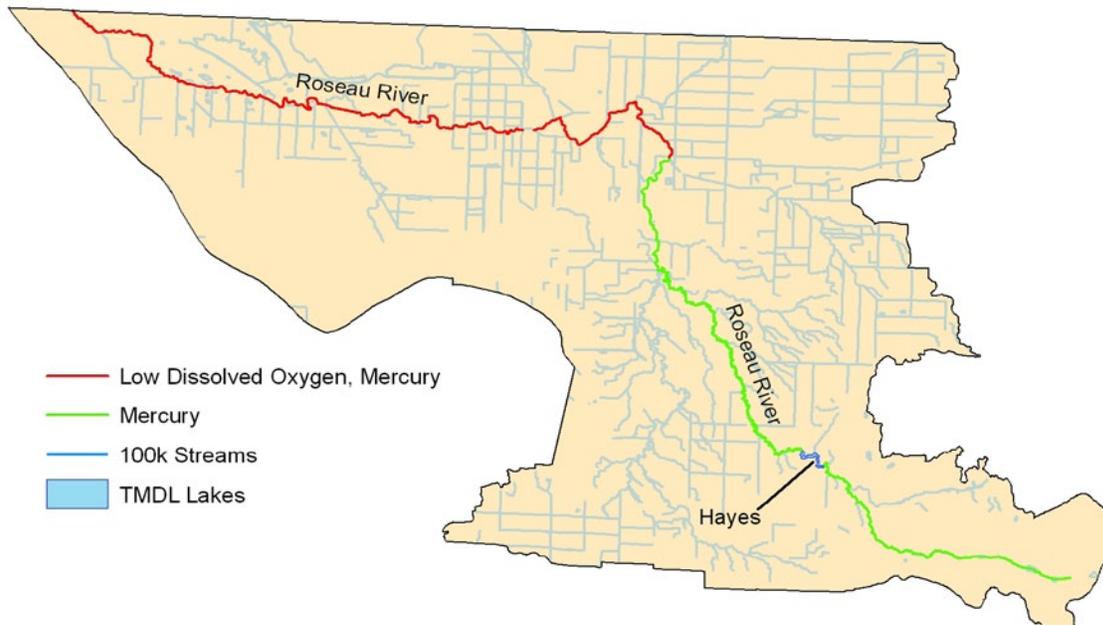
Watershed Totals:	276,907	35.77%	490,810	63.4%	6,472	0.8%	774,197	100%
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Physical Description (continued)

		ACRES	cu. ft/sec	
Stream Flow Data	USGS 05112000 ROSEAU RIVER BELOW STATE DITCH 51 NR CARIBOU, MN	2008 Avg.	337.3	
		May – Sept. Avg.	535.8	
		ACRES/MILES	PERCENT	
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)	Total Miles – Major (100K Hydro GIS Layer)	1,255.3	---	
	303d/TMDL Listed Streams (DEQ)	111.4	8.9%	
Riparian Land Cover/Land Use¹⁵ (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	Land Use Type	Acres	Percent	
	Forest	4,047	13.5%	
	Grain Crops	0	0.0%	
	Grass, etc	2,794	9.3%	
	Orchards	0	0.0%	
	Row Crops	9,344	31.2%	
	Shrub etc	290	1.0%	
	Wetlands	9,094	30.3%	
	Residential/Commercial	3,492	11.6%	
	Open Water*	933	3.1%	
	Total Buffer Acres:	29,993	100%	
Crop and Pastureland Land Capability Class¹⁶ (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	0	0%	
	2 – moderate limitations	175,300	53%	
	3 – severe limitations	109,600	33%	
	4 – very severe limitations	34,300	10%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	12,200	4%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	0	0%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	0	0%	
	Total NRI Crop & Pasture Lands	331,400	-	
	TYPE OF LAND	ACRES	% of Crop Lands	% of HUC
Irrigated Lands¹⁷ (2002 NASS Estimates)	Cultivated Cropland / Pastureland	478	0.1%	<0.1%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	478	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.



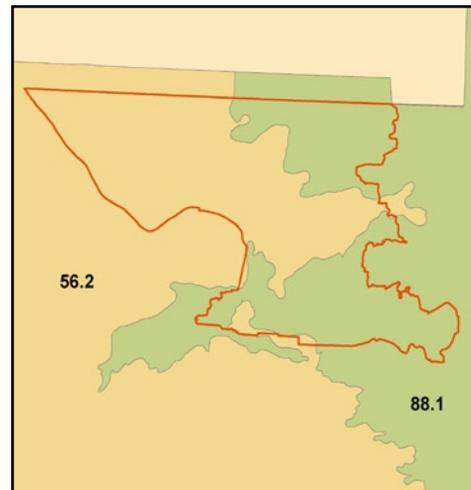
Listed Stream	Impairment	Affected Use
Roseau River Hay Cr to MN/Canada Border	Low Dissolved Oxygen, Mercury	Aquatic Consumption and Aquatic Life
Roseau River S Fk Roseau R to Hay Cr	Mercury	Aquatic Consumption
Roseau River Headwaters to S Fk Roseau R	Mercury	Aquatic Consumption
Hayes Lake	Mercury	Aquatic Consumption

Common Resource Areas

The Roseau watershed occurs in two Common Resource Areas, 56.2 and 88.1. ¹⁹

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>

Soils / Geology ¹⁰

The entire watershed was once covered by Glacial Lake Agassiz. When the Lake receded, it left behind a level plain containing beach ridges and remnant lakes. The elevation at the headwaters is about 1,250 feet above mean sea level (msl) and about 780 feet above msl at the mouth of the Roseau River. The water table is normally very high, with peat bogs as a common occurrence.

Glacial deposits in the northern and southern part of the watershed are mainly organic deposits of peat and muck in wetland areas. The central part of the watershed is primarily till, made up of clay, silt, sand, gravel, cobble and boulders.

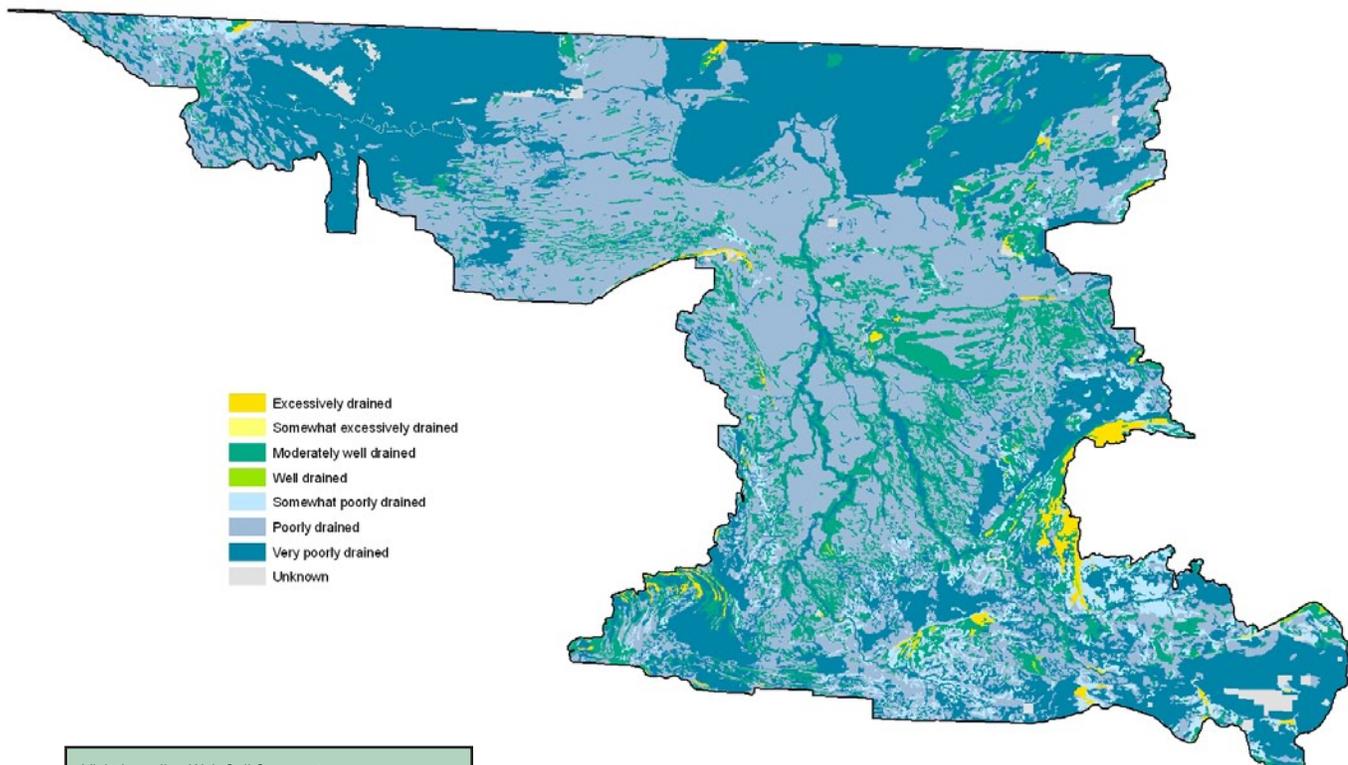
Soils in the northern portion of the watershed are mainly organic soils. The central watershed is a large area of black, limey, clay soils. Sandy soils make up the southern part of the watershed.

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 Classification¹⁰

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.”



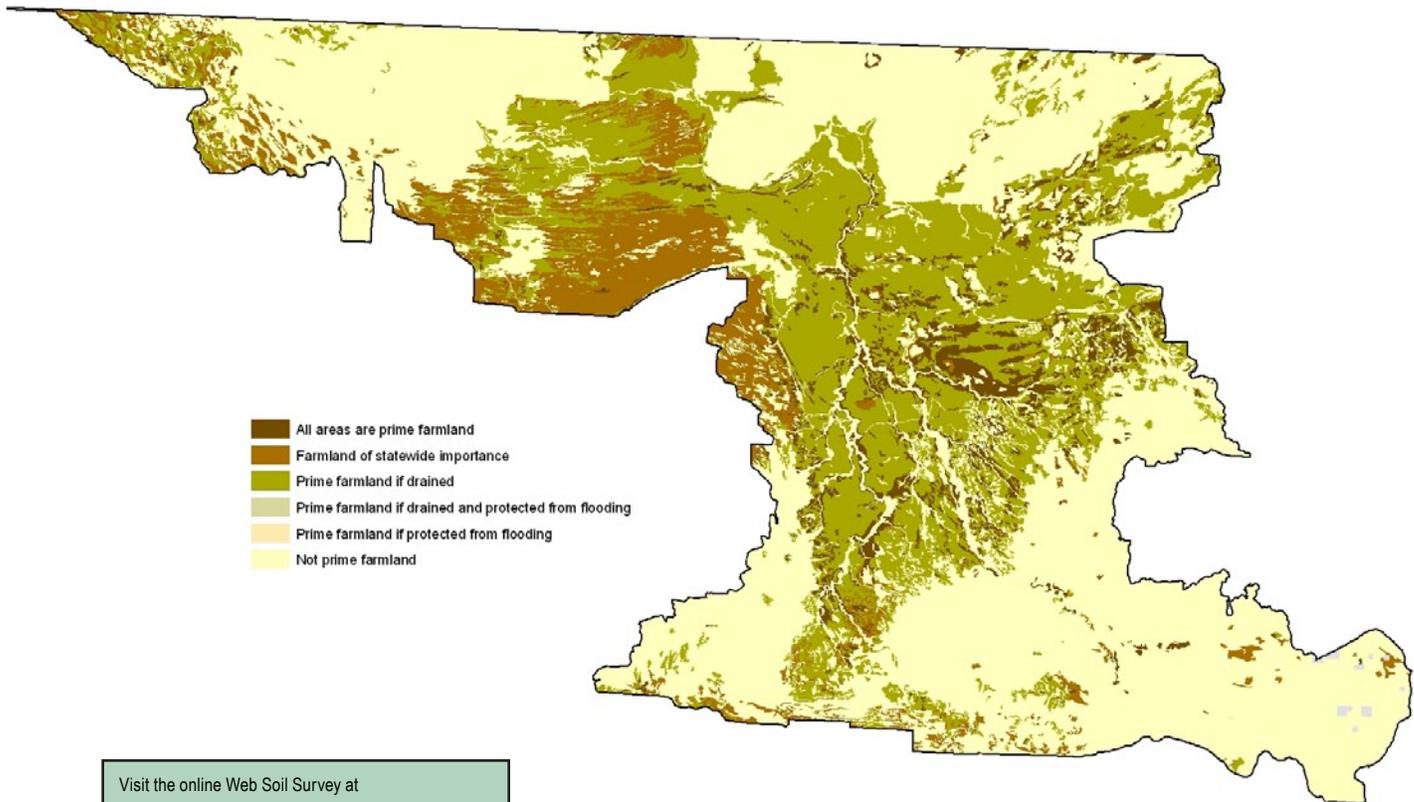
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Farmland Classification ^{/10}

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.

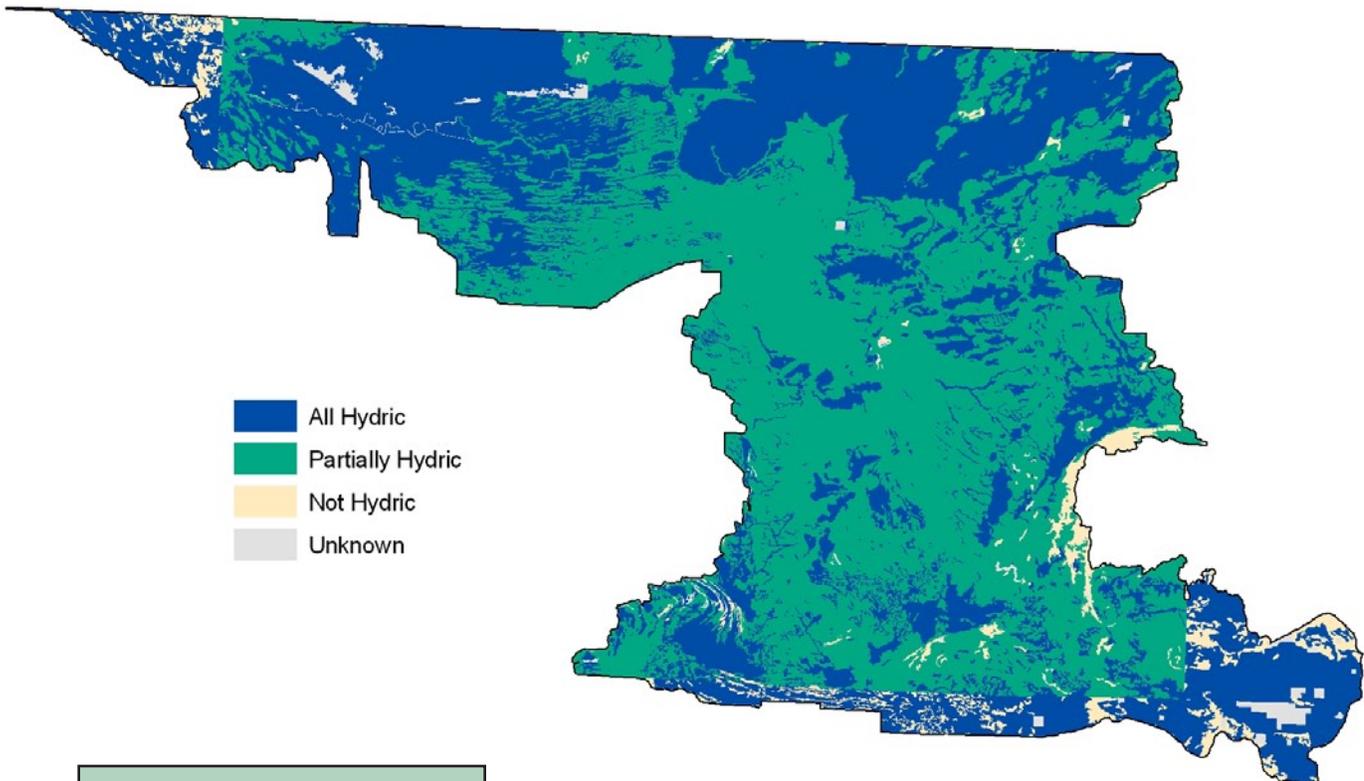


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Hydric Soils⁷¹⁰

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.



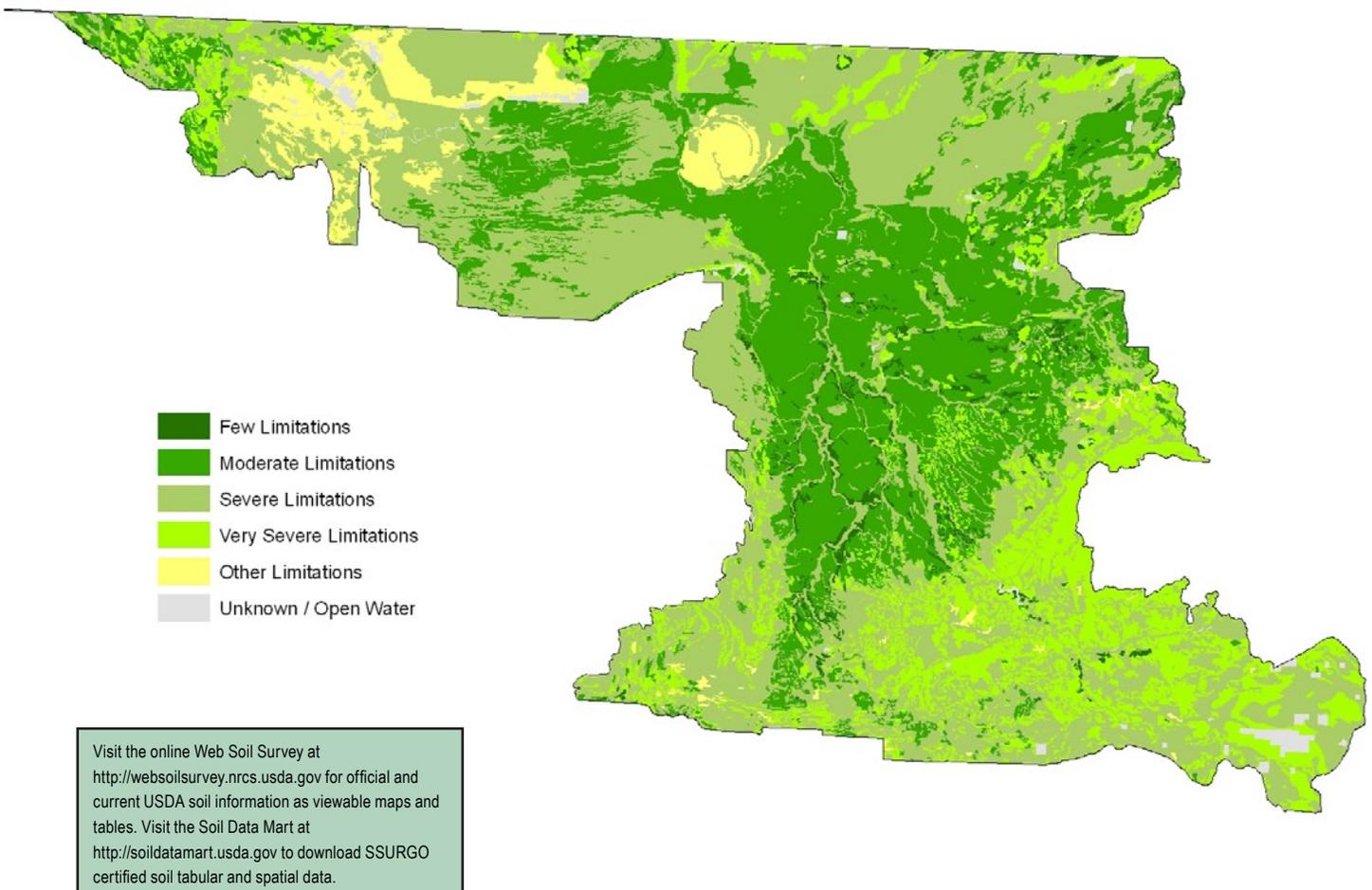
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Note: Historical Hydric Soil Determination Standards, scale, and methodology can vary on a county-to-county basis, leading to irregularities in thematic maps representing hydric soil determinations.

Land Capability Classification ¹⁰

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.



Performance Results System and Other Data

Watershed Name: Roseau				Watershed Number: 9020314						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	0	30	0	3,003	3,535	N/A	5,261	7,004	53,973	72,806
Total Conservation Systems Applied (acres)	0	18,452	0	17,028	17,028	N/A	1,048	9,185	51,553	114,294
Conservation Practices										
Total Waste Management (313) (numbers)	0	0	0	0	0	0	0	0	0	0
Riparian Forest Buffers (391) (acres)	0	0	0	27	0	0	0	61	0	88
Erosion Control Total Soil Saved (tons/year)	0	195,793	218,197	143,192	123,056	N/A	N/A	N/A	N/A	680,238
Total Nutrient Management (590) (Acres)	0	0	0	9,462	0	0	169	169	309	10,109
Pest Management Systems Applied (595A) (Acres)	0	0	0	0	0	0	0	169	250	419
Prescribed Grazing 528a (acres)	0	0	0	376	0	0	0	383	383	1,142
Tree & Shrub Establishment (612) (acres)	0	124	764	1,097	1,177	2	6	265	82	3,517
Residue Management (329A-C) (acres)	0	0	0	0	500	0	0	1,998	623	3,121
Total Wildlife Habitat (644 - 645) (acres)	0	15,936	24,436	16,733	14,103	2,266	16,733	5,106	22,084	117,397
Total Wetlands Created, Restored, or Enhanced (acres)	0	304	286	1,503	6,364	2,204	0	3,839	46	14,546
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	0	18,422	24,177	16,943	10,388	N/A	72	5,610	49,508	125,120
Wetlands Reserve Program	0	0	35	0	0	N/A	0	0	0	35
Environmental Quality Incentives Program	0	0	0	0	500	N/A	21	3,159	1,656	5,336
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 ¹⁴

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
<i>Acipenser fulvescens</i>	Lake Sturgeon	Zoological
<i>Ammodramus bairdii</i>	Baird's Sparrow	Zoological
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	Zoological
<i>Androsace septentrionalis</i> ssp. <i>puberulenta</i>	Northern Androsace	Botanical
<i>Anthus spragueii</i>	Sprague's Pipit	Zoological
<i>Asio flammeus</i>	Short-eared Owl	Zoological
<i>Carex hallii</i>	Hall's Sedge	Botanical
<i>Carex sterilis</i>	Sterile Sedge	Botanical
<i>Cladium mariscoides</i>	Twig-rush	Botanical
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological
<i>Cypripedium arietinum</i>	Ram's-head Lady's-slipper	Botanical
<i>Drosera anglica</i>	English Sundew	Botanical
<i>Drosera linearis</i>	Linear-leaved Sundew	Botanical
<i>Eleocharis quinqueflora</i>	Few-flowered Spike-rush	Botanical
<i>Gentiana affinis</i>	Northern Gentian	Botanical
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Limosa fedoa</i>	Marbled Godwit	Zoological
<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	White Adder's-mouth	Botanical
<i>Minuartia dawsonensis</i>	Rock Sandwort	Botanical
<i>Mustela nivalis</i>	Least Weasel	Zoological
<i>Nymphaea leibergii</i>	Small White Water-lily	Botanical
<i>Oarisma powesheik</i>	Powesheik Skipper	Zoological
<i>Oxyethira itascae</i>	A Caddisfly	Zoological
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Podiceps auritus</i>	Horned Grebe	Zoological
<i>Ranunculus lapponicus</i>	Lapland Buttercup	Botanical
<i>Rhynchospora capillacea</i>	Hair-like Beak-rush	Botanical
<i>Salix maccalliana</i>	Mccall's Willow	Botanical
<i>Scirpus clintonii</i>	Clinton's Bulrush	Botanical
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Zoological
<i>Stellaria longipes</i>	Long-stalked Chickweed	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 and Water Quality: Excessive water and wind erosion.** Presence of Highly Erodible land, frequently flooded agricultural areas, altering of waterways and ditches and streams over permeable soils make erosion a significant problem affecting the health and vitality of both soil and water throughout the watershed.



- Surface Water Management: Sediment control, stormwater management.** Drained wetlands, improper grazing, fluctuating water levels, and the spread of more intensive farming practices are diminishing surface water quality, and exacerbating flooding problems throughout the Red River Valley.

- Ground Water Quality: Nutrients, organics, animal and human waste.** Farming practices on highly permeable soils, aging septic systems, runoff and abandoned wells all pose significant threats to groundwater quality throughout the region. While drinking water quality of is the primary consideration, the quality of groundwater moving to lakes and recharging streams is also a concern.

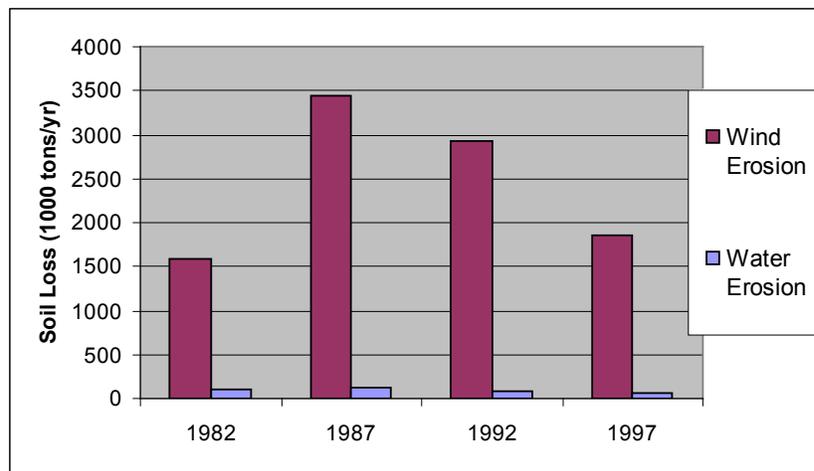
- Wildlife Habitat improvement and mangement.** Loss and fragmentation of habitat areas has been significantly detrimental to the wildlife populations of the region. The few natural areas that remain are typically isolated by cultivated fields that allow no corridors for wildlife and the plant life they often depend on for habitat and nutrition.

- Wetland Restoration.** Agricultural practices and the consequential sedimentation have resulted in the loss of viable habitat for natural, economic and cultural resources. Though efforts are in place, additional practices are necessary to achieve a favorable balance between land use and biota in the region.

- Protection / Restoration of Riparian Areas.** Historical Agricultural practices led to the altering of stream channels and beds, ans removal and/or destruction of natural vegetative buffers that existed along the regions waterways. These practices have led to increased runoff, sediment and pollutant loadings, a rise in surface water temperatures, and oxgen depleting algal blooms.

NRI Soil Loss Estimates¹³

- Sheet and rill erosion rates on crop and pasture land decreased by approximately 29,300 tons (29%) between 1982 and 1997.
- NRI estimates indicate wind erosion on crop and pasture land increased by approximately 256,400 tons (16%) between 1982 and 1997.



Socioeconomic and Agricultural Data (Relevant)

Population estimates for the subbasin indicate that approximately 9,600 people reside in the area. Median household income throughout the district is \$36,843 yearly, roughly 79% of the national average. Figures show an unemployment rate of 5.6% for the basin, and approximately 10% of the residents in the watershed live below the national poverty level.



Data indicates there are 850 farms in the watershed. Of the 829 operators in the basin, fifty five percent are full time producers not reliant on off-farm income. Approximately thirty nine 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 84 acres.

(MN) HUC# 9020314		Total Acres:	774,197
Population Data*	Watershed Population	9,608	
	Unemployment Rate	5.6%	
	Median Household Income	36,843	
	% below poverty level	10%	
	Median Value of Home	60,140	
Farm Data	# of Farms	850	
	# of Operators	829	Percent
	# of Full Time Operators	454	55%
	# of Part Time Operators	375	45%
	Total Cropland Acres	403,150	52.1%
Farm Size	1 to 49 Acres	85	10%
	50 to 179 Acres	247	29%
	180 to 499 Acres	255	30%
	500 to 999 Acres	119	14%
	1,000 Acres or more	145	17%
	Average Farm Size	84	
Livestock & Poultry	Cattle - Beef	6,106	2%
	Cattle - Dairy	1,500	0%
	Chicken	1,205	0%
	Swine	1,982	1%
	Turkey	175,751	47%
	Other	188,503	50%
	Animal Count Total:	375,048	
	Total Permitted AFOs:	74	
Chemicals (Acres Applied)	Insecticides	13,859	
	Herbicides	110,809	
	Wormicides	359	
	Fruiticides	71	
	Total Acres Treated	125,098	
	% State Chemical Totals	0.9%	

* 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

- **Aggassiz Basin White Pine Restoration**
Minnesota Civilian Conservation Corps
- **Hay Creek Aquatic Ecosystem Restoration**
Roseau River WD, US Army Corps of Engineers
- **International Trans-boundary Case Study**
Red River Basin Commission
- **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
- **Roseau River Flood Mitigation Project**
State of MN, City of Roseau, US Army Corps of Engineers
- **Roseau Watershed Ditch Project**
Roseau SWCD, Gladen Construction
- **Ross No. 7 Impoundment**
Two Rivers WD, Red River Watershed Mngmt Board
- **Roseau River Flood Damage Reduction**
City of Roseau, US Army Corps of Engineers.
- **Roseau River Watch**
Roseau Public Schools
- **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

- **Beltrami County SWCD**
3217 Bemidji Ave N Ste 3, Bemidji, MN 56601
Phone (218) 755-4339
- **Kittson County SWCD**
410 S 5th St Ste 106, Hallock, MN 56728
Phone (218) 843-2619
- **Lake of The Woods SWCD**
PO Box 217, Baudette, MN 56623
Phone (218) 634-1842
- **Marshall County SWCD**
PO Box 74, Warren, MN 56772
Phone (218) 745-5010
- **Roseau County SWCD**
7th St SW, Ste 8, Roseau, MN 56751
Phone (218) 463-1903
- **Red River RC&D**
516 cooper Ave, Suite 101 Grafton, ND 58237
Phone (701) 352-0127
- **Red River Basin Riparian Project**
516 Cooper Ave Grafton, ND 58237
Phone (701) 352-3550
- **International Joint Commission - U.S. Section**
1250 23rd St., NW, Ste. 100 Washington, DC 20440
Phone (202) 736-9021
- **International Joint Commision - Canadian Section**
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- **Roseau River Anishinabe First Nation**
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- **Red River Basin Commission**
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- **UND Energy & Environmental Research Center**
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Phone (701) 777-5000
- **Roseau River Watershed District**
P.O. Box 26, Roseau, 56751-0026
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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.
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)

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 (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>.