

Rapid Watershed Assessment
Upper Red River
(MN/ND) HUC: 09020104



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 Upper Red River 8-Digit Hydrologic Unit Code (HUC) subbasin occurs in west central Minnesota and southeastern North Dakota. The majority of the watershed lies in the Glacial Lake Agassiz ecoregion, while the extreme south-eastern portion of the basin lies in the North Central Hardwood Forests ecoregion.

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 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 / water soil erosion, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many of the resource concerns relate directly to landuse and development in the region, resulting in fragmentation and increased sediment and pollutant loadings to surface waters.



County Totals

County	Acres in HUC	% HUC
Cass - ND	62,805	16.9%
Richland - ND	26,894	7.2%
Clay	111,126	29.9%
Otter Tail	6,243	1.7%
Wilkin	164,693	44.3%
Total acres:	371,689	100%

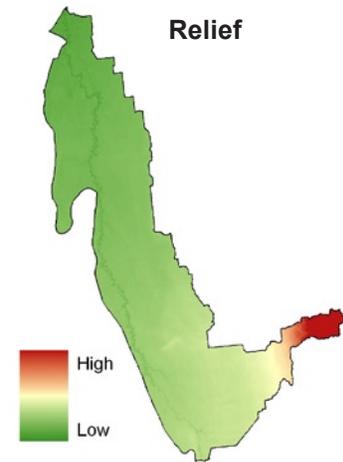
Physical Description

The Red River begins its course just below Wahpeton, North Dakota at an elevation of 943 feet above mean sea level (msl), and descends a mere 82 feet as it reaches the boundary of the Upper Red River watershed North of the Fargo-Moorhead metropolitan area.

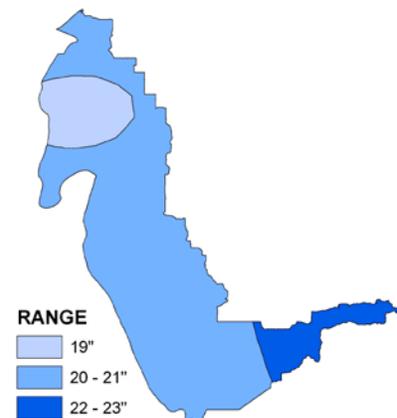
Precipitation in the watershed ranges from 19 to 23 inches annually. Above-normal amounts of precipitation in the late fall of the year or from May to October lead to high levels of soil moisture, periodically producing the snow-melt and summer floods that affect the region.

Predominate land uses / land covers are Row Crops (80.2%), Residential/Commercial Development (13.5%), and Wetlands (3.0%). Land use within the watershed is largely agricultural, accounting for nearly 82% of the overall watershed acres.

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

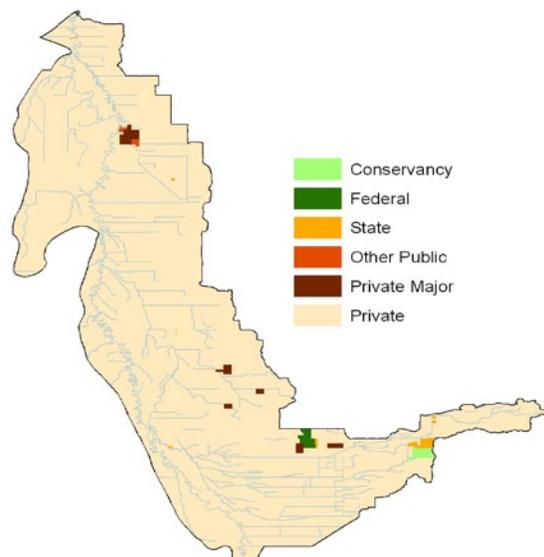


Average Precipitation



Ownership* ¹

Ownership Type	Acres	% of HUC
Conservancy	947	0.3
County	-	-
Federal	992	0.3
State	1,066	0.3
Other Public	315	0.1
Tribal	-	-
Private Major	2,415	0.6
Private	365,954	98.5
Total Acres:	371,689	100

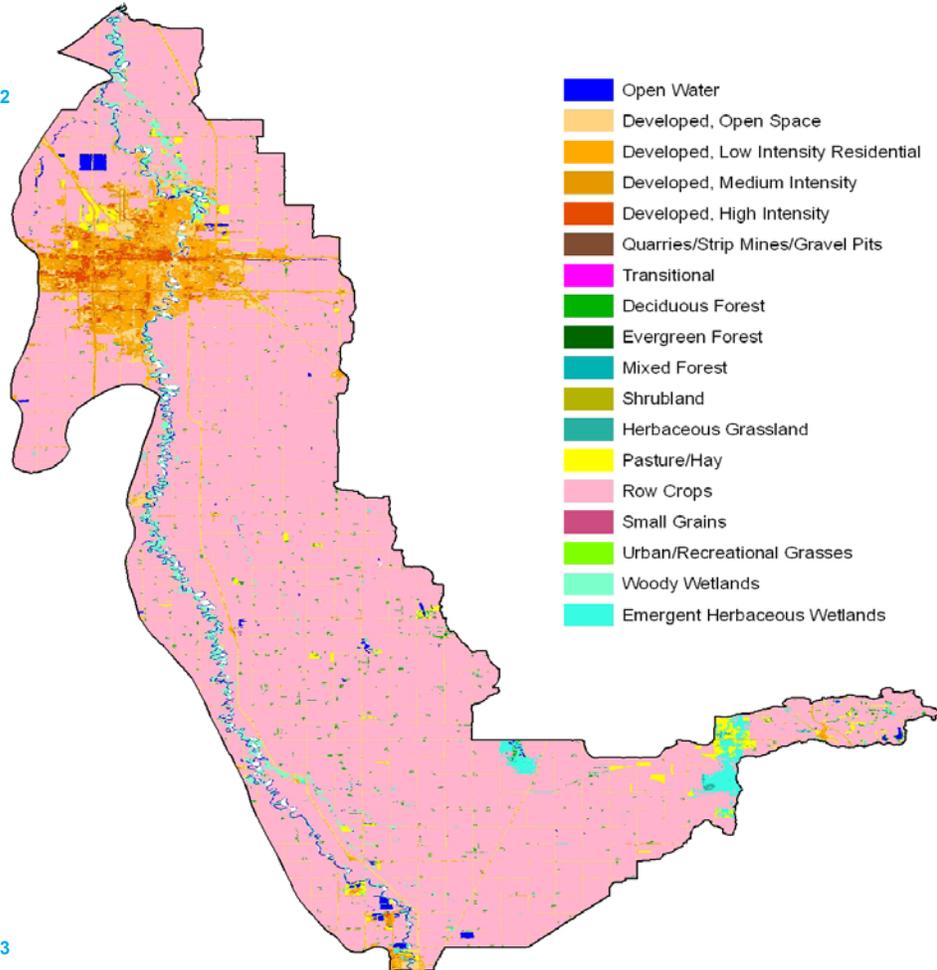


* Ownership totals derived from MN and ND GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Upper Red River watershed covers an area of 371,689 acres. Approximately ninety eight percent of the land in the watershed is owned by private landholders (365,954 acres). The second largest ownership type is Private-Major (Corporate) with approximately 2,415 acres (0.7%), followed by State with 1,066 acres (0.29%), Federal with 992 acres (0.27%), and Conservancy with 947 acres (0.25%). There are also an additional 315 acres of miscellaneous "Other" Public lands (0.08%). Ownership data shows no major Tribal land holdings in the region. Land use by ownership type is represented in the table below.

Land Use / Land Cover ^{1/2}



Ownership / Land Use ^{1/3}

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	% Public	Acres	% Private	Acres	% Tribal		
Forest	63	0.0%	2,802	0.8%	0	0.0%	2,865	0.8%
Grass, etc	82	0.0%	4,565	1.2%	0	0.0%	4,647	1.3%
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Row Crops	734	0.2%	295,738	80.0%	0	0.0%	296,472	80.2%
Shrub etc	1	0.0%	65	0.0%	0	0.0%	66	0.0%
Wetlands	1,236	0.3%	9,796	2.6%	0	0.0%	11,032	3.0%
Residential/Commercial	164	0.0%	49,779	13.5%	0	0.0%	49,943	13.5%
Open Water*	88	0.0%	4,624	1.3%	0	0.0%	4,713	1.3%
Watershed Totals:	2,370	0.64%	367,368	99.4%	0	0.0%	371,689	100%

* ownership undetermined

** includes private-major

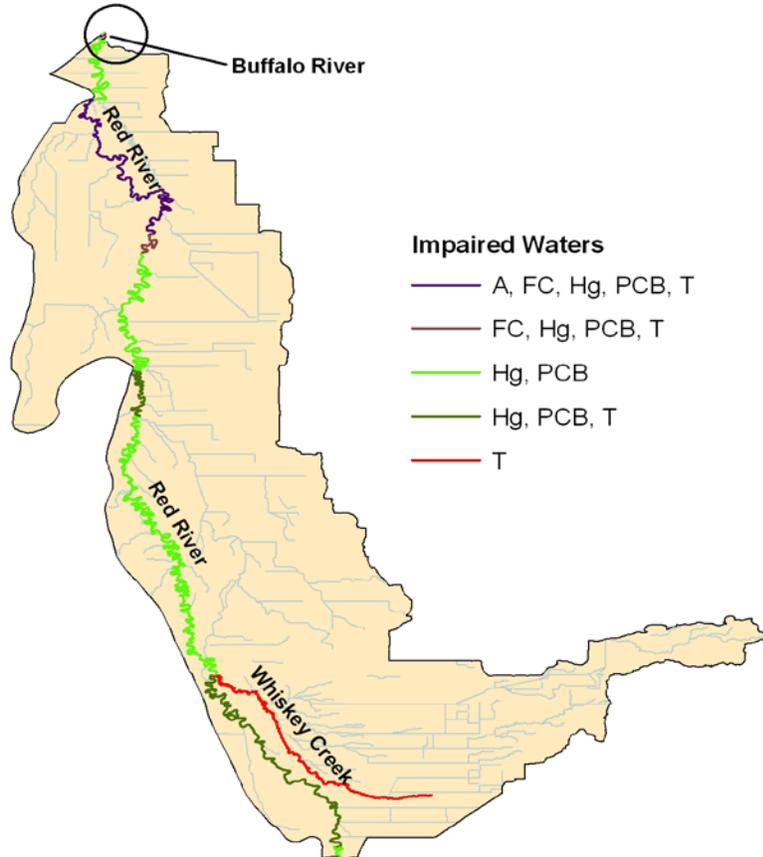
Physical Description (continued)

			cu. ft/sec	
Stream Flow Data	USGS 05054000 RED RIVER OF THE NORTH AT FARGO, ND	2008 Avg.	1,028	
		May – Sept. Avg.	1,584	
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)		MILES	PERCENT	
	Total Miles – Major (100K Hydro GIS Layer)	622.7	---	
	303d/TMDL Listed Streams (DEQ)	60.4	9.6%	
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	202	1.4%	
	Grain Crops	0	0.0%	
	Grass, etc	257	1.8%	
	Orchards	0	0.0%	
	Row Crops	8,548	59.5%	
	Shrub etc	3	0.0%	
	Wetlands	1,579	11.0%	
	Residential/Commercial	1,963	13.7%	
	Open Water	1,818	12.7%	
		Total Buffer Acres:	14,370	100%
Crop and Pastureland Land Capability Class¹⁶ (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	4,000	1%	
	2 – moderate limitations	244,600	84%	
	3 – severe limitations	36,000	12%	
	4 – very severe limitations	4,900	2%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	2,600	1%	
	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	292,100	-
	TYPE OF LAND	ACRES	% of Crop Lands	% of HUC
Irrigated Lands¹⁷ (2002 NASS Estimates)	Cultivated Cropland / Pastureland	2,181	0.7%	0.5%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	2,181	0.7%	0.5%

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.

2006 303d Listed Streams - Upper Red River Watershed ¹⁸



Listed Waterbody	Impairment	Affected Use
RED RIVER	MERCURY, FECAL COLIFORM	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; BRECKENRIDGE DAM TO WHISKEY CR	MERCURY, PCBs, TURBIDITY	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; DAM 3 (COMSTOCK) TO WOLVERTON CR	MERCURY, PCBs	AQUATIC CONSUMPTION
RED RIVER OF THE NORTH; FARGO-MOORHEAD DAM 2 TO DAM 1	FECAL COLIFORM, MERCURY, PCBs, TURBIDITY	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; MOORHEAD/FARGO DAM 1 (RM 452.15) TO DAM A (RM 448.9)	MERCURY, PCBs, TURBIDITY, FECAL COLIFORM	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; MOORHEAD/FARGO DAM A (RM 448.9) TO SHEYENNE R	AMMONIA, FECAL COLIFORM, MERCURY, TURBIDITY, PCBs	AQUATIC CONSUMPTION, AQUATIC LIFE, AQUATIC RECREATION
RED RIVER OF THE NORTH; OTTER TAIL R TO BRECKENRIDGE DAM	MERCURY, PCBs	AQUATIC CONSUMPTION
RED RIVER OF THE NORTH; SHEYENNE R (ND) TO BUFFALO R	MERCURY, PCBs	AQUATIC CONSUMPTION
RED RIVER OF THE NORTH; WHISKEY CR TO DAM 3 (COMSTOCK)	MERCURY, PCBs	AQUATIC CONSUMPTION
RED RIVER OF THE NORTH; WILD RICE R (ND) TO DAM 2 (FARGO-MOORHEAD)	MERCURY, PCBs	AQUATIC CONSUMPTION
RED RIVER OF THE NORTH; WOLVERTON CR TO WILD RICE	MERCURY, PCBs, TURBIDITY	AQUATIC CONSUMPTION, AQUATIC LIFE
WHISKEY CREEK; HEADWATERS TO T133 R46W S18 WEST LINE	TURBIDITY	AQUATIC LIFE
WHISKEY CREEK; T133 R47W S13 EAST LINE TO RED R	TURBIDITY	AQUATIC LIFE

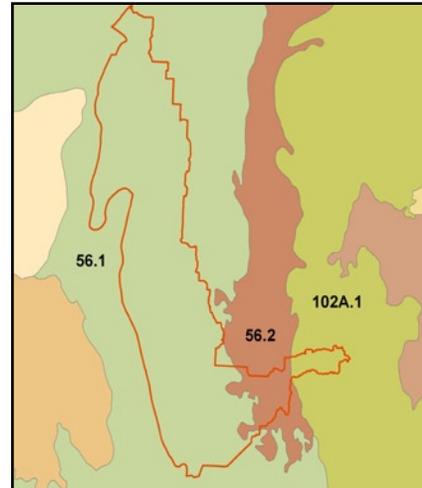
Common Resource Areas

The Upper Red Watershed encompasses three Common Resource Areas, CRA 56.1, 56.2 and 102A.1.¹⁹

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.

102A.1 Rolling Till Prairie: Gently sloping to steep, loamy glacial till soils with scattered sandy outwash soils and silty alluvial flood plains soils. This area is part of the Prairie Pothole region of the upper Midwest. Predominantly cropped to corn and soybeans with increasing hayland and pasture and small grains in the western part. Resource concerns are water and wind erosion, nutrient management and water quality.



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

Geology / Soils¹⁰

Glacial deposits in the western portion of the watershed are glacial lake deposits of clay and silt from Glacial Lake Agassiz, and glacial lakeshore deposits of delta sand and gravel, along with areas of beach sand ridges separated by silty wetland depressions. The eastern portion of the watershed has primarily till glacial deposits made up of clay, silt, sand, gravel, cobble and boulders. Soils in the watershed vary moving from west to east from clayey soils of the lake plain at the mouth of the watershed, to black, limey, clayey soils; sandy soils; black, loamy soils; loamy soils and rolling wooded soils in the very uplands of the watershed.

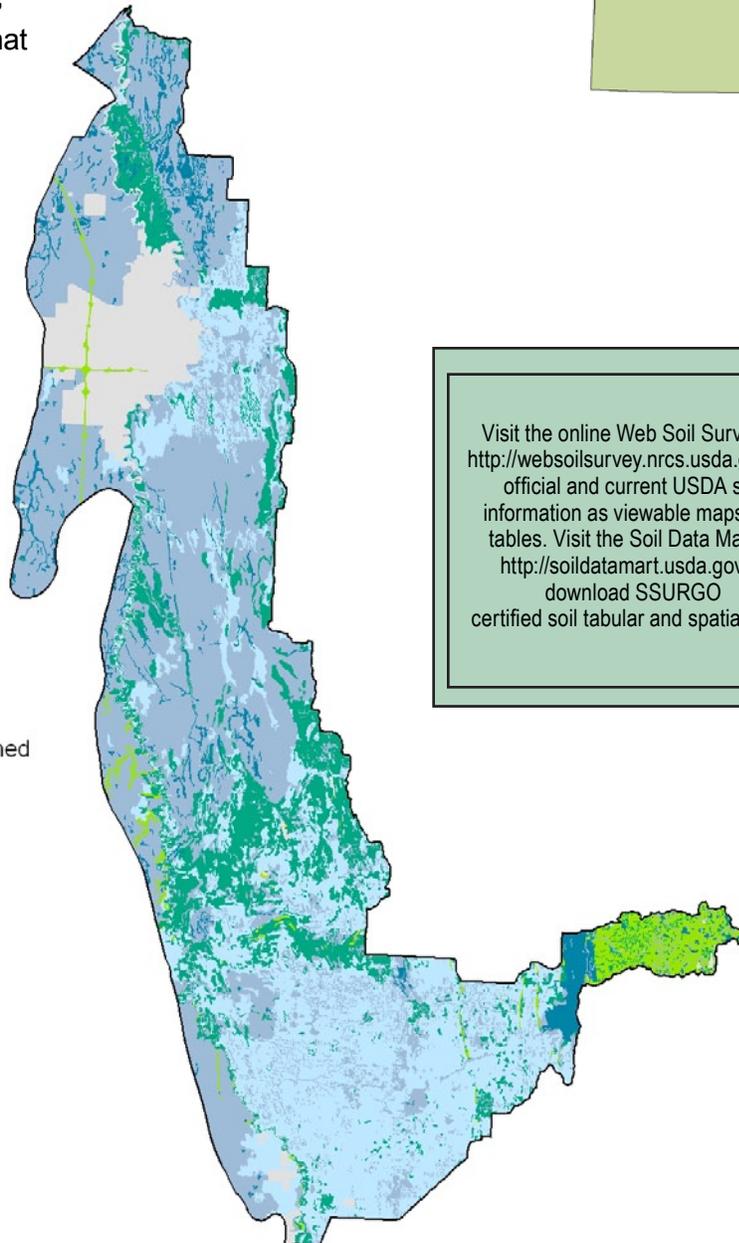
A buried sand aquifer, the Buffalo aquifer, containing large amounts of ground water underlies the watershed near its mouth. Smaller quantities of ground water are available throughout the rest of the basin. An average of 2,700 acre-feet per year of ground water is pumped for municipal water supplies and crop irrigation. Ground water recharge occurs in the moraine area, while discharge occurs to the Red River, the Buffalo River and the glacial lake plain.

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, moderately well drained, well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”



- Excessively drained
- Somewhat excessively drained
- Moderately well drained
- Well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Unknown / Open Water

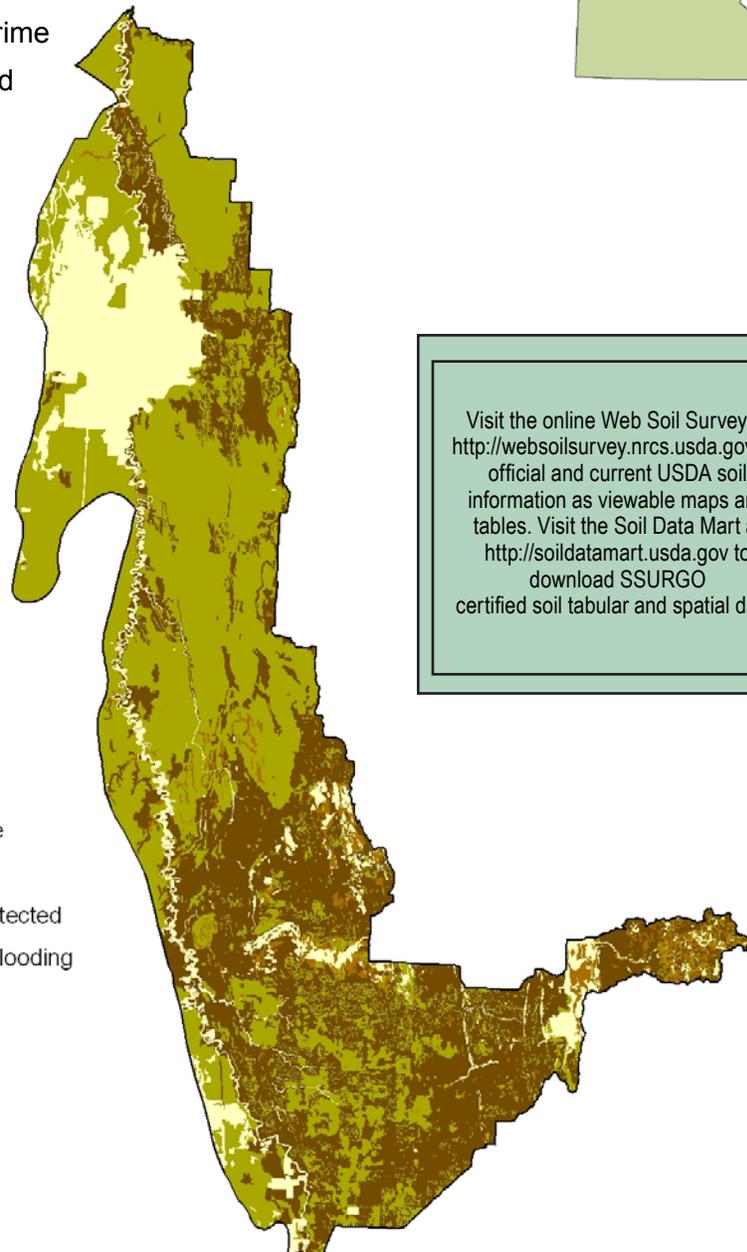
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Farmland Classification

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.



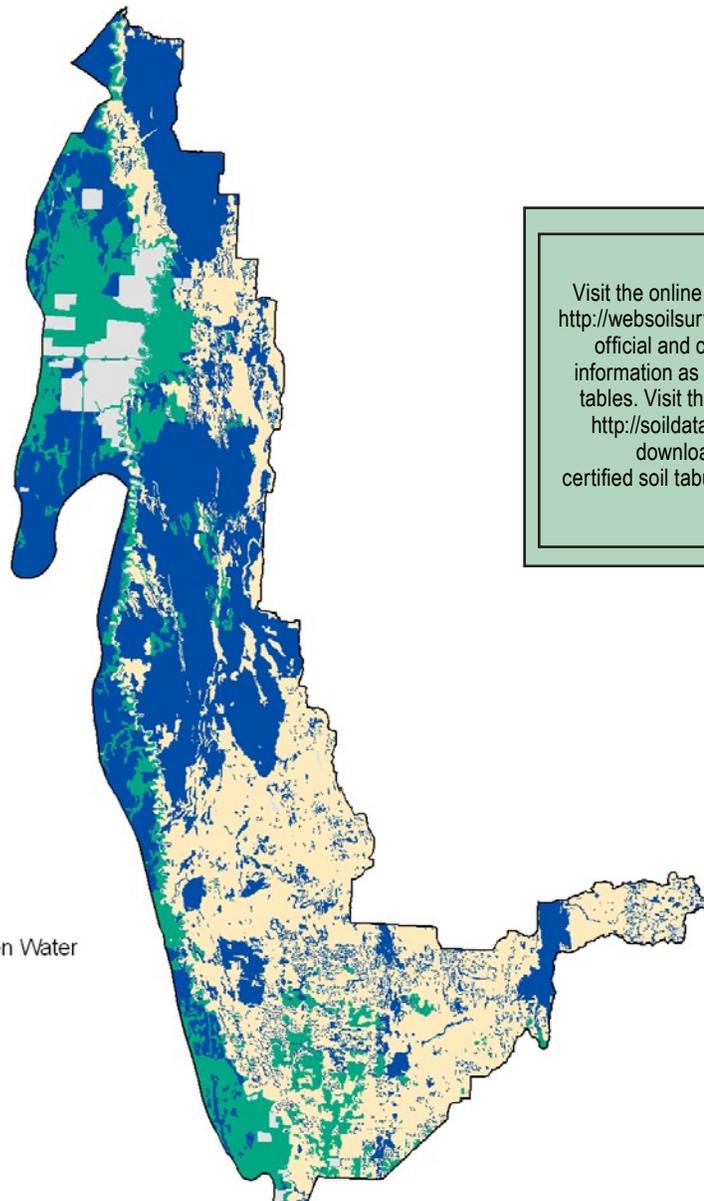
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-  All areas are prime farmland
-  Farmland of statewide importance
-  Prime farmland if drained
-  Prime farmland if drained and protected
-  Prime farmland if protected from flooding
-  Not prime farmland

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.



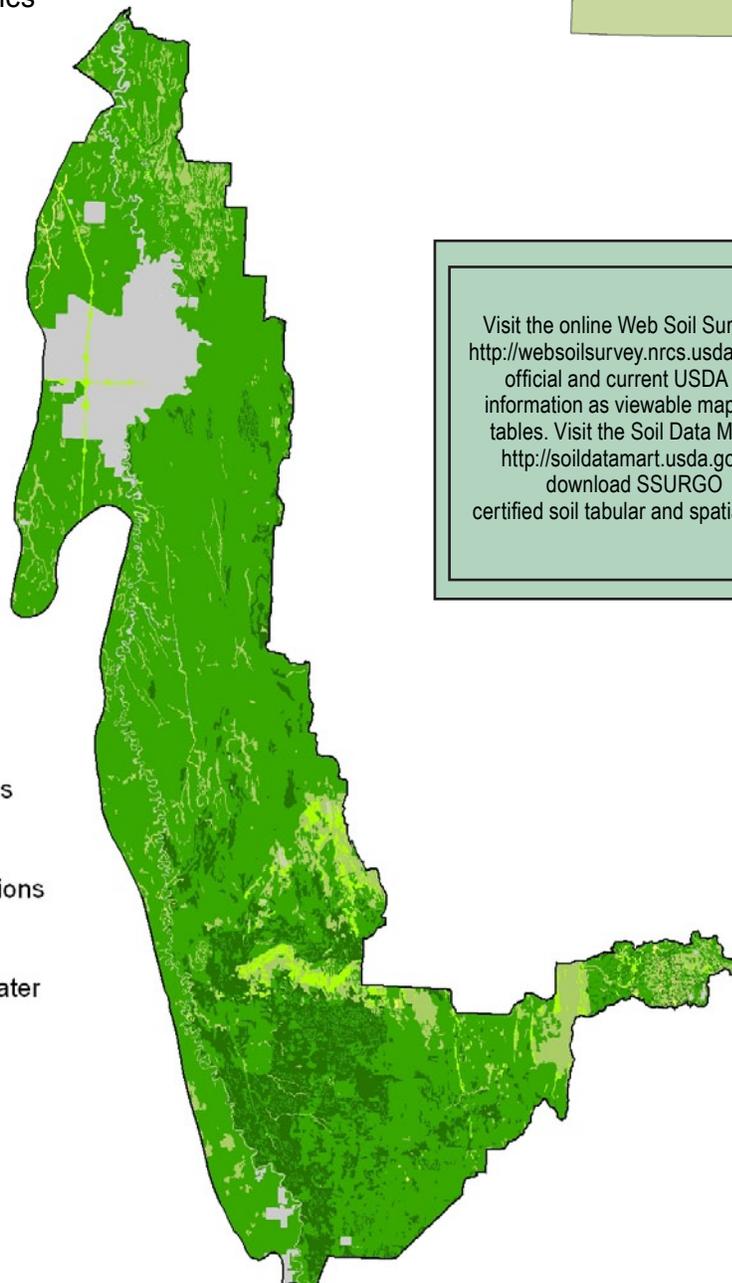
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- All Hydric
- Partially Hydric
- Not Hydric
- Unknown / Open Water

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.



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-  Few Limitations
-  Moderate Limitations
-  Severe Limitations
-  Very Severe Limitations
-  Other Limitations
-  Unknown / Open Water

Performance Results System and Other Data

Watershed Name: Upper Red				Watershed Number: 9020104						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL (MN)
Total Conservation Systems Planned (acres)	64	524	0	1,828	3,007	N/A	2,764	3,053	12,427	23,667
Total Conservation Systems Applied (acres)	0	455	0	1,302	1,302	N/A	3,284	2,952	1,410	10,705
Conservation Practices										
Total Waste Management (313) (numbers)	0	0	0	0	0	0	0	0	0	0
Riparian Forest Buffers (391) (acres)	0	15	0	0	11	0	6	29	0	61
Erosion Control Total Soil Saved (tons/year)	0	1,996	4,416	13,862	15,467	N/A	N/A	N/A	N/A	35,741
Total Nutrient Management (590) (Acres)	0	0	0	0	168	1,143	1,167	1,167	640	4,285
Pest Management Systems Applied (595A) (Acres)	0	0	0	254	388	787	444	851	301	3,025
Prescribed Grazing 528a (acres)	0	400	0	0	509	1,473	0	0	0	2,382
Tree & Shrub Establishment (612) (acres)	0	0	0	5	21	4	0	0	0	30
Residue Management (329A-C) (acres)	0	0	176	307	252	392	392	1,327	240	3,086
Total Wildlife Habitat (644 - 645) (acres)	0	201	284	771	1,175	234	771	98	0	3,534
Total Wetlands Created, Restored, or Enhanced (acres)	0	0	0	112	0	27	0	170	1	310
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	0	455	50	571	292	N/A	69	147	0	1,584
Wetlands Reserve Program	0	0	0	676	0	N/A	0	170	0	846
Environmental Quality Incentives Program	0	0	0	0	335	N/A	2,368	2,484	1,395	6,582
Wildlife Habitat Incentive Program	0	0	0	0	0	N/A	0	49	12	61
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 Minnesota portion of the subbasin.



Scientific Name	Common Name	Type
<i>Acipenser fulvescens</i>	Lake Sturgeon	Zoological
<i>Ammodramus henslowii</i>	Henslow's Sparrow	Zoological
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	Zoological
<i>Asio flammeus</i>	Short-eared Owl	Zoological
<i>Carex hallii</i>	Hall's Sedge	Botanical
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological
<i>Cypripedium candidum</i>	Small White Lady's-slipper	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>Larus pipixcan</i>	Franklin's Gull	Zoological
<i>Ligumia recta</i>	Black Sandshell	Zoological
<i>Limosa fedoa</i>	Marbled Godwit	Zoological
<i>Oarisma garita</i>	Garita Skipper	Zoological
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Speyeria idalia</i>	Regal Fritillary	Zoological
<i>Trimorpha lonchophylla</i>	Shortray Fleabane	Botanical

RESOURCE CONCERNS

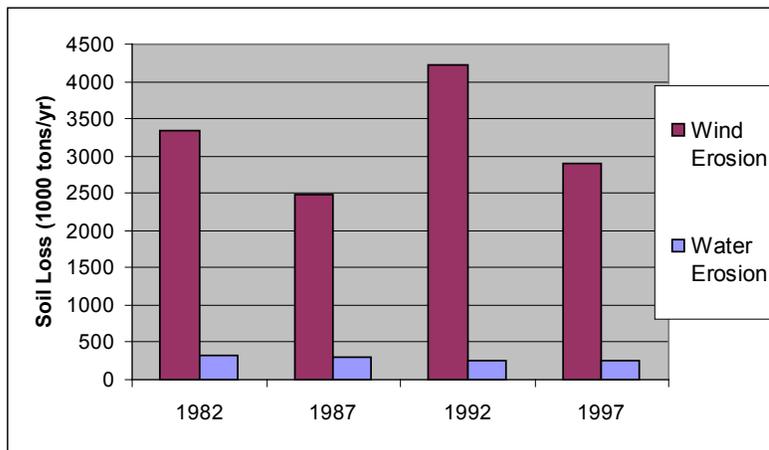
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- Soil Quality; Excessive Sheet and Rill Erosion.** In addition to erosion on the cropland, sedimentation caused by the clearing and grading of developing property is neither desirable nor necessary. Erosion issues relate directly to lake pollution/eutrophication, and compound effects of erosion from agricultural lands.
- 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 main concern. Concerns over flooding in the basin include tiling practices, drainage management, stormwater conveyance, 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.
- 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 Prairie and Wetland areas throughout the watershed.
- 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 Estimates¹³

- Sheet and rill erosion rates on crop and pasture land decreased by approximately 56,700 tons (18%) between 1982 and 1997.
- NRI estimates indicate wind erosion on crop and pasture land decreased by approximately 425,300 tons (13%) between 1982 and 1997.



Socioeconomic and Agricultural Data (Relevant)

Population estimates indicate that approximately 138,908 people reside in the basin. Median household income is \$40,242 yearly, roughly 88% of the national average. Figures show an unemployment rate of 3.6%, and approximately 10% of the residents in the watershed live below the national poverty level.



There are an estimated 377 farms in the watershed. Of the 374 operators in the basin, seventy one percent are full time producers not reliant on off-farm income. Approximately forty five percent of the operations are less than 180 acres in size, thirty five 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 113 acres.

(MN) HUC# 9020104		Total Acres:	371,689
Population Data *	Watershed Population	138,908	
	Unemployment Rate	3.6%	
	Median Household Income	40,242	
	% below poverty level	10%	
	Median Value of Home	78,500	
Farm Data	# of Farms	377	
	# of Operators	374	Percent
	# of Full Time Operators	266	71%
	# of Part Time Operators	109	29%
	Total Cropland Acres	301,120	81.0%
Farm Size	1 to 49 Acres	60	16%
	50 to 179 Acres	109	29%
	180 to 499 Acres	90	24%
	500 to 999 Acres	41	11%
	1,000 Acres or more	79	21%
	Average Farm Size	113	
Livestock & Poultry	Cattle - Beef	2,023	3%
	Cattle - Dairy	672	1%
	Chicken	236	0%
	Swine	3,769	6%
	Turkey	21,972	38%
	Other	29,500	51%
	Animal Count Total:	58,172	
	Total MN Permitted AFOs:	39	
Chemicals (Acres Applied)	Insecticides	17,229	
	Herbicides	150,045	
	Wormicides	3,206	
	Fruiticides	9,074	
	Total MN Acres Treated	179,554	
	% MN Chemical Totals	1.3%	

* 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
- **Comprehensive Watershed Management Plan**
Buffalo-Red River WS District
- **Red River Valley Water Supply Project**
Garrison Diversion Conservancy District, DKAO
- **Whiskey Creek Watershed Project**
Wilkin County SWCD
- **International Trans-boundary Case Study**
Red River Basin Commission
- **Aggassiz Basin White Pine Restoration**
Minnesota Civilian Conservation Corps
- **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

- **Buffalo-Red River Watershed District**
123 Front St S Barnesville, MN 56514
Phone (218) 354-7710
- **Cass County Soil Conservation District**
4660 Amber Valley Parkway Fargo, ND 58104
Phone (701) 282-2157
- **Clay County SWCD**
1615 30th Ave S, Moorhead, MN 56560
Phone (218) 287-2255
- **Minnesota NRCS - USDA**
375 Jackson Street, Suite 600 St Paul, MN 55101
On the Web: www.mn.nrcs.usda.gov
- **North Dakota NRCS - USDA**
220 E Rosser Avenue # 270 Bismarck, ND 58501
Phone (701) 530-2000
- **Ottertail SWCD, West**
506 Western Ave N, Fergus Falls, MN 56537
Phone (218) 739-1308
- **Red River Basin Commission**
119th 5th St. P.O. Box 66 Moorhead, MN 56561
www.redriverbasincommission.org
- **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
- **Richland Soil Conservation District**
1687 Bypass Road Wahpeton, ND 58075-3107
Phone (701) 642-5997
- **West Central Minnesota Joint Powers Board**
809 SE 8th St, Detroit Lakes, MN 56501
Phone (218) 847-9392
- **Wilkin County SWCD**
1150 Hwy 75 N, Breckenridge, MN 56520
(218) 643-2933

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 (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.