

Rapid Watershed Assessment

Sandhill-Wilson

(MN/ND) HUC: 09020301



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 Sandhill-Wilson 8-Digit Hydrologic Unit Code (HUC) subbasin is part of the Red River Basin in northwestern Minnesota and southeastern North Dakota. The watershed occurs in the Glacial Lake Agassiz Plain and North Central Hardwoods Level III Ecoregions.

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 Winnepeg.

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
Grand Forks	220,290	31.1%
Traill	127,588	18.0%
Polk	301,141	42.5%
Norman	38,702	5.5%
Mahnomen	21,509	3.0%
Total acres:	708,469	100%

Physical Description

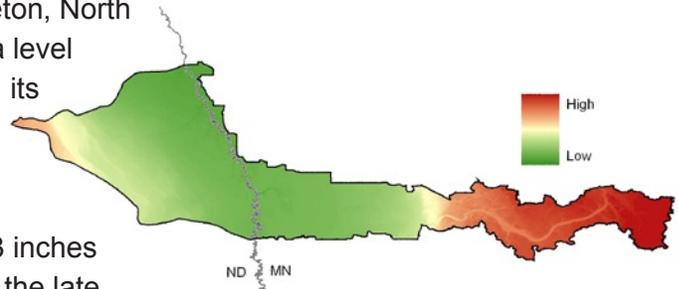
The Red River begins its course just below Wahpeton, North Dakota at an elevation of 943 feet above mean sea level (msl). The river descends a mere 118 feet between its origin and the northern boundary of the watershed North of Grand Forks North Dakota.

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 are known to affect the region.

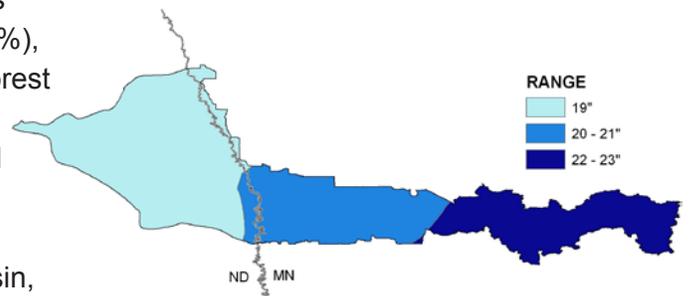
Predominate land uses / land covers are Row Crops (81.5%), Residential/Commercial Development (6.9%), Wetlands (4.0%), Grass/Pasture/Hay (3.1%) and Forest (3.0%). Land use within the watershed is largely agricultural, accounting for nearly 85% of the overall watershed acres.

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

Relief

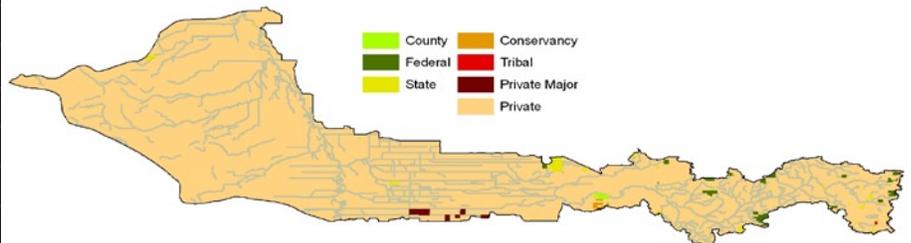


Average Precipitation



Ownership* ¹

Ownership Type	Acres	% of HUC
Conservancy	936	0.13
County	765	0.11
Federal	4,715	0.7
State	4,912	0.7
Other	-	-
Tribal	80	0.01
Private Major	4,632	0.7
Private	692,429	97.7
Total Acres:	708,469	100

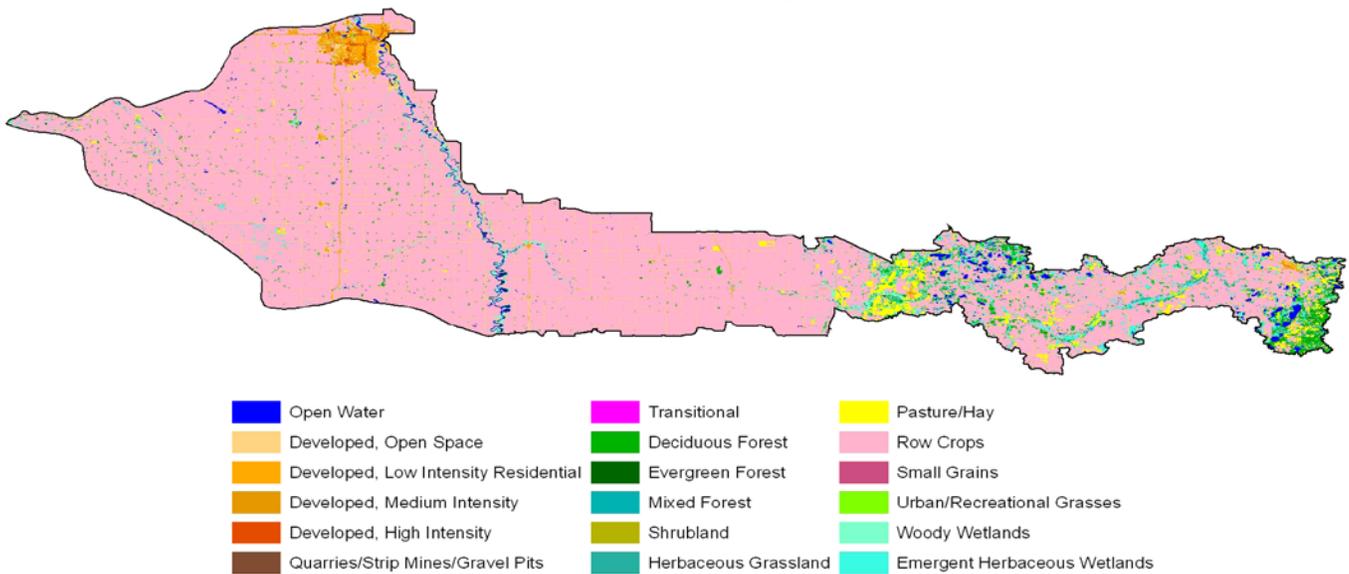


* Ownership totals derived from MN and ND GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Sandhill-Wilson watershed covers an area of 708,469 acres. Approximately ninety eight percent of the land in the watershed is held by private landowners (692,429 acres). The second largest ownership type is State with approximately 4,912 acres (0.69%), followed by Federal with 4,715 acres (0.67%), Private-Major (Corporate) with 4,632 acres (0.65%), Conservancy with 936 acres (0.13%), and County with 765 acres (0.11%). Ownership data also indicates approximately 80 acres of Tribal land holdings in the region. Land use by ownership type is represented in the table below.

Land Use / Land Cover ¹²



Ownership / Land Use ¹³

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	% Public	Acres	% Private	Acres	% Tribal		
Forest	1,316	0.2%	19,961	2.8%	72	0.01%	21,350	3.0%
Grass, etc	673	0.1%	21,522	3.0%	0	0.00%	22,196	3.1%
Orchards	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Row Crops	4,213	0.6%	573,360	80.9%	3	0.00%	577,576	81.5%
Shrub etc	2	0.0%	220	0.0%	0	0.00%	222	0.0%
Wetlands	2,821	0.4%	25,208	3.6%	3	0.00%	28,031	4.0%
Residential/Commercial	431	0.1%	48,692	6.9%	1	0.00%	49,125	6.9%
Open Water*	767	0.1%	9,153	1.3%	0	0.00%	9,921	1.4%

* ownership undetermined

** includes private-major

Watershed Totals:	10,224	1.44%	698,117	98.5%	80	0.01%	708,469	100%
--------------------------	---------------	--------------	----------------	--------------	-----------	--------------	----------------	-------------

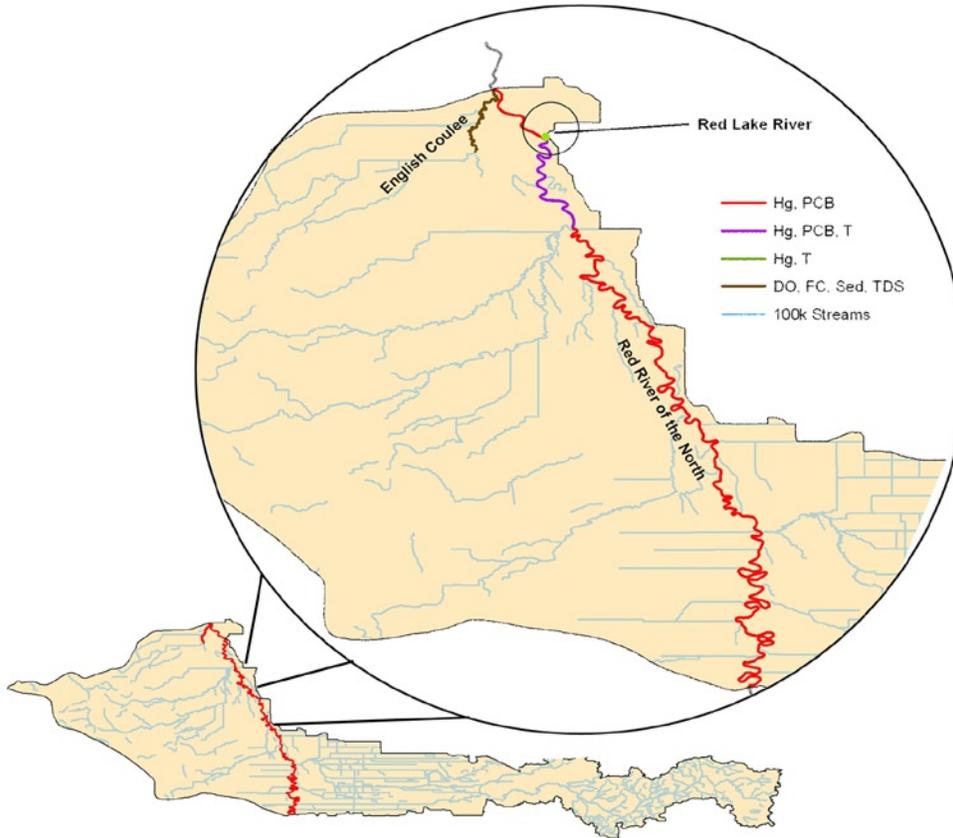
Physical Description (continued)

			cu. ft./sec	
Stream Flow Data	USGS 05082500 RED RIVER AT GRAND FORKS, ND	2008 Avg.	2,981	
		May – Sept. Avg.	4,411	
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)		MILES	PERCENT	
	Total Miles – Major (100K Hydro GIS Layer)	1,037	---	
	303d/TMDL Listed Streams (DEQ)	41.0	4.0%	
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	624	2.5%	
	Grain Crops	0	0.0%	
	Grass, etc	892	3.6%	
	Orchards	0	0.0%	
	Row Crops	17,426	70.2%	
	Shrub etc	16	0.1%	
	Wetlands	2,888	11.6%	
	Residential/Commercial	1,304	5.3%	
	Open Water	1,673	6.7%	
	Total Buffer Acres:	24,823	---	
Crop and Pastureland Land Capability Class¹⁶ (Croplands & Pasturelands Only) (2002 NASS Croplands extracted from Non-Irrigated Land Capabuiltiy Class)	1 – slight limitations	11,459	3%	
	2 – moderate limitations	379,971	102%	
	3 – severe limitations	102,532	28%	
	4 – very severe limitations	67,852	18%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	0	0%	
	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 NASS Crop & Pasture Land	561,815	---	
	TYPE OF LAND	ACRES	% of Crop Lands	% of HUC
Irrigated Lands¹⁷ (2002 NASS Estimates)	Cultivated Cropland / Pastureland	5,872	1.1%	0.8%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	5,872	1.1%	0.8%

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 - Sandhill-Wilson Watershed /8



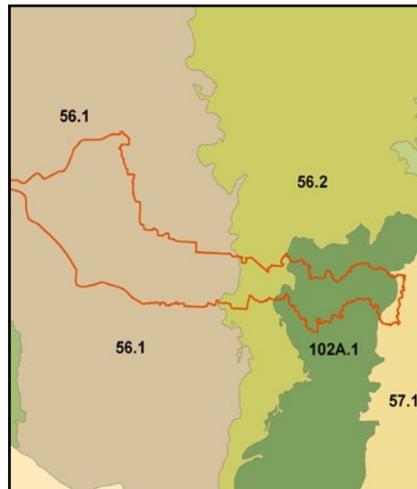
Waterbody Name	Impairment	Affected Use
ENGLISH COULEE	LOW DO, FECAL COLIFORM, SEDIMENT, TDS	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; BUFFALO COULEE TO COLE CR (ND)	MERCURY, PCBs	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; COLE CR (ND) TO RED LK R	MERCURY, PCBs, TURBIDITY	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; GRAND FORKS DAM TO ENGLISH COULEE	MERCURY, PCBs	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; MARSH R TO SAND HILL CR	MERCURY, PCBs	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; RED LK R TO GRAND FORKS DAM	MERCURY, PCBs	AQUATIC CONSUMPTION, AQUATIC LIFE
RED RIVER OF THE NORTH; SAND HILL CR TO BUFFALO COULEE	MERCURY, PCBs	AQUATIC CONSUMPTION, AQUATIC LIFE

Common Resource Areas

The Sandhill-Wilson watershed encompasses four Common Resource Areas, CRA 56.1, 56.2, 57.1 and 102A.1.¹⁹

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

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



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

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

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

57.1 Northern Minnesota Till Moraine: Rolling glacial moraine and associated outwash with short, choppy and complex slopes. Soils are generally loamy with some clayey and sandy soils included. Organic soils occur in depressions. Land use is cropland, pasture timber and recreation. Numerous lakes occur in this region. Main crops are small grain, soybeans and forage crops. Resource concerns include improved drainage for crop production, grazing management of forest and grassland, water and wind erosion and water quality impacts.

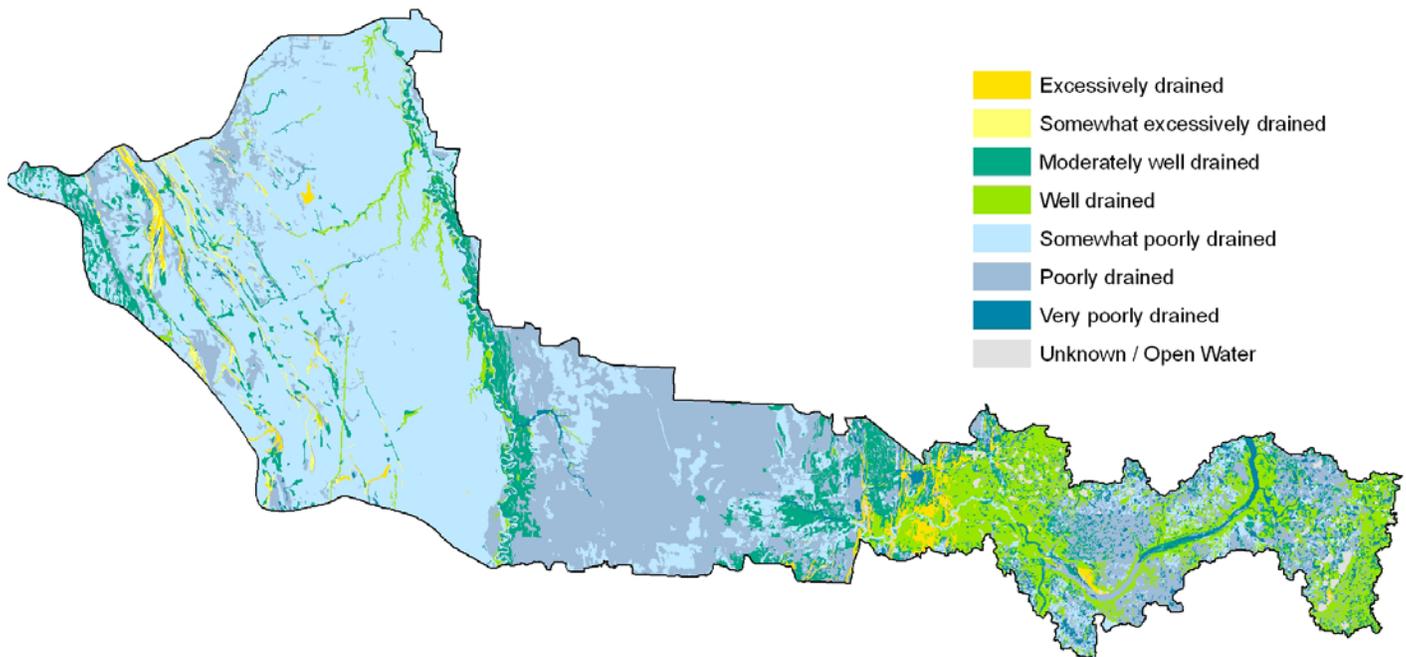
102A.1 Rolling Till Prairie: Gently sloping to steep, loamy glacial till soils with scattered sandy outwash soils and silty alluvial flood plains soils. This area is part of the Prairie Pothole region of the upper Midwest. Predominantly cropped to corn and soybeans with increasing hayland and pasture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

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

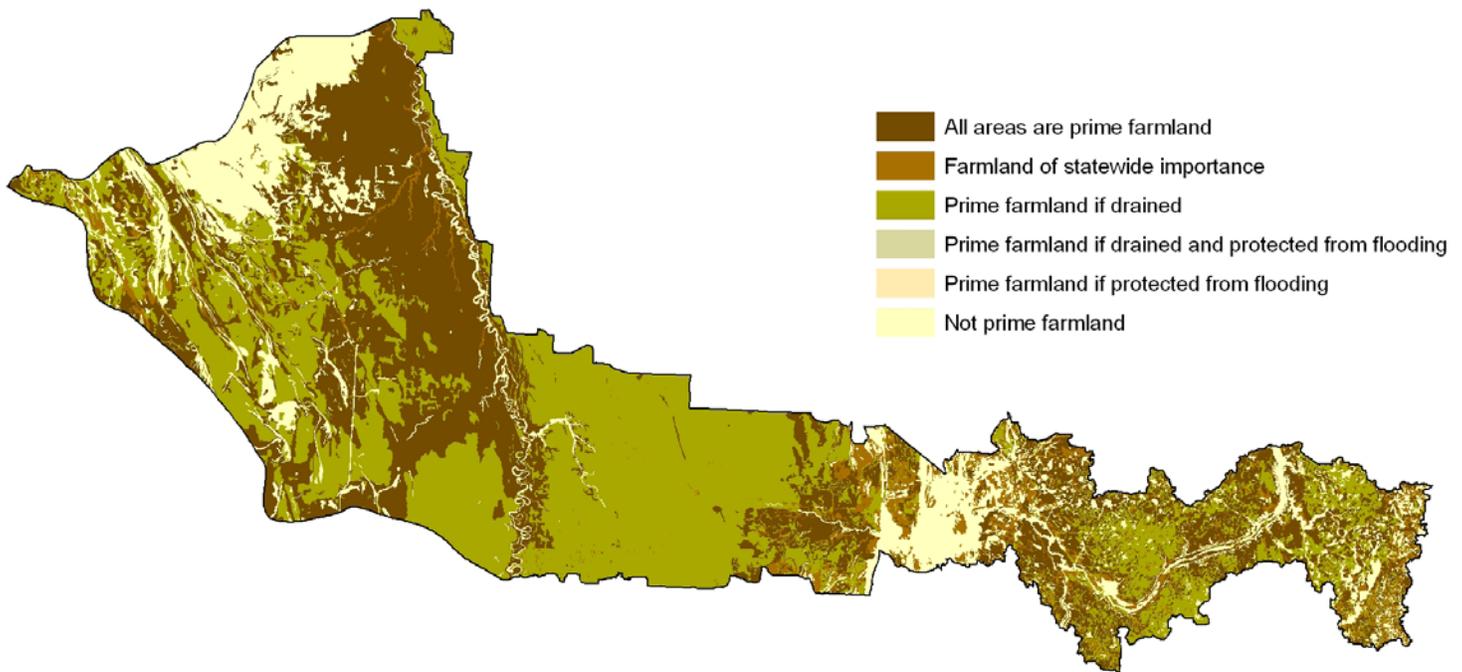
 certified soil tabular and spatial data.

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 farmland published in the Federal Register, Vol. 43, No 21, Janu

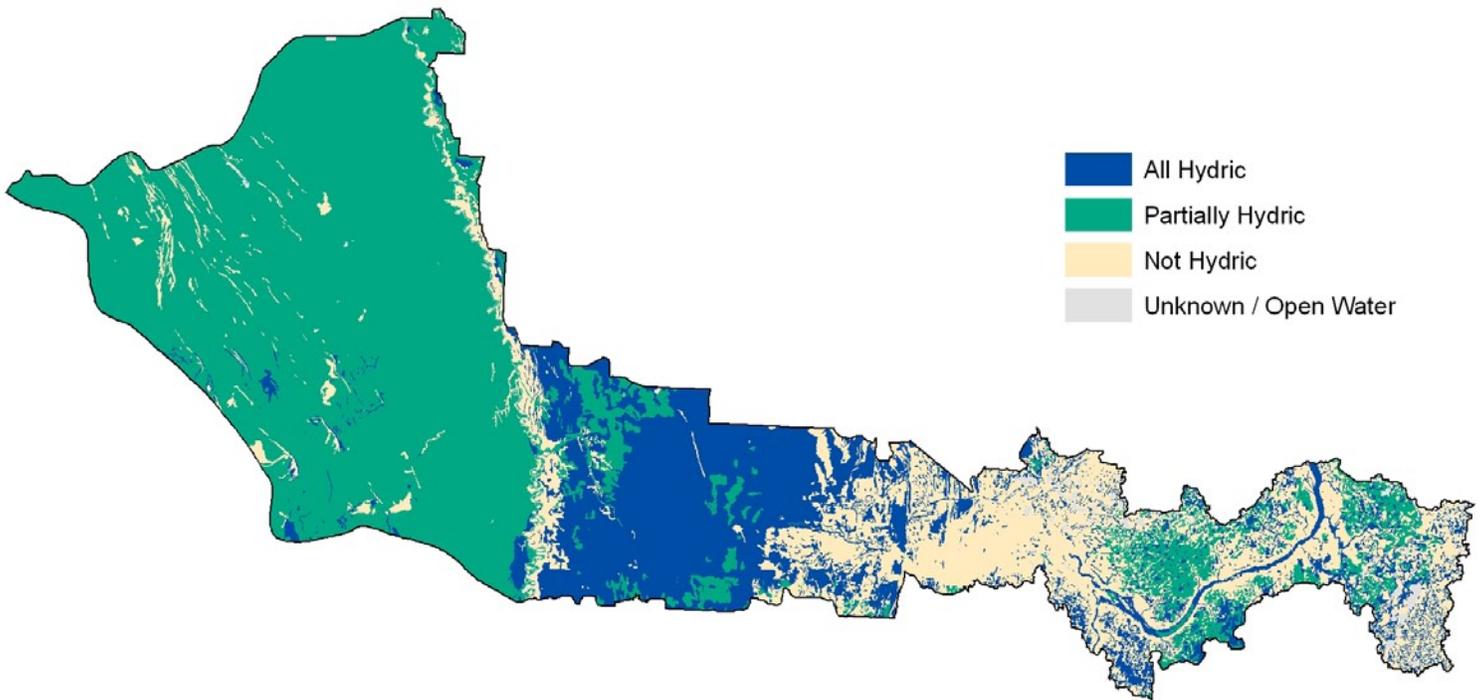


Visit the online Web Soil Survey at <http://websoilsurvey.nrcs.usda.gov> for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at <http://soildatamart.usda.gov> to download SSURGO certified soil tabular and spatial data.

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.



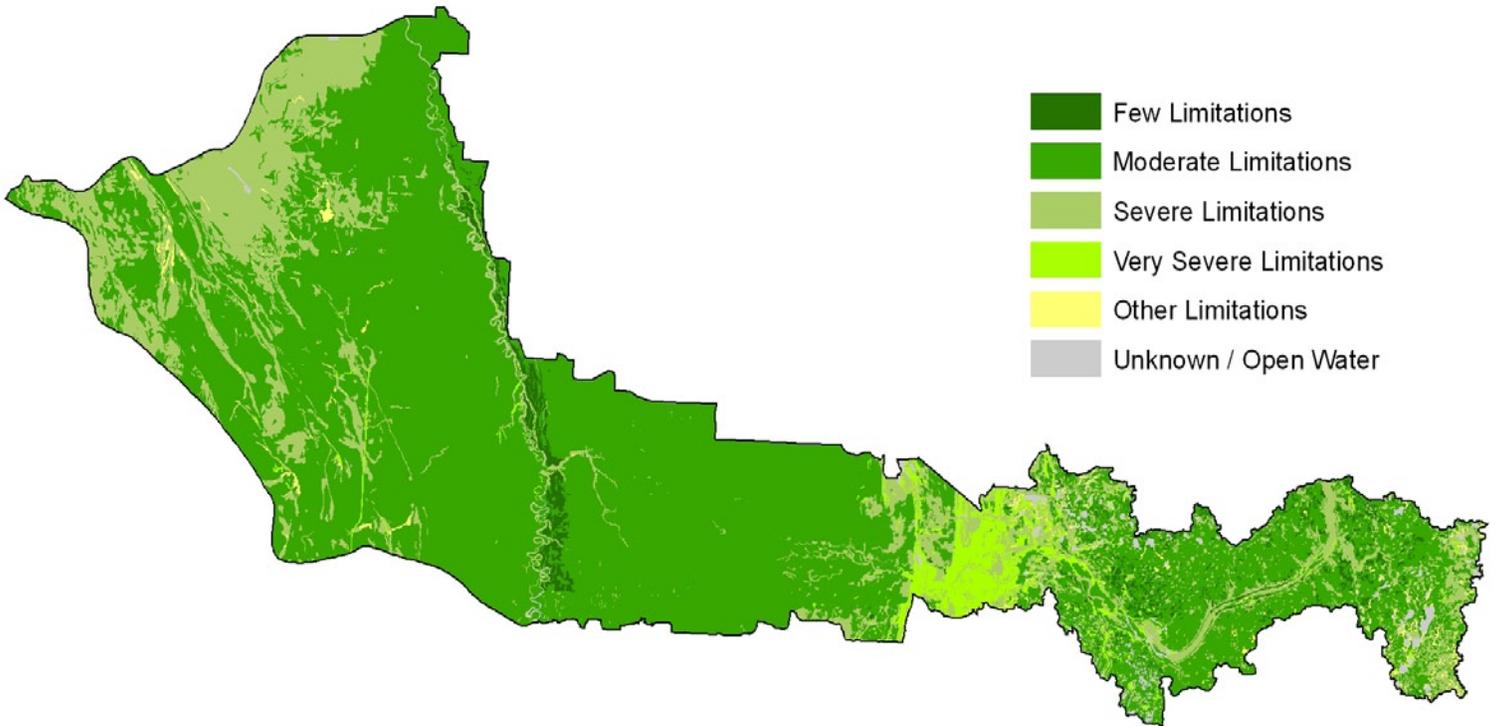
Visit the online Web Soil Survey at <http://websoilsurvey.nrcs.usda.gov> for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at <http://soildatamart.usda.gov> to download SSURGO certified soil tabular and spatial data.

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: Sandhill-Wilson				Watershed Number: 9020301						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL (MN)
Total Conservation Systems Planned (acres)	91	15,930	0	6,721	2,187	N/A	5,494	13,431	24,292	68,146
Total Conservation Systems Applied (acres)	335	7,808	0	1,822	1,822	N/A	4,032	15,365	15,696	46,880
Conservation Practices										
Total Waste Management (313) (numbers)	0	0	0	0	0	0	0	0	0	0
Riparian Forest Buffers (391) (acres)	12	0	7	5	0	13	18	0	0	55
Erosion Control Total Soil Saved (tons/year)	303	82,327	75,807	32,773	17,446	N/A	N/A	N/A	N/A	208,656
Total Nutrient Management (590) (Acres)	0	0	1,437	367	141	0	5,465	5,465	2,331	15,206
Pest Management Systems Applied (595A) (Acres)	0	0	0	0	0	0	1,113	1,070	4,894	7,077
Prescribed Grazing 528a (acres)	0	0	0	31	17	71	0	252	252	623
Tree & Shrub Establishment (612) (acres)	0	0	66	44	34	51	0	8	0	203
Residue Management (329A-C) (acres)	0	0	0	42	0	248	248	6,404	2,335	9,277
Total Wildlife Habitat (644 - 645) (acres)	0	5,464	4,629	1,975	1,466	215	1,975	879	3,763	20,366
Total Wetlands Created, Restored, or Enhanced (acres)	0	848	404	174	253	211	641	179	93	2,803
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	335	7,805	4,352	1,780	639	N/A	1,067	687	3,237	19,902
Wetlands Reserve Program	0	0	0	0	80	N/A	0	272	0	352
Environmental Quality Incentives Program	0	0	0	0	0	N/A	2,874	12,445	12,437	27,756
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 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>Antennaria parvifolia</i>	Small-leaved Pussytoes	Botanical
<i>Carex hallii</i>	Hall's Sedge	Botanical
<i>Carex obtusata</i>	Blunt Sedge	Botanical
<i>Carex sterilis</i>	Sterile Sedge	Botanical
<i>Cicindela limbata nympha</i>	Sandy Tiger Beetle	Zoological
<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>Gaillardia aristata</i>	Blanket-flower	Botanical
<i>Gentiana affinis</i>	Northern Gentian	Botanical
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Helictotrichon hookeri</i>	Oat-grass	Botanical
<i>Hudsonia tomentosa</i>	Beach-heather	Botanical
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Zoological
<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Ligumia recta</i>	Black Sandshell	Zoological
<i>Limosa fedoa</i>	Marbled Godwit	Zoological
<i>Metaphidippus arizonensis</i>	A Jumping Spider	Zoological
<i>Mustela nivalis</i>	Least Weasel	Zoological
<i>Najas marina</i>	Sea Naiad	Botanical
<i>Oarisma powesheik</i>	Powesheik Skipper	Zoological
<i>Orobanche fasciculata</i>	Clustered Broomrape	Botanical
<i>Orobanche ludoviciana</i>	Louisiana Broomrape	Botanical
<i>Oryzopsis hymenoides</i>	Indian Ricegrass	Botanical

RESOURCE CONCERNS

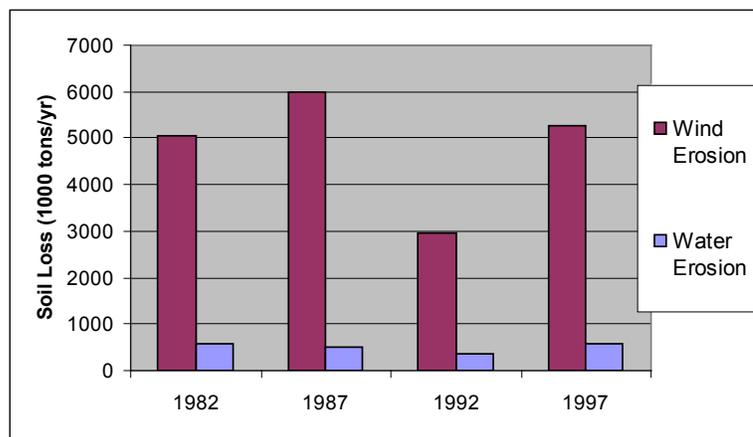
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- 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 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.
- 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 Estimates¹³

- NRI Estimates for Sheet and Rill erosion rates on crop and pasture land decreased by approximately 200 tons (0.1%) between 1982 and 1997.
- NRI estimates indicate wind erosion on crop and pasture land increased by approximately 245,000 tons (4.9%) between 1982 and 1997.



Socioeconomic and Agricultural Data (Relevant)

Population estimates indicate that approximately 65,485 people reside in the basin. Median household income is \$37,244 yearly, roughly 80% of the national average. Figures show an unemployment rate of 4.4%, and approximately 10% of the residents in the watershed live below the national poverty level.



There are an estimated 731 farms in the watershed. Of the 695 operators in the basin, sixty eight percent are full time producers not reliant on off-farm income. Approximately thirty five percent of the operations are less than 180 acres in size, thirty seven percent are from 180 to 1000 acres in size, and twenty eight percent of the farms are greater than 1000 acres. Average Farm size in the basin is 151 acres.

(MN) HUC# 9020301		Total Acres:	708,469
Population Data*	Watershed Population	65,485	
	Unemployment Rate	4.4%	
	Median Household Income	37,234	
	% below poverty level	10%	
	Median Value of Home	66,200	
Farm Data	# of Farms	731	
	# of Operators	695	Percent
	# of Full Time Operators	470	68%
	# of Part Time Operators	225	32%
	Total Cropland Acres	561,815	79.3%
Farm Size	1 to 49 Acres	108	12%
	50 to 179 Acres	209	23%
	180 to 499 Acres	204	22%
	500 to 999 Acres	137	15%
	1,000 Acres or more	254	28%
	Average Farm Size	151	
Livestock & Poultry	Cattle - Beef	2,141	16%
	Cattle - Dairy	800	6%
	Chicken	239	2%
	Swine	2,824	21%
	Turkey	3	0%
	Other	7,387	55%
	Animal Count Total:	13,395	
	Total Permitted AFOs:	44	
Chemicals MN (Acres Applied)	Insecticides	43,006	
	Herbicides	178,725	
	Wormicides	6,735	
	Fruiticides	5,574	
	Total Acres Treated	234,040	
	% State Chemical Totals	1.6%	

* 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**
Sand Hill River Watershed District, MN DNR
- **Garden Slough Project**
Sand Hill River Watershed District
- **PL 566: Norman-Polk, Spring Creek**
Minnesota NRCS
- **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

- **Grand Forks Soil Conservation District**
4775 Technology Cir. #1C Grand Forks ND 58203
Phone (701) 772-2321 Ext 3
- **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
- **Mahnomen SWCD**
200 US HWY 59, Box 381, Mahnomen, MN 56557
Phone: (218) 935-2987
- **Norman SWCD**
100 Main Ave E PO Box 60, Twin Valley, MN 56584
Phone (218) 584-5169
- **Polk SWCD East**
PO Box 57, Mcintosh, MN 56556
Phone: (218) 563-2777
- **Polk SWCD West**
528 Strander Ave, Crookston, MN 56716
Phone (218) 281-6070
- **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
- **Sand Hill River Watershed District**
219 North Mill Street Fertile, MN 56540
Phone: (218) 945-3204
- **Trail County Soil Conservation District**
804 West Caledonia Hillsboro, ND 58045
Phone: (701) 436-4311
- **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 (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.