

Rapid Watershed Assessment

Snake River

(MN) HUC: 09020309



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 Snake River 8-Digit Hydrologic Unit Code (HUC) subbasin is part of the Red River Basin in northwestern Minnesota. The watershed occurs in the Glacial Lake Agassiz Plains ecoregion. Soils at the mouth of the watershed are clayey soils of the lake plain. Moving eastward, soils are black, limey, clayey soils in the central part of the watershed, and sandy soils in the eastern headwaters of the watershed.

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

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



County Totals

County	Acres in HUC	% HUC
Marshall	469,765	76.8%
Polk	122,513	20.0%
Pennington	19,576	3.2%
Total acres:	624,422	100%

Physical Description

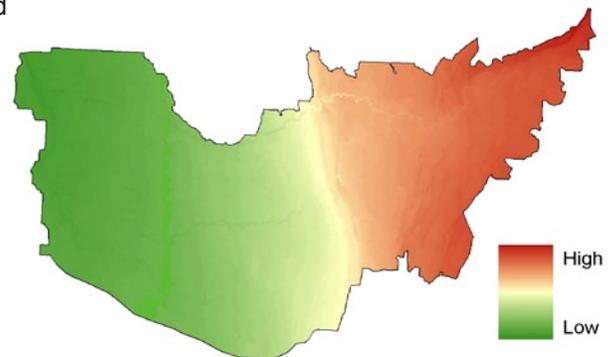
The Snake River begins its 50 mile course in Marshall county and drains an area of approximately 611,800 acres. The river flows southwestwardly from the headwaters, continuing westward and collecting the South Fork Snake River and passing through the towns of Warren and Alvarado. Downstream of Alvarado, the Snake turns northwestward, then collecting the Middle River upstream of its confluence with the Red in Fork Township.

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

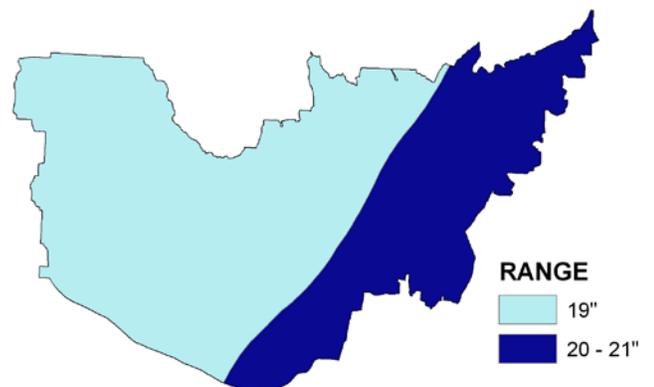
Predominate land uses / land covers are Row Crops (81%), Wetlands (6%), Forest (5%), Residential/Commercial Development (5%), and Grass/Pasture/Hay (3%), Agricultural land use in the basin accounts for approximately eighty four percent of the overall watershed acres.

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

Relief

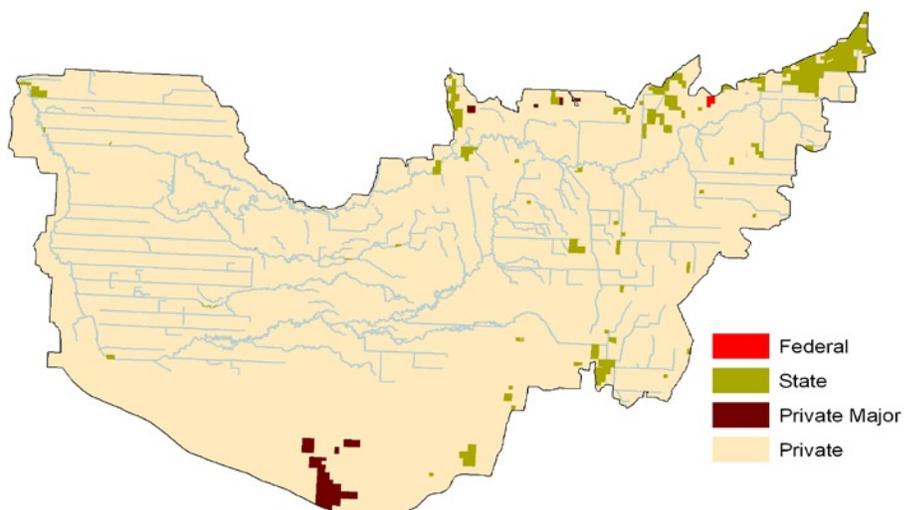


Average Precipitation



Ownership* ¹

Ownership Type	Acres	% HUC
Conservancy	-	-
County	-	-
Federal	201	0.0
State	16,377	2.7
Other	-	-
Tribal	-	-
Private Major	4,005	0.7
Private	591,272	96.6
Total Acres:	611,854	100

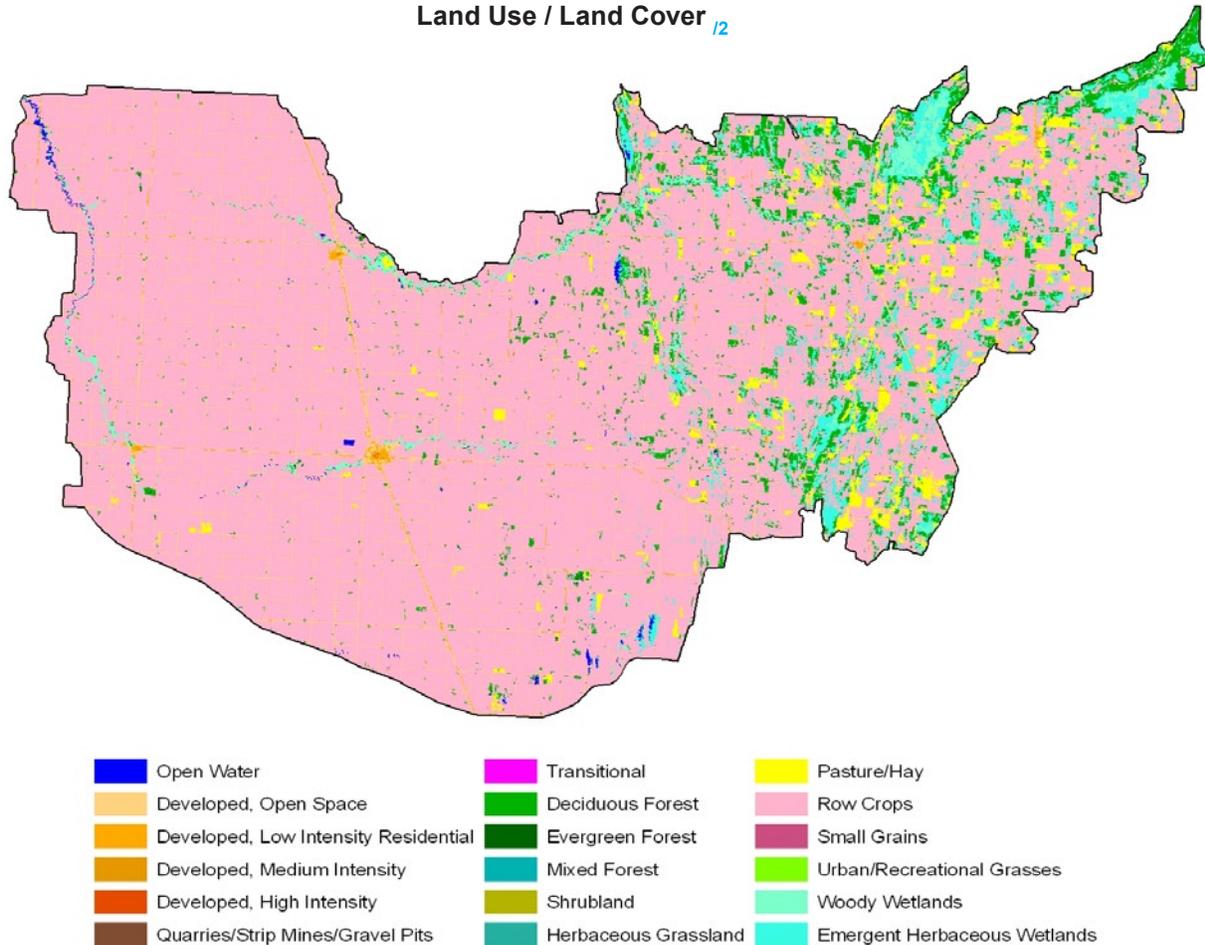


* Ownership totals derived from 2007 MN DNR GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Snake River watershed covers an area of 611,854 acres. Approximately ninety seven percent of the land in the watershed is owned by private landholders (309,530 acres). The second largest ownership type is State, with approximately 16,340 acres (2.7%) followed by Private-Major (corporate) land holdings of 120 acres (1%) and Federal lands amounting to 200 acres (<1%), 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	5,097	0.8%	25,702	4.2%	0	0.0%	30,800	5.0%
Grass, etc	331	0.1%	16,651	2.7%	0	0.0%	16,981	2.8%
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Row Crops	3,098	0.5%	492,410	80.5%	0	0.0%	495,508	81.0%
Shrub etc	182	0.0%	457	0.1%	0	0.0%	639	0.1%
Wetlands	7,240	1.2%	29,912	4.9%	0	0.0%	37,152	6.1%
Residential/Commercial	402	0.1%	28,955	4.7%	0	0.0%	29,357	4.8%
Open Water*	206	0.0%	1,219	0.2%	0	0.0%	1,424	0.2%
Watershed Totals:	16,555	2.7%	595,306	97.3%	0	0.0%	611,854	100%

* ownership undetermined

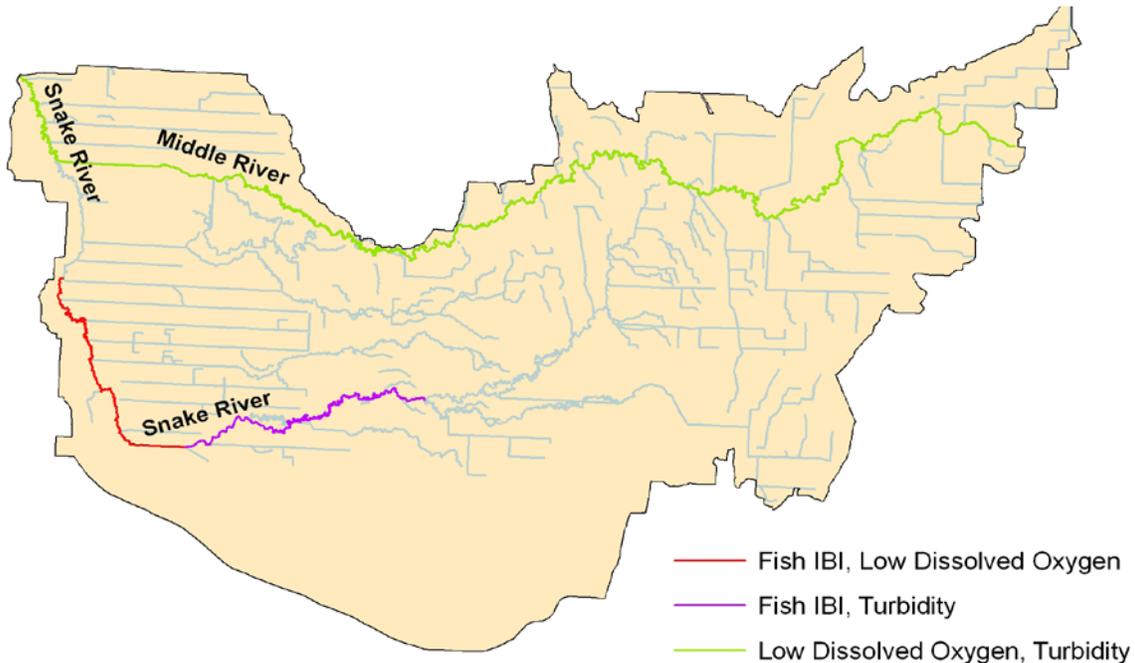
** includes private-major

Physical Description (continued)

		ACRES	cu. ft/sec	
Stream Flow Data	USGS 05087500 MIDDLE RIVER AT ARGYLE, MN	2008 Avg.	18.7	
		May – Sept. Avg.	24.5	
		ACRES/MILES	PERCENT	
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)	Total Miles – Major (100K Hydro GIS Layer)	787.5	---	
	303d/TMDL Listed Streams (DEQ)	146.6	18.6%	
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	825	4.4%	
	Grain Crops	0	0.0%	
	Grass, etc	399	2.1%	
	Orchards	0	0.0%	
	Row Crops	12,330	65.2%	
	Shrub etc	11	0.1%	
	Wetlands	2,567	13.6%	
	Residential/Commercial	2,423	12.8%	
	Open Water*	348	1.8%	
	Total Buffer Acres:	18,904	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	378,800	80%	
	3 – severe limitations	50,100	11%	
	4 – very severe limitations	35,400	7%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	10,200	2%	
	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	474,500	-
	TYPE OF LAND	ACRES	% of Crop Lands	% of HUC
Irrigated Lands¹⁷ (2002 NASS Estimates)	Cultivated Cropland / Pastureland	1408	0.2%	0.1%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	1408	0.2%	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.



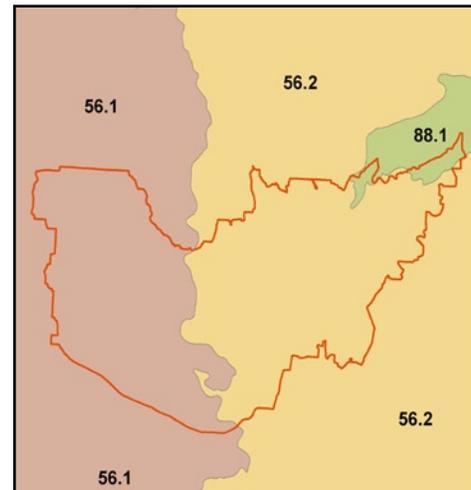
Listed Stream	Impairment	Affected Use
Snake River Middle R to Red R	Dissolved Oxygen, Turbidity	Aquatic Life
Snake River CD 7 to CD 3	Fish IBI, Low Dissolved Oxygen	Aquatic Life
Snake River S Br Snake R to CD 7	Fish IBI, Turbidity	Aquatic Life
Middle River Headwaters to Snake R	Low Dissolved Oxygen, Turbidity	Aquatic Life

Common Resource Areas

The Snake River watershed occurs in three Common Resource Areas, 56.1, 56.2 and 88.1. 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, doughiness on sandy soils and wetness in low lying and seepy areas.

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

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

Visit the online Web Soil Survey at

<http://websoilsurvey.nrcs.usda.gov> for official and

 current USDA soil information as viewable maps and

 tables. Visit the Soil Data Mart at

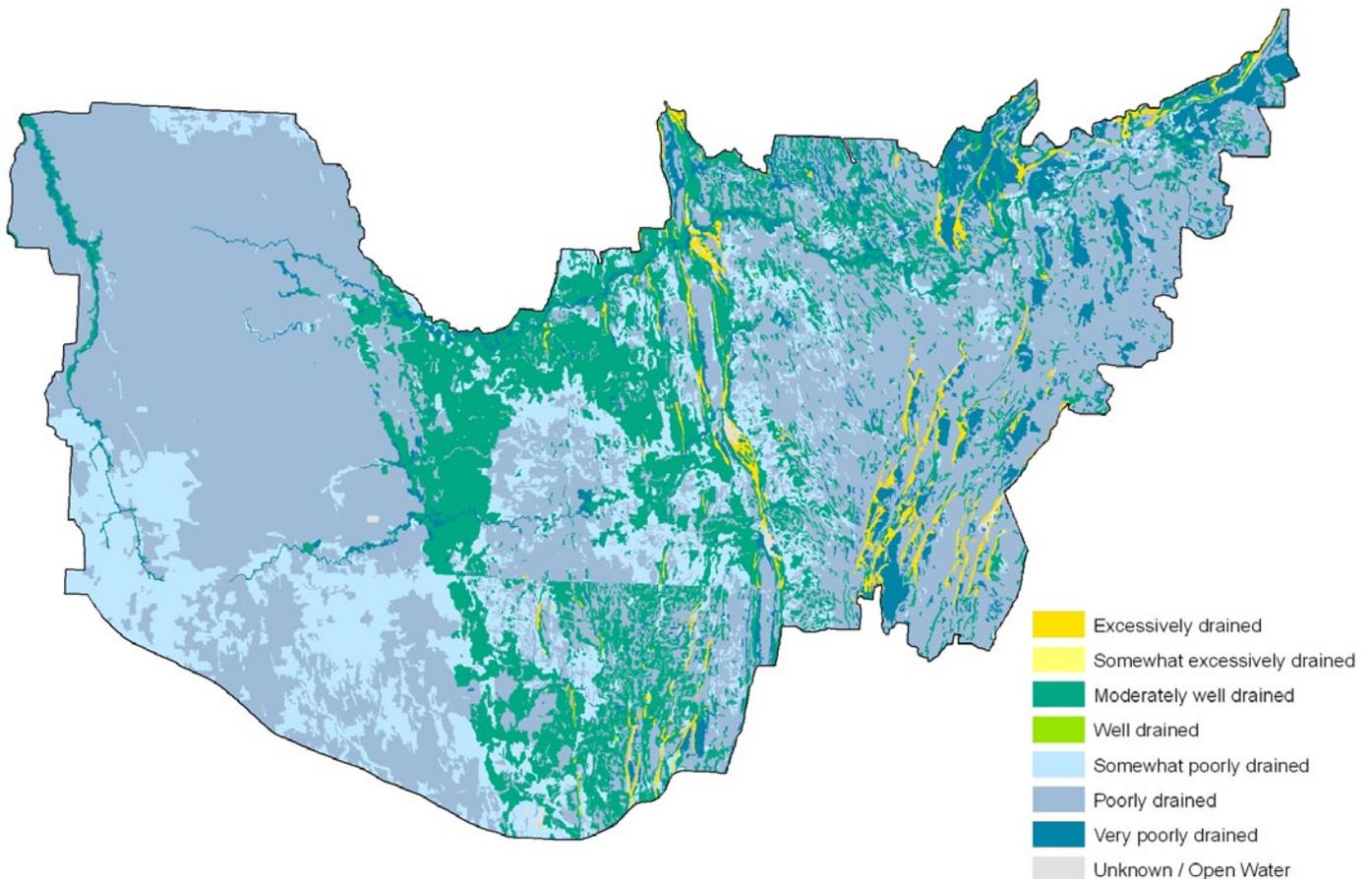
<http://soildatamart.usda.gov> to download SSURGO

 certified soil tabular and spatial data.

Drainage 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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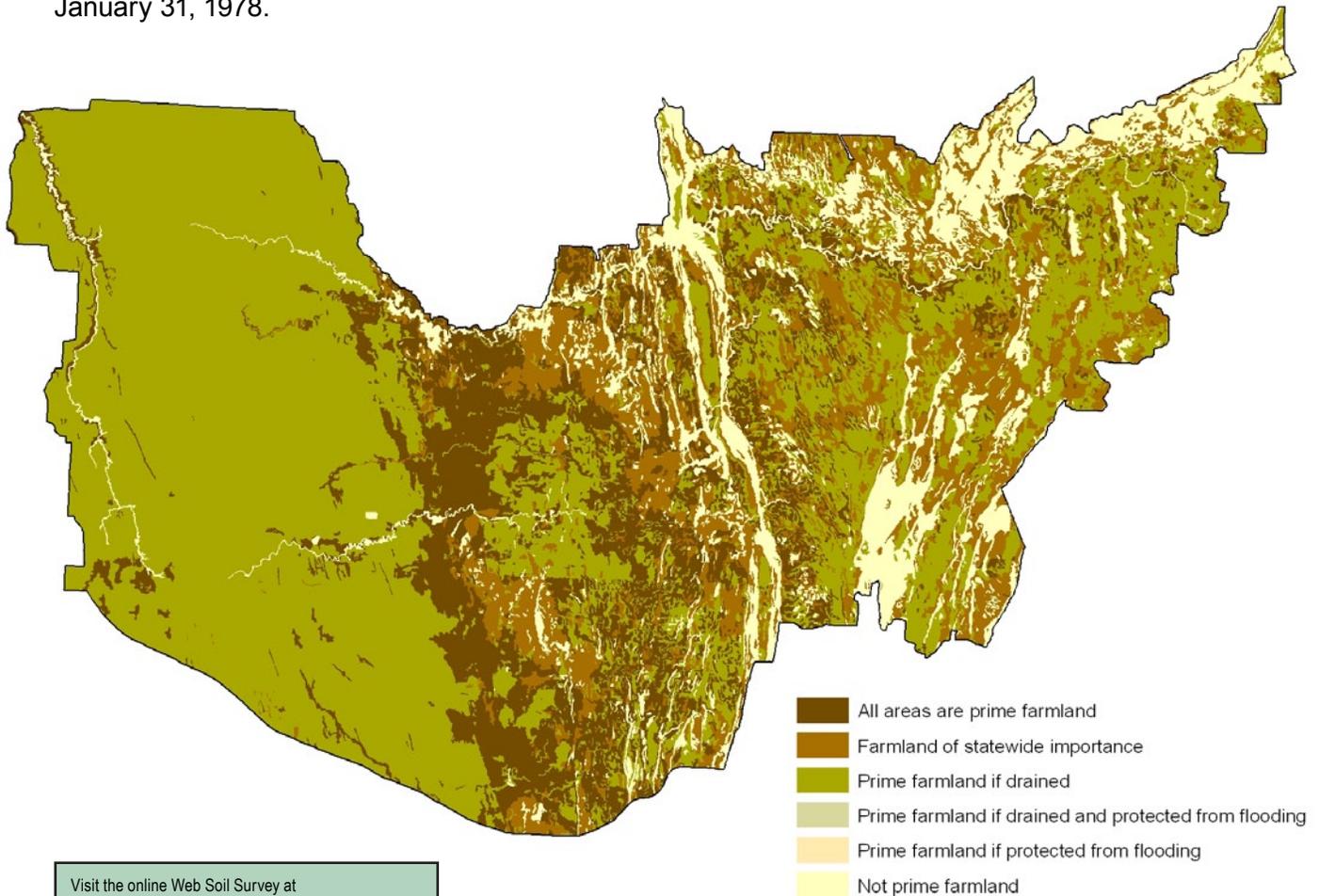
 certified soil tabular and spatial data.

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.

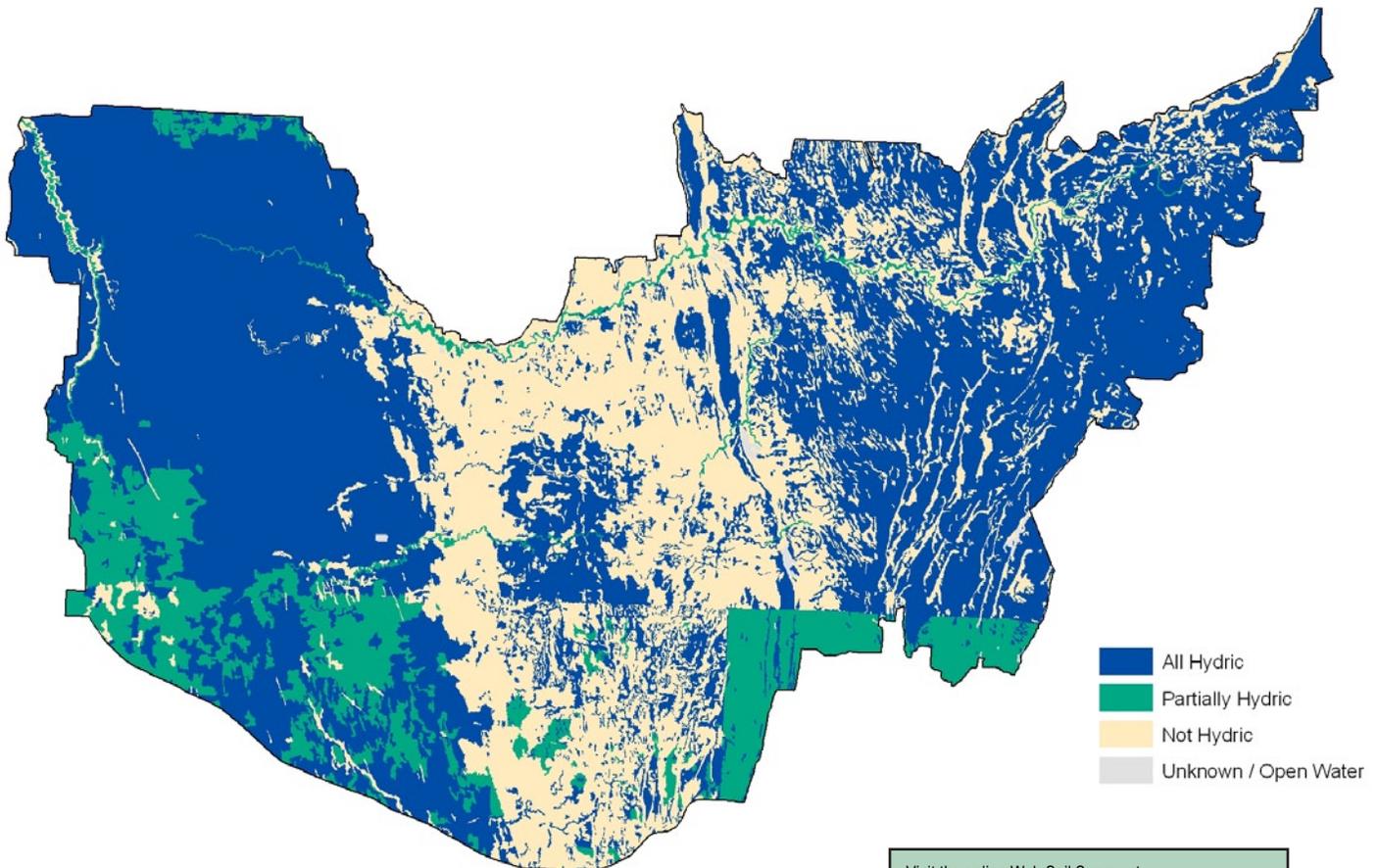


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Hydric Soils ¹⁰

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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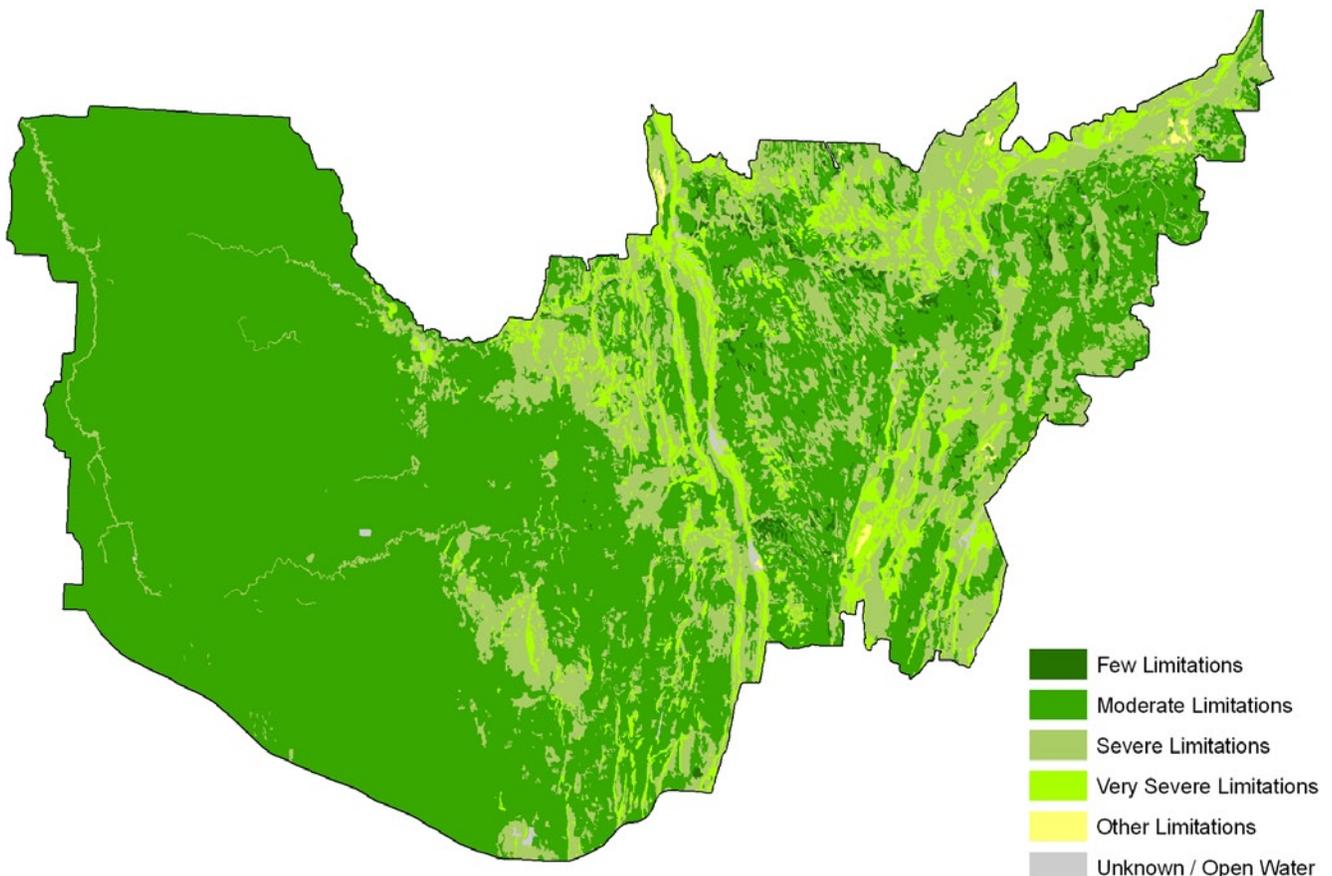
 certified soil tabular and spatial data.

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.



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Performance Results System and Other Data

Watershed Name: Snake				Watershed Number: 9020309						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	104	2,027	0	947	2,789	N/A	6,820	6,319	5,026	24,032
Total Conservation Systems Applied (acres)	274	2,997	0	2,141	2,141	N/A	5,654	6,106	7,314	26,627
Conservation Practices										
Total Waste Management (313) (numbers)	0	1	0	4	1	1	1	1	0	9
Riparian Forest Buffers (391) (acres)	0	5	21	35	33	7	0	0	0	101
Erosion Control Total Soil Saved (tons/year)	0	127,926	1,454	2,120	3,503	N/A	N/A	N/A	N/A	135,003
Total Nutrient Management (590) (Acres)	104	525	163	361	507	244	218	218	2,305	4,645
Pest Management Systems Applied (595A) (Acres)	0	0	0	70	62	0	0	0	819	951
Prescribed Grazing 528a (acres)	0	110	388	61	0	0	626	612	612	2,409
Tree & Shrub Establishment (612) (acres)	10	121	110	113	87	54	8	12	10	525
Residue Management (329A-C) (acres)	93	763	0	103	250	540	540	2,051	323	4,663
Total Wildlife Habitat (644 - 645) (acres)	729	746	277	284	1,814	475	284	1,856	2,844	9,309
Total Wetlands Created, Restored, or Enhanced (acres)	3	9	22	14	9	0	18	0	21	96
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	104	829	88	523	465	N/A	209	1,207	0	3,425
Wetlands Reserve Program	0	0	0	0	0	N/A	0	0	0	0
Environmental Quality Incentives Program	0	0	388	733	797	N/A	2,171	2,982	4,011	11,082
Wildlife Habitat Incentive Program	20	154	52	462	9	N/A	503	41	349	1,590
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>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	Zoological
<i>Androsace septentrionalis</i> ssp. <i>puberulenta</i>	Northern Androsace	Botanical
<i>Asio flammeus</i>	Short-eared Owl	Zoological
<i>Botrychium campestre</i>	Prairie Moonwort	Botanical
<i>Botrychium simplex</i>	Least Moonwort	Botanical
<i>Carex obtusata</i>	Blunt Sedge	Botanical
<i>Carex scirpoidea</i>	Northern Singlespike Sedge	Botanical
<i>Carex sterilis</i>	Sterile Sedge	Botanical
<i>Carex xerantica</i>	Dry Sedge	Botanical
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological
<i>Cypripedium candidum</i>	Small White Lady's-slipper	Botanical
<i>Gentiana affinis</i>	Northern Gentian	Botanical
<i>Helictotrichon hookeri</i>	Oat-grass	Botanical
<i>Limosa fedoa</i>	Marbled Godwit	Zoological
<i>Microtus ochrogaster</i>	Prairie Vole	Zoological
<i>Minuartia dawsonensis</i>	Rock Sandwort	Botanical
<i>Mustela nivalis</i>	Least Weasel	Zoological
<i>Orobanche ludoviciana</i>	Louisiana Broomrape	Botanical
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Rhynchospora capillacea</i>	Hair-like Beak-rush	Botanical
<i>Salix maccalliana</i>	Mccall's Willow	Botanical
<i>Senecio canus</i>	Gray Ragwort	Botanical
<i>Silene drummondii</i>	Drummond's Campion	Botanical
<i>Stellaria longipes</i>	Long-stalked Chickweed	Botanical
<i>Thomomys talpoides</i>	Northern Pocket Gopher	Zoological
<i>Tympanuchus cupido</i>	Greater Prairie-chicken	Zoological

RESOURCE CONCERNS

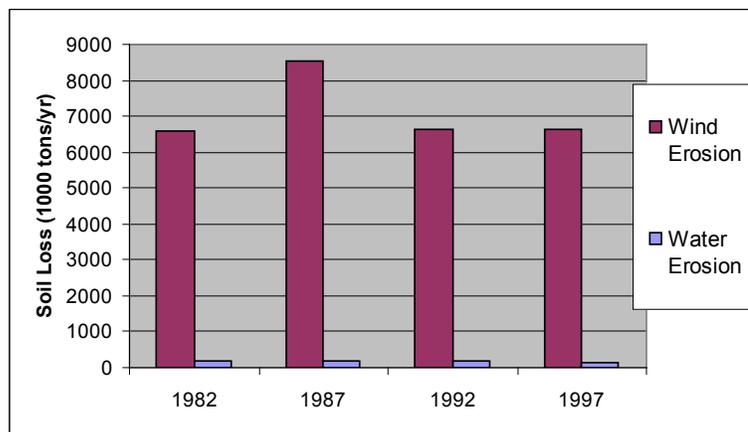
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- Soil Quality; Excessive Wind Erosion.** Soil loss from high and constant wind is considerable. Though there has been recent progress in this area, reduction of Wind erosion continues to be a pressing concern in western areas approaching the Red River Valley.
- Flood Damage Reduction.** Local districts recognize that annual flood damage is a main concern. Concerns over flooding in the basin include tiling practices, drainage management, stormwater 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 water as impervious surface and tilled area increase and natural buffers disappear.
- Wildlife Habitat.** Given the fragmentation caused by increased development, and agricultural land use there are few to no natural corridors of natural habitat for wildlife. Districts recognize the need for the protection and enhancement of wildlife corridors and potential for connecting public lands.
- Wetland Management.** Due to documented development pressures within shoreland and agricultural areas, priority should be given to preserving the wetlands within 1000 feet of a lake or 300 feet of a river. Restoration of wetlands, dam repair and placing flood-prone lands in CRP/RIM all serve to lessen the impact of flooding and sedimentation, and improve drainage.



NRI Soil Loss Estimates¹³

- Sheet and rill erosion rates on crop and pasture land decreased by approximately 47,500 tons (26%) between 1982 and 1997.
- NRI estimates indicate wind erosion on crop and pasture land increased by approximately 45,000 tons (1%) between 1982 and 1997.



Socioeconomic and Agricultural Data (Relevant)

Population estimates for the subbasin indicate that approximately 6,500 people reside in the area. Median household income throughout the district is \$37,713 yearly, roughly 81% 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 746 farms in the watershed. Of the 712 operators in the basin, sixty three percent are full time producers not reliant on off-farm income. Approximately thirty seven percent of the operations are less than 180 acres in size, forty one 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 122 acres.

(MN) HUC# 9020309		Total Acres:	611,854
Population Data*	Watershed Population	6,522	
	Unemployment Rate	5.6%	
	Median Household Income	37,713	
	% below poverty level	10%	
	Median Value of Home	62,000	
Farm Data	# of Farms	746	
	# of Operators	712	Percent
	# of Full Time Operators	449	63%
	# of Part Time Operators	263	37%
	Total Cropland Acres	436,089	71.3%
Farm Size	1 to 49 Acres	148	10%
	50 to 179 Acres	388	27%
	180 to 499 Acres	372	26%
	500 to 999 Acres	209	15%
	1,000 Acres or more	309	22%
	Average Farm Size	122	
Livestock & Poultry	Cattle - Beef	3,298	24%
	Cattle - Dairy	874	6%
	Chicken	1,040	8%
	Swine	1,062	8%
	Turkey	1	0%
	Other	7,195	53%
	Animal Count Total:	13,470	
	Total Permitted AFOs:	291	
Chemicals (Acres Applied)	Insecticides	24,454	
	Herbicides	180,067	
	Wormicides	5,858	
	Fruiticides	2,105	
	Total Acres Treated	212,485	
	% State Chemical Totals	1.5%	

* 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

- **Angus Olso Site #4 Flood Reduction Project**
MSTRWD, State of MN, RRWMB
- **Agassiz Water Resource Management Project**
MSTR Watershed District
- **Red River Basin Turbidity TMDL Study**
MPCA, Red River Basin Water Quality Team
- **Red River Basin Riparian Project**
Red River RC&D
- **Snake River PL-566 Flood Control**
MN Natural Resources Conservation Service
- **Farmstead Ring Dike Program**
MSTR Watershed District
- **Red River Water Management Consortium**
USDA, UND EERC, Red River Basin Citizens
- **Red River Basin Water Quality Work Plan**
Minnesota Pollution Control Agency
- **Red River Valley Water Supply Project**
Red River International Joint Commission
- **Red River Basin Water Quality Monitoring Project**
Red River Basin Commission
- **Red River Basin Mapping Initiative**
International Water Institute, Red River Stakeholders
- **USGS Sediment to Streams Study - Red River Basin**
USGS, Minnesota Pollution Control Agency

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

Conservation Districts, Organizations & Partners

- **Marshall SWCD**
PO Box 74, Warren, MN 56772
Phone: (218) 745-5010
- **North Central Minnesota Joint Powers Board**
3217 Bemidji Ave N, Bemidji, MN
Phone (218) 755-4339
- **Polk SWCD East**
PO Box 57, McIntosh, MN 56556
Phone: (218) 563-2777
- **Polk SWCD West**
528 Strander Ave, Crookston, MN 56716
Phone (218) 281-6077
- **Pennington SWCD**
201 Sherwood Ave S, Thief River Falls, MN 56701
Phone (218) 683-7075
- **Middle-Snake-Tamarack Rivers Watershed Dist.**
453 N McKinley St PO Box 154 Warren, MN 56762
Phone (218) 6745-4741
- **Red Lake Watershed District**
1000 Pennington Ave S Thief River Falls, MN 56701
Phone (218) 681-5800
- **Red River Basin Commission**
119th 5th St. P.O. Box 66 Moorhead, MN 56561
www.redriverbasincommission.org

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>.