

Rapid Watershed Assessment

Sauk

(MN) HUC: 07010202



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 Sauk 8-Digit Hydrologic Unit Code (HUC) subbasin is located entirely within the North Central Hardwood Forest Ecoregion of Minnesota. While much of the watershed is comprised of agricultural lands, it is also largely forested, with many of the hardwoods and conifers typical of the region.

Approximately ninety seven percent of the 667,214 acres in this HUC are privately owned. The remaining acres are predominantly County, Federal or state owned land.

Assessment estimates indicate 2,164 Farms in the watershed. Approximately forty six percent of the operations are less than 180 acres in size, fifty percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Of the 2,232 operators in the subbasin, sixty five percent are full time producers not reliant on off-farm income.

The main resource concerns in the basin are excessive soil erosion, woodland management, surfacewater quality, groundwater quality and quantity, surfacewater management, and wetland management.

Many of the resource concerns relate directly to agricultural land use and increased development in the region, resulting in fragmentation and increased sediment and pollutant (mercury, PCBs, excess nutrients) loadings to surface waters.



County Totals

County	Acres in HUC	% HUC
Todd	137,589	20.6%
Morrison	6	0.0%
Douglas	57,951	8.7%
Stearns	431,831	64.7%
Pope	30,347	4.5%
Meeker	9,491	1.4%
Total acres:	667,214	100%

Physical Description

Average elevation in the Sauk subbasin is 1,002 feet above sea level, with the highest values being in the Western and Northwestern portions of the watershed, while increasingly lower values are found towards the Southeastern regions.

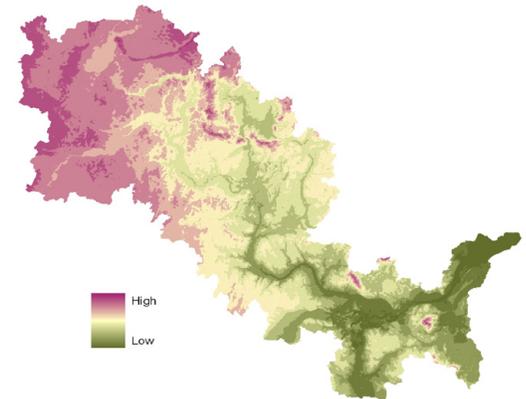
Precipitation in the watershed ranges from 25 to 29 inches each year. Evaporation estimates are between 36 to 37 inches annually (Minnesota State Climatologists Office, 1999).

Most lands within this HUC are not highly erodible, and are moderately suited to agricultural uses. Predominate land uses / land covers are Row Crops (49.9%), Grass/Pasture/Hay (27.4%), Forest (8.7%), and Residential/Commercial Development (5.9%).

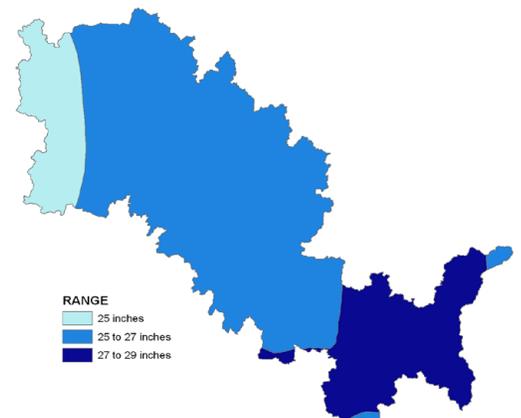
Land use within the watershed is largely agricultural, with crop and pasture lands accounting for approximately 77% of the overall watershed acres.

Development pressure is moderate to considerable in some areas, with occasional farms, timberland, and lakeshore being parceled out for recreation, lake or country homes.

Relief

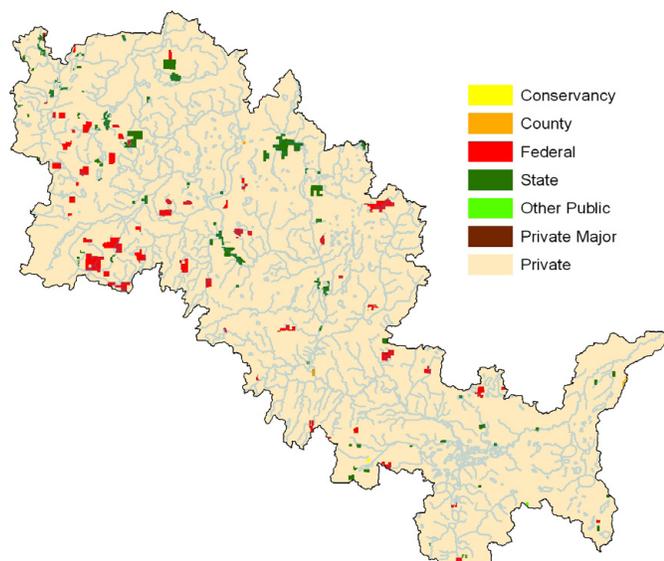


Average Precipitation



Ownership

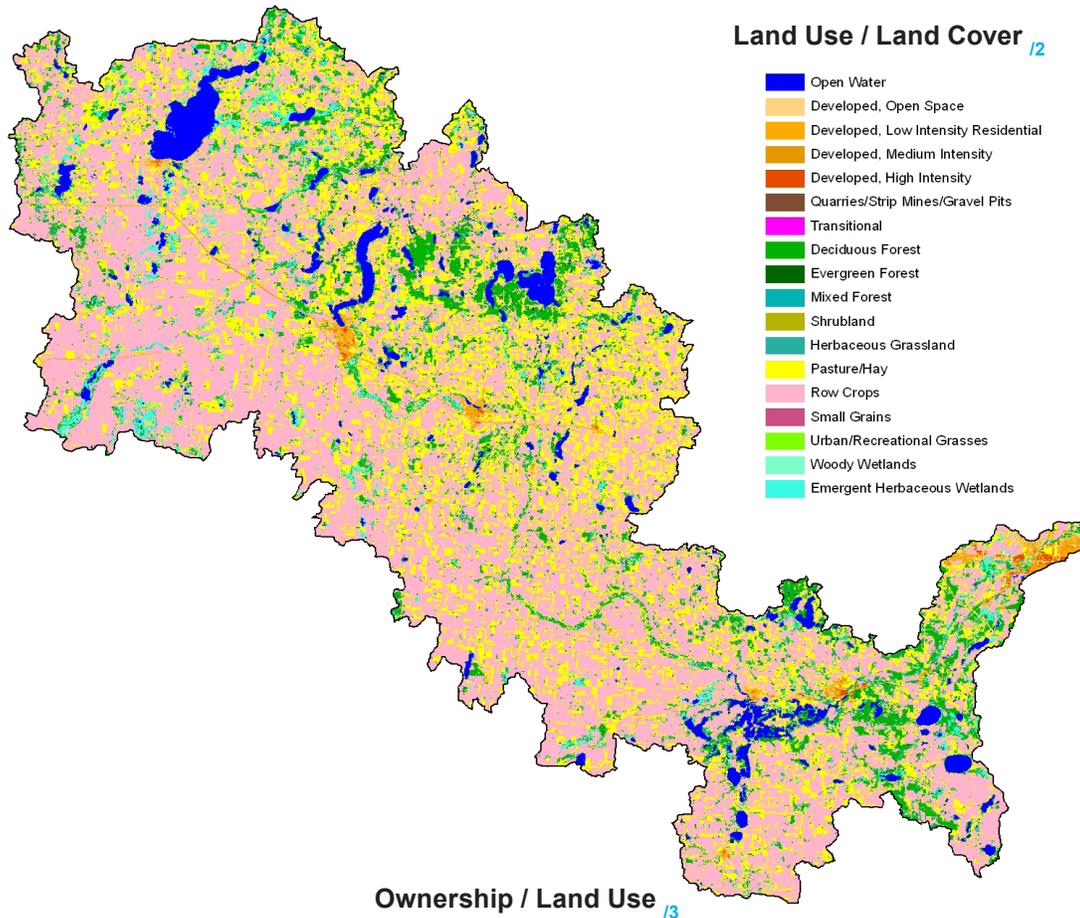
Ownership Type	Acres	% of HUC
Conservancy	57	0.01
County	246	0.03
Federal	11,055	1.7
State	9,303	1.4
Other	57	0.01
Tribal	-	-
Private Major	89	0.01
Private	646,407	96.9
Total Acres:	667,214	100



* Ownership totals derived from 2007 MN DNR GAP Stewardship Coverage 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 Sauk River watershed covers an area of 667,214 acres. Slightly less than ninety seven percent of the land in the watershed is owned by private landholders (645,407 acres). The second largest ownership type is Federal, with approximately 11,055 acres (1.7%), followed by State with 9,303 acres (1.4%), County with 246 acres (0.01%), and Private Major with 89 acres (0.01%). In addition there are 57 acres of Conservancy land, and 57 acres of miscellaneous "Other" Public Lands. Existing ownership data shows no Tribal land holdings in the region. Land use by ownership type is represented in the table below.



Ownership / Land Use ^{/3}

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	% Public	Acres	% Private	Acres	% Tribal		
Forest	3,305	0.5%	54,747	8.2%	0	0.0%	58,053	8.7%
Grass, etc	5,952	0.9%	176,590	26.5%	0	0.0%	182,543	27.4%
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Row Crops	5,643	0.8%	327,127	49.0%	0	0.0%	332,770	49.9%
Shrub etc	3	0.0%	182	0.0%	0	0.0%	185	0.0%
Wetlands	3,828	0.6%	19,566	2.9%	0	0.0%	23,395	3.5%
Residential/Commercial	638	0.1%	38,602	5.8%	0	0.0%	39,240	5.9%
Open Water*	1,278	0.2%	29,748	4.5%	0	0.0%	31,026	4.7%

* ownership undetermined

** includes private-major

Watershed Totals:	20,649	3.09%	646,562	96.9%	0	0.0%	667,214	100%
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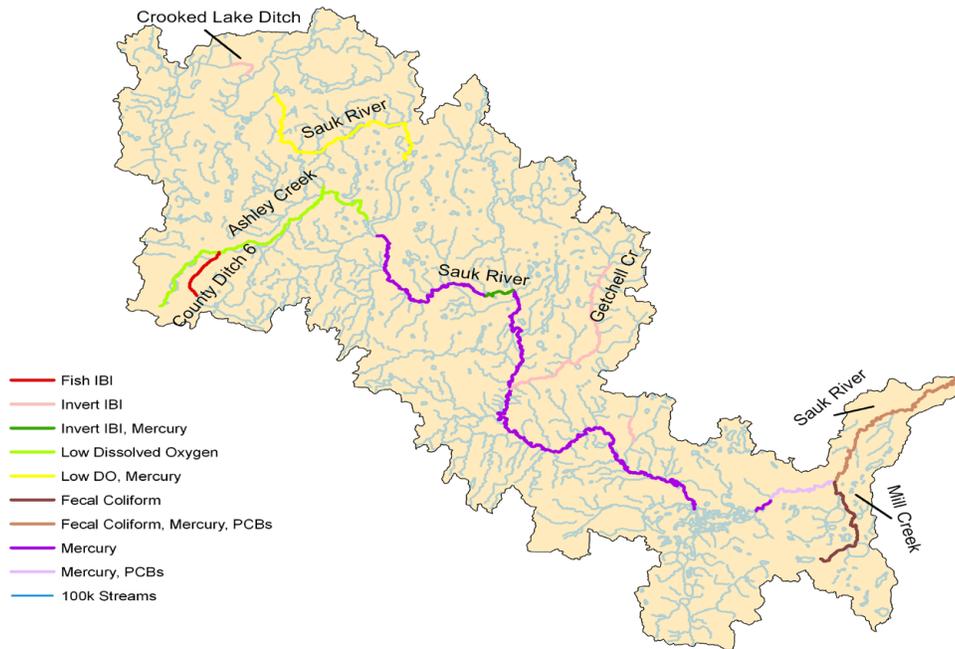
Physical Description (continued)

		ACRES	cu. ft/sec	
Stream Flow Data	USGS 05270500 SAUK RIVER NEAR ST. CLOUD, MN	Total Avg.	296.8	
		May – Sept. Yield	340.2	
		ACRES/MILES	PERCENT	
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)	Total Miles – Major (100K Hydro GIS Layer)	1,527	---	
	303d/TMDL Listed Streams (DEQ)	162	11%	
Riparian Land Cover/Land Use¹⁵ (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	Forest	4,934	13.4%	
	Grain Crops	0	0.0%	
	Grass, etc	9,965	27.1%	
	Orchards	0	0.0%	
	Row Crops	11,133	30.3%	
	Shrub etc	13	0.0%	
	Wetlands	3,847	10.5%	
	Residential/Commercial	1,220	3.3%	
	Open Water*	5,613	15.3%	
	Total Buffer Acres:	36,724	100%	
Crop and Pastureland Land Capability Class¹⁶ (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	48,800	10%	
	2 – moderate limitations	248,000	49%	
	3 – severe limitations	91,200	18%	
	4 – very severe limitations	61,800	12%	
	5 – no erosion hazard, but other limitations	10,400	2%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	42,600	8%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	3,200	1%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	0	0%	
	Total Croplands & Pasturelands	506,000	---	
Irrigated Lands¹⁷ (1997 NRI Estimates for Non- Federal Lands Only)	TYPE OF LAND	ACRES	% of Crop Lands	% of HUC
	Cultivated Cropland / Pastureland	23,100	4.6%	3.5%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	23,100	4.6%	3.5%

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 the Minnesota Pollution Control Agency (MPCA) to identify and restore impaired waters.

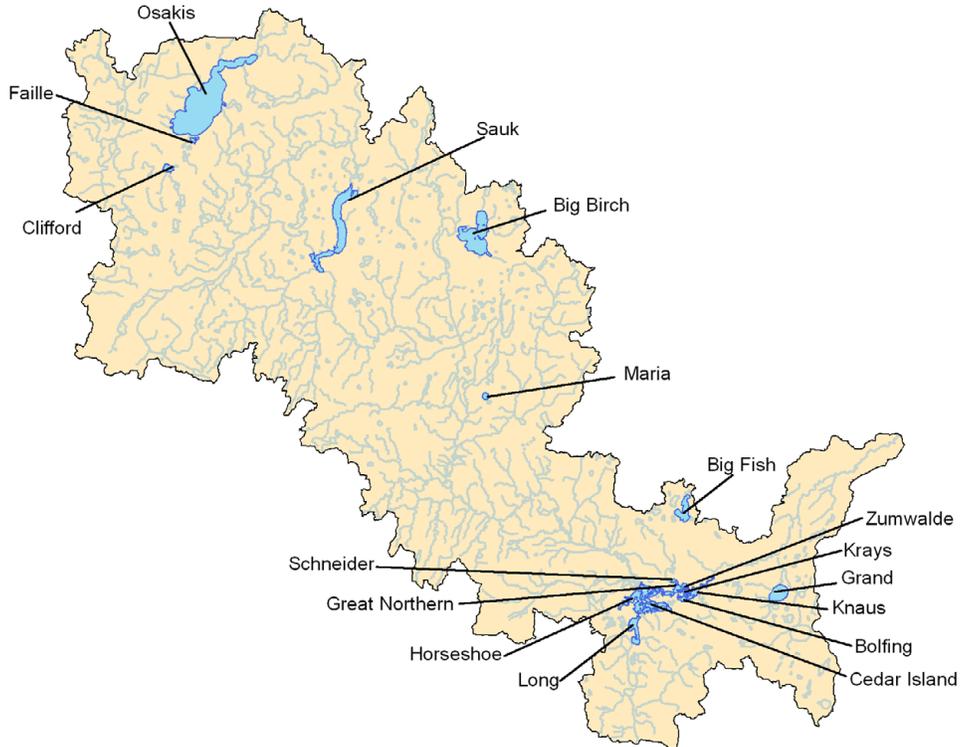
2006 Minnesota 303d Listed Streams - Sauk Watershed



Listed Stream / Reach ⁸	Impairment	Affected Use
Sauk River Mill Cr to Mississippi R	Fecal Coliform, Mercury, PCBs	Aquatic Consumption, Recreation
Sauk River Headwaters (Lk Osakis) to Sauk Lk	Low Dissolved Oxygen, Mercury	Aquatic Consumption, Aquatic Life
Ashley Creek Headwaters to Sauk Lk	Low Dissolved Oxygen	Aquatic Life
Sauk River Adley Cr to Getchell Cr	Mercury	Aquatic Consumption
Sauk River Melrose Dam to Adley Cr	Invert IBI, Mercury	Aquatic Consumption, Aquatic Life
Sauk River Sauk Lk to Melrose Dam	Mercury	Aquatic Consumption
Sauk River Getchell Cr to State Hwy 23	Mercury	Aquatic Consumption
Sauk River Knaus Lk to Cold Spring Dam	Mercury	Aquatic Consumption
Sauk River Cold Spring Dam to Cold Spring WWTP	Mercury, PCBs	Aquatic Consumption
Sauk River Cold Spring WWTP to Mill Cr	Mercury, PCBs	Aquatic Consumption
County Ditch 6 Unnamed Cr to Ashley Cr	Fish and Invert IBI	Aquatic Life
Mill Creek Headwaters to Sauk R	Fecal Coliform	Aquatic Recreation
Crooked Lake Ditch Unnamed Cr to Lk Osakis	Invert IBI	Aquatic Life
Unnamed creek Unnamed Cr to Unnamed Cr	Invert IBI	Aquatic Life
Sauk River State Hwy 23 to Horseshoe Lk	Mercury	Aquatic Consumption
Getchell Cr County Ditch 2 to Sauk River	Invert IBI	Aquatic Life

Assessment of Waters (continued)

2006 Minnesota 303d Listed Lakes - Sauk Watershed



Listed Lake	Impairment	Affected Use
Clifford	Excess nutrients	Aquatic Recreation
Grand	Mercury	Aquatic Consumption
Schneider	Excess nutrients	Aquatic Recreation
Great Northern	Excess nutrients	Aquatic Recreation
Knaus	Excess nutrients	Aquatic Recreation
Krays	Excess nutrients	Aquatic Recreation
Bolfing	Excess nutrients	Aquatic Recreation
Zumwalde	Excess nutrients	Aquatic Recreation
Big Fish	Mercury	Aquatic Consumption
Cedar Island (Main Bay)	Excess nutrients	Aquatic Recreation and Aquatic Consumption
Cedar Island (Mud Lk)	Mercury	Aquatic Consumption
Cedar Island (Koetter Lk)	Excess nutrients	Aquatic Recreation and Aquatic Consumption
Cedar Island (East Lk)	Mercury	Aquatic Consumption
Long	Excess nutrients	Aquatic Recreation
Horseshoe	Excess nutrients	Aquatic Recreation and Aquatic Consumption
Maria	Excess nutrients	Aquatic Recreation
Big Birch	Mercury	Aquatic Consumption
Sauk	Excess nutrients	Aquatic Recreation and Aquatic Consumption
Faille	Excess nutrients	Aquatic Recreation
Osakis	Excess nutrients	Aquatic Recreation and Aquatic Consumption

Common Resource Areas

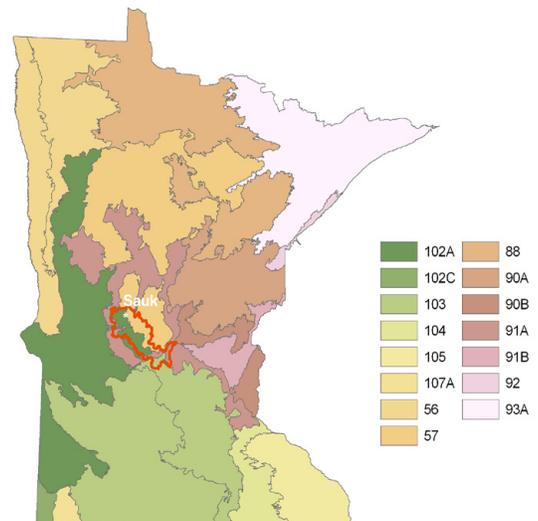
The Sauk Watershed encompasses four common resource areas, 103.2, 102A.1, 91A.1, and 57.1.¹⁹

103.2 Iowa and Minnesota Rolling Prairie/Forest Moraines
 Primarily loamy glacial till soils with some potholes, outwash and flood plains. Gently undulating to rolling with relatively short, complex slopes. Organic soils occur in the larger basins. Primary land use is cropland. Corn, soybeans, and hay are the major crops. Native vegetation was dominantly mixed tall grass prairie and deciduous trees. Resource concerns are water and wind erosion, nutrient management, water quality & wildlife habitat management.

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.

91A.1 Central Minnesota Outwash: Nearly level to gently sloping well drained sandy soils on outwash plains and stream terraces. There are also numerous poorly and very poorly drained mineral and organic soils. Irrigated crop land, pasture and hayland are the major land uses. Forestland is common in parts. Corn, soybeans, edible beans and potatoes are the primary irrigated crops. Forage crops are also extensively grown. Resource concerns are wind erosion water quality, nutrient management, improperly managed grazing.

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.



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

Geology / Soils¹⁰

The major types of soils within the watershed are Alfisols and Mollisols. The bedrock geology consists of primarily Precambrian crystalline rocks (Sims and Morey, 1972, Stark et al, 1996). The Sauk River Watershed lies within calcareous glacial deposits characterized by the Des Moines Lobe Association.

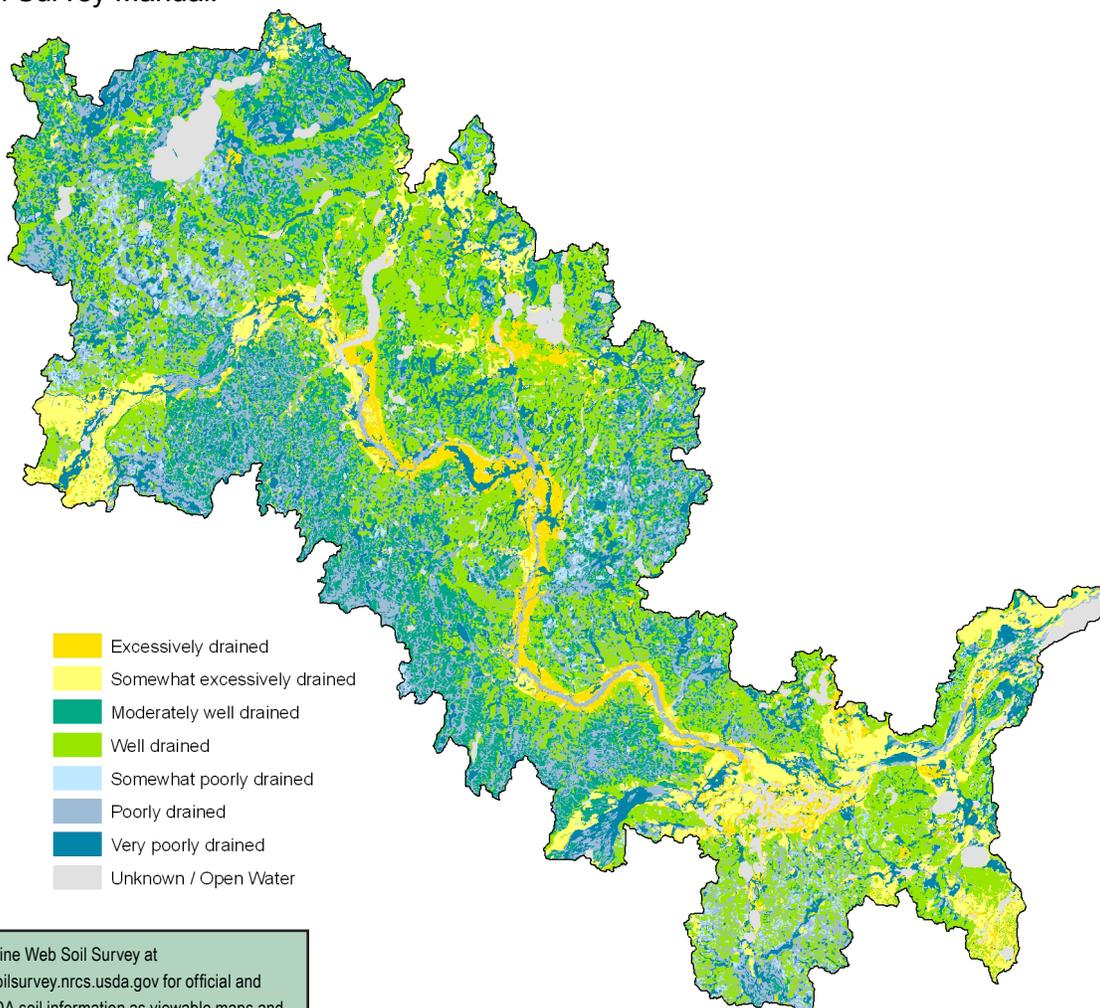
The bedrock hydrogeology and ground water in the Sauk River Watershed consists of primarily Precambrian igneous and metamorphic rocks with a Cretaceous aquifer (Stark, et al., 1996). The surficial aquifers are primarily glacial outwash consisting of course-grained sands and fine-grained alluvium of calcareous and siliceous depots and glacial till consisting of calcareous and siliceous deposits. Parts of the watershed area are also located in the surficial aquifer known as the Anoka Sand 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, 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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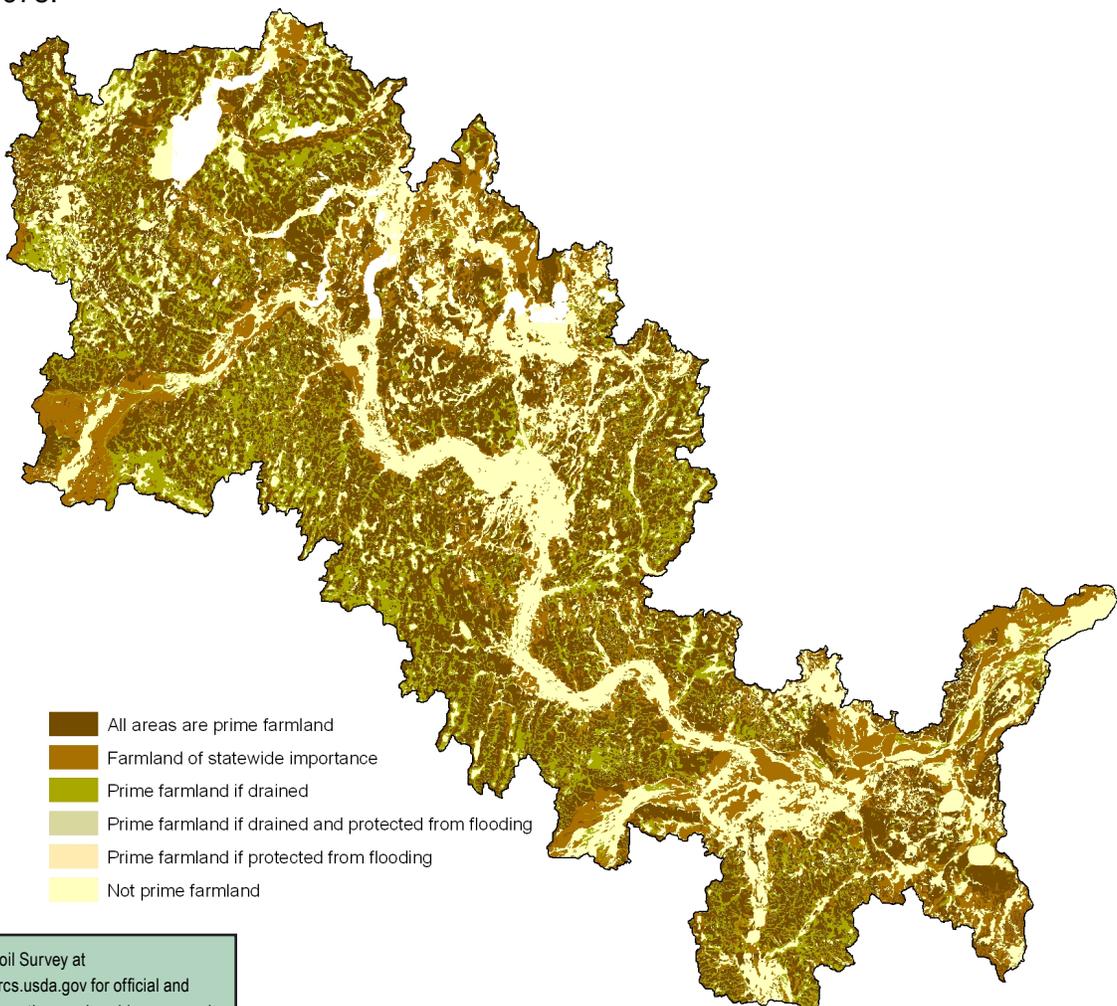
 certified soil tabular and spatial data.

Farmland Classification

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.



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

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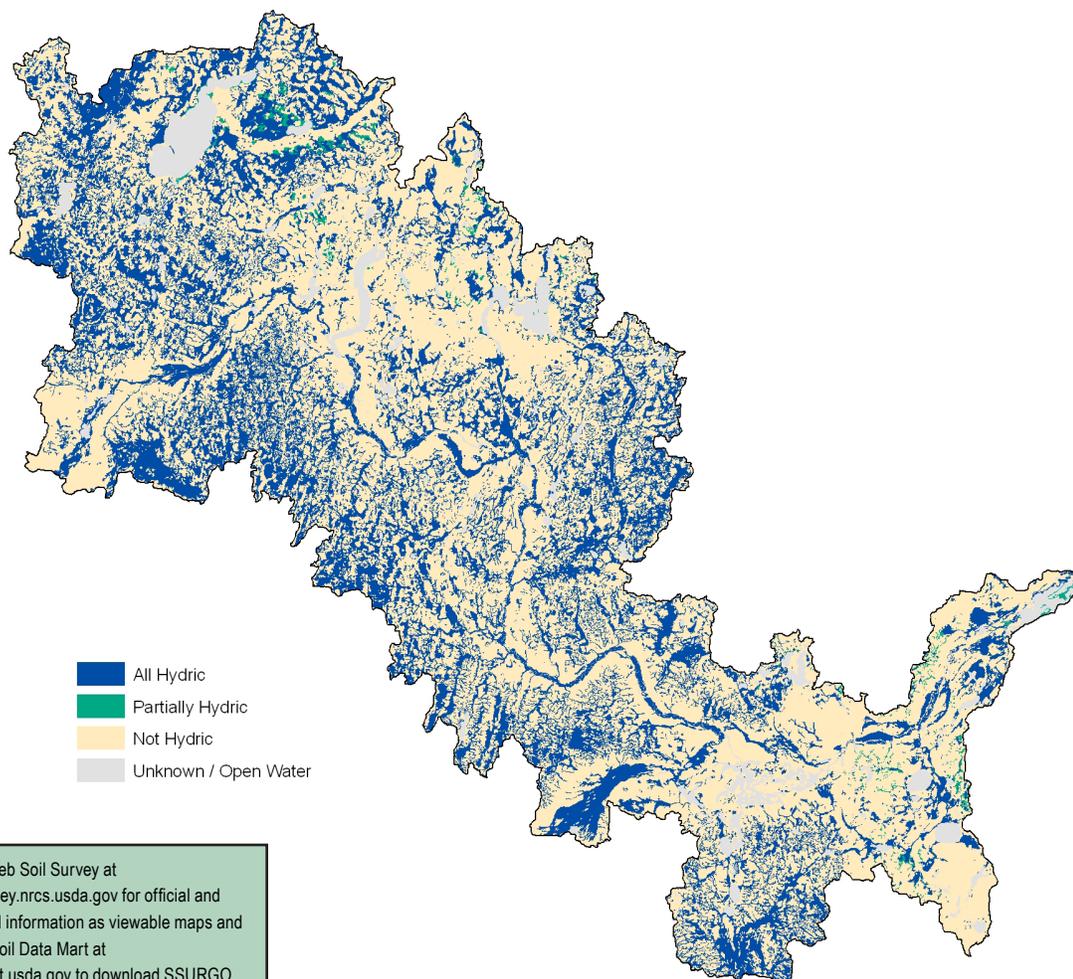
 certified soil tabular and spatial data.

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.

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field.



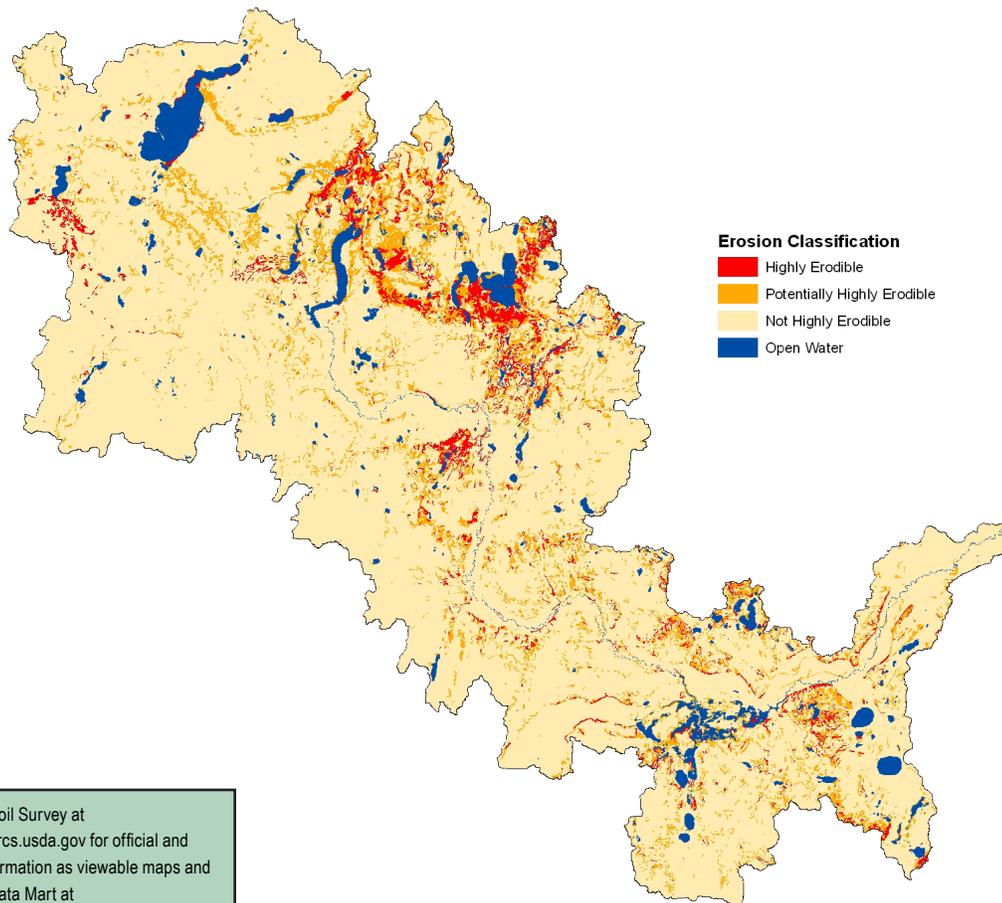
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Highly Erodible Land (HEL)

The erodibility index (EI) for a soil map unit is determined by dividing the potential erodibility for the soil map unit by the soil loss tolerance (T) value established for the soil in the FOTG as of January 1, 1990.

A soil map unit with an EI of 8 or greater is considered to be highly erodible land (HEL).

Potential erodibility is based on default values for rainfall amount and intensity, percent and length of slope, surface texture and organic matter, permeability, and plant cover. Actual erodibility and EI for any specific map unit depends on the actual values for these properties.

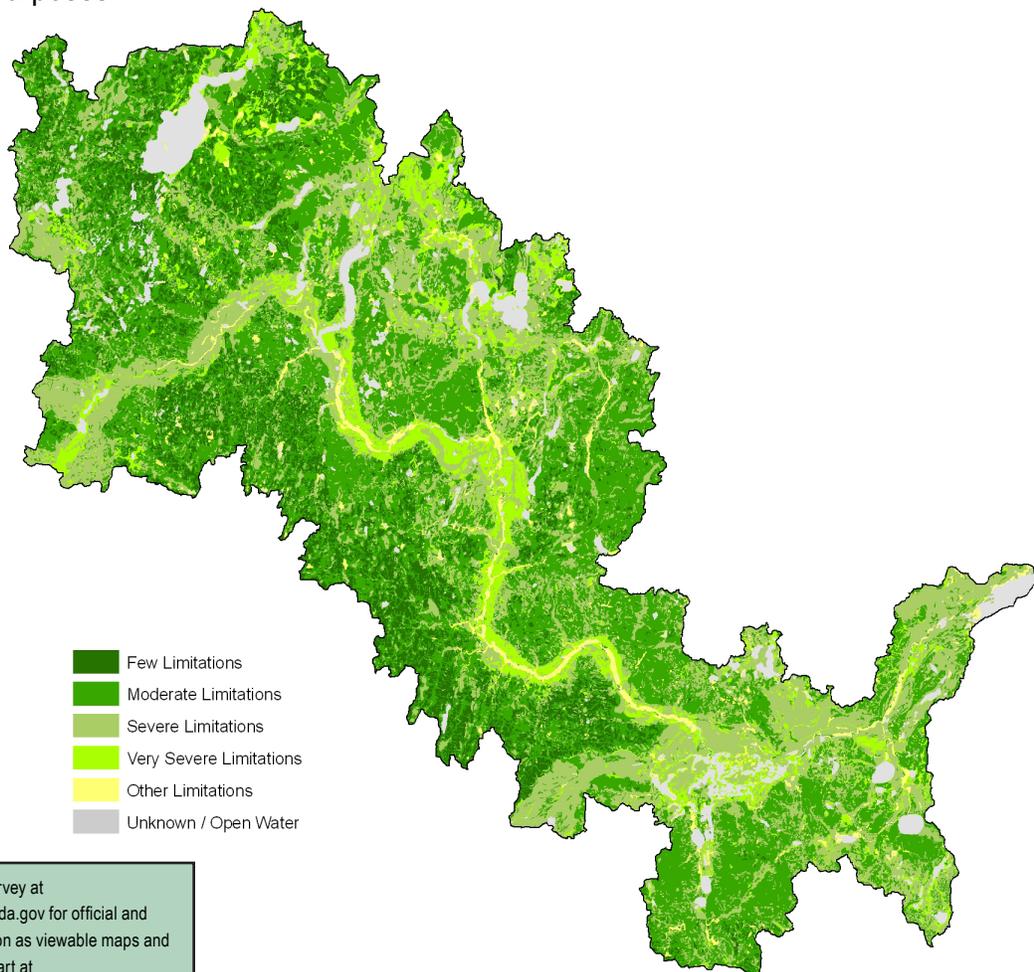


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Land Capability Classification

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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Performance Results System Data

Watershed Name: Sauk				Watershed Number: 07010202						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	2,696	8,026	0	7,152	21,889	N/A	41,360	34,974	17,228	133,325
Total Conservation Systems Applied (acres)	6,412	5,876	0	7,512	7,512	N/A	49,655	44,372	27,547	148,886
Conservation Practices										
Total Waste Management (313) (numbers)	5	3	0	11	4	7	10	10	16	66
Riparian Forest Buffers (391) (acres)	32	13	55	441	157	55	151	0	21	925
Erosion Control Total Soil Saved (tons/year)	1,271	39,259	12,224	12,597	29,235	N/A	N/A	N/A	N/A	94,586
Total Nutrient Management (590) (Acres)	3,484	4,023	1,137	7,993	4,560	6,545	35,441	35,441	14,642	113,266
Pest Management Systems Applied (595A) (Acres)	352	2,385	1,539	5,830	1,005	5,981	8,155	28,552	11,438	65,237
Prescribed Grazing 528a (acres)	0	0	55	0	45	126	40	19	19	304
Tree & Shrub Establishment (612) (acres)	370	198	536	320	125	121	29	45	38	1,782
Residue Management (329A-C) (acres)	470	4,172	2,011	141	144	892	892	10,826	3,139	22,687
Total Wildlife Habitat (644 - 645) (acres)	3,146	2,287	3,057	1,716	955	233	1,716	2,451	2,836	18,397
Total Wetlands Created, Restored, or Enhanced (acres)	180	444	345	144	121	148	101	53	131	1,667
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	6,172	5,440	5,169	3,658	431	N/A	676	1,079	2,761	25,386
Wetlands Reserve Program	0	0	0	0	0	N/A	0	0	93	93
Environmental Quality Incentives Program	0	3,316	3,556	1,652	4,513	N/A	15,271	36,201	20,156	84,665
Wildlife Habitat Incentive Program	5,451	0	0	0	0	N/A	0	7	238	5,696
Farmland Protection Program	0	0	0	0	0	N/A	0	0	0	0

RESOURCE CONCERNS

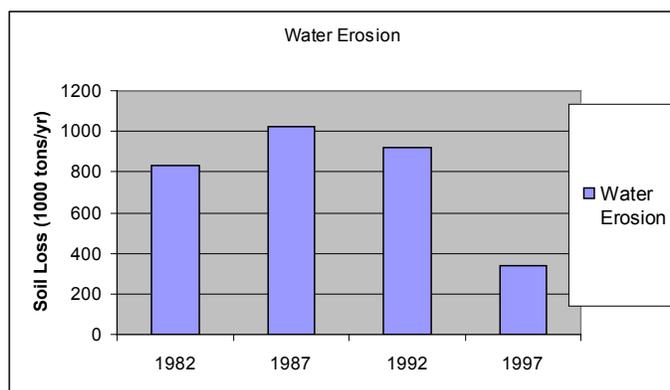
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- Soil Quality, Excessive Erosion.** Sheet and rill as well as gully erosion and consequential soil deposition have ranked as high concerns for the counties in the watershed.
- Woodland Management.** Management opportunities include, but are not limited to planting trees or shrubs, timber stand improvement, timber sales, enhancing wildlife habitat, prescribed burning, and controlling invasive species.
- Surface 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. Mercury and PCB levels are affecting Aquatic consumption, aquatic life, and aquatic recreation.
- Ground Water Quality, Nutrients, Organics, Animal and Human Wastewater management.** Aging septic systems, feedlot runoff, nutrient runoff, tilling practices, improper closure of old manure pits, and abandoned wells all pose threats to groundwater quality throughout the region. Improved management of wastewater ensures safe water for all uses.
- Ground Water Quantity.** Land alterations have transformed the flow, retention, and replenishment of the hydrologic cycle. Pattern tiling, ditching, wetland removal, development, stormwater drainage, excessive groundwater use, etc. have resulted in the cumulative effect of rapidly transporting a greater amount of water to major rivers and streams, and away from groundwater recharge potential.
- Surface Water Management, Gully Control, Drainage Management.** Drained wetlands, crop production in flood prone areas, and aging dams all diminish surface water quality and productivity. Restoration of wetlands, dam repair and placing flood-prone lands in CRP/RIM all serve to lessen the impact of flooding and improve drainage.
- Wetland Management.** Area groups recognize that development and agricultural practices have had major impacts on wetlands. Physical changes have taken place, wildlife and plant species composition have been altered greatly changing the function and value of the areas plentiful wetlands. Priority should be given to the protection and enhancement of remaining wetlands in the basin.



NRI Erosion Estimates

- NRI estimates for sheet and rill erosion by water on the cropland and pastureland increased by approximately 169,000 tons (20.3%) of soil between 1982 and 1997. ¹³



THREATENED AND ENDANGERED SPECIES 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 basin.



Scientific Name	Common Name	Type
<i>Aflexia rubranura</i>	Red Tailed Prairie Leafhopper	Zoological
<i>Ammodramus henslowii</i>	Henslow's Sparrow	Zoological
<i>Botrychium mormo</i>	Goblin Fern	Botanical
<i>Buteo lineatus</i>	Red-shouldered Hawk	Zoological
<i>Carex sterilis</i>	Sterile Sedge	Botanical
<i>Cirsium hillii</i>	Hill's Thistle	Botanical
<i>Cypripedium candidum</i>	Small White Lady's-slipper	Botanical
<i>Dendroica cerulea</i>	Cerulean Warbler	Zoological
<i>Emydoidea blandingii</i>	Blanding's Turtle	Zoological
<i>Etheostoma microperca</i>	Least Darter	Zoological
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Hesperia dacotae</i>	Dakota Skipper	Zoological
<i>Larus pipixcan</i>	Franklin's Gull	Zoological
<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Ligumia recta</i>	Black Sandshell	Zoological
<i>Limosa fedoa</i>	Marbled Godwit	Zoological
<i>Marpissa grata</i>	A Jumping Spider	Zoological
<i>Microtus ochrogaster</i>	Prairie Vole	Zoological
<i>Notropis anogenus</i>	Pugnose Shiner	Zoological
<i>Oarisma powesheik</i>	Powesheik Skipper	Zoological
<i>Panax quinquefolius</i>	American Ginseng	Botanical
<i>Paradamoetas fontana</i>	A Jumping Spider	Zoological
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Platanthera flava</i> var. <i>herbiola</i>	Tuberclcd Rein-orchid	Botanical
<i>Potamogeton vaseyi</i>	Vasey's Pondweed	Botanical
<i>Rhynchospora capillacea</i>	Hair-like Beak-rush	Botanical
<i>Speyeria idalia</i>	Regal Fritillary	Zoological
<i>Sterna forsteri</i>	Forster's Tern	Zoological

Socioeconomic and Agricultural Data (Relevant)

Estimations for the Sauk River subbasin indicate a current population of just under 57,100 people. Median household income throughout the district is \$41,834 annually, roughly 90% of the national average. The estimated unemployment rate is 4.53%, and approximately 9% of the residents in the watershed are living below the national poverty level.

Assessment estimates indicate 2,164 Farms in the watershed. Approximately forty six percent of the operations are less than 180 acres in size, fifty percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Of the 2,232 operators in the subbasin, sixty five percent are full time producers not reliant on off-farm income.



(MN) HUC# 7010202		Total Acres:	667,214
Population Data*	Watershed Population	57,092	
	Unemployment Rate	4.53%	
	Median Household Income	41,834	
	% below poverty level	9%	
	Median Value of Home	89,033	
Farms	# of Farms	2,164	
	# of Operators	2,232	Percent
	# of Full Time Operators	1,460	65%
	# of Part Time Operators	772	35%
	Total Crop/Pasturelands:	506,000	75.8%
Farm Size	1 to 179 Acres	802	46%
	180 to 499 Acres	698	40%
	500 to 999 Acres	167	10%
	1,000 Acres or more	69	4%
Livestock & Poultry	Cattle - Beef	8,688	0%
	Cattle - Dairy	36,556	1%
	Chicken	507,223	17%
	Swine	55,532	2%
	Turkey	898,106	30%
	Other	1,510,755	50%
	Animal Count Total:	3,016,861	
Total Permitted AFOs:	1,593		
Chemicals (Acres Applied)	Insecticides	14,687	
	Herbicides	152,661	
	Wormicides	839	
	Fruiticides	528	
	Total Acres Treated	168,716	
	% State Chemical Totals	1.2%	

* 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

- **Alum and Lime Treatment on Clifford & Faille Lake**
 - Sauk River Watershed District
- **Biological & Toxicological Assessment**
 - Minnesota Pollution Control Agency
- **Mississippi River Env. Management Program**
 - US Army Corps of Engineers
- **Mississippi River Watch**
 - Mississippi Headwaters Board
- **Mississippi River Defense Network**
 - Legislative Commission on Minnesota Resources
- **Upper Mississippi River Basin W.Q. Plan**
 - Minnesota Pollution Control Agency
- **Sauk Lake Alternatives Study**
 - Wenk Associates Inc.
- **Upper Mississippi River Basin Planning**
 - Minnesota Pollution Control Agency
- **Upper Mississippi Source Water Protection Project**
 - Minnesota Department of Health
- **Upper Mississippi River WS Forest Partnership**
 - USDA Forest Service
- **Upper Mississippi River Watershed Fund**
 - USDA Forest Service / National Fish & Wildlife Federation
- **Sauk River Watershed Incentive Program**
 - Sauk River Watershed District

* 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

- **Douglas County SWCD**
 - 900 Robert St Ste 102, Alexandria, MN 56308
 - Phone (320) 763-3191
- **Meeker County SWCD**
 - 916 E St Paul St, Litchfield, MN 55355-0891
 - Phone (320) 693-7287
- **Morrison County SWCD**
 - 16776 Heron Rd, Little Falls, MN 56345
 - Phone (320) 616-2479
- **Pope County SWCD**
 - 1680 Franklin St N, Glenwood, MN 56334
 - Phone (320) 634-5327
- **Todd County SWCD**
 - 607 9th St NE, Long Prairie, MN 56347
 - Phone (320) 732-2644
- **Stearns County SWCD**
 - 110 Second St S Ste 128, Waite Park, MN 56387
 - Phone (320) 251-7800
- **Sauk River Watershed District**
 - 524 Fourth Street South Sauk Centre, MN 56378
 - Phone (320) 352-2231
- **Friends of the Mississippi River**
 - 360 N Robert St Saint Paul, MN 55101
 - Phone (651) 222-2193
- **West Central Minnesota Joint Powers Board**
 - 809 SE 8th St, Detroit Lakes, MN 56501
 - Phone (218) 847-9392
- **Wenck - Shingle Creek WMO, W. Mississippi WMO**
 - 1800 Pioneer Creek Center, Maple Plain, MN 55359
 - Phone (763) 479-4229
- **Trout Unlimited Twin Cities Chapter**
 - PO Box 390207
 - Edina, MN 55439-0207
- **MN DNR Area Fisheries Supervisor:**
 - 1509 1st Ave N Fergus Falls, MN 56537
 - Phone (218) 739-7576

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. U.S. Geological Survey National Hydrography Dataset (NHD) 1:100,000-scale Digital Line Graph (DLG) medium resolution hydrography data, integrated with reach-related information from the U.S. Environmental Protection Agency Reach File Version 3.0 (RF3). 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. 1997 NRI 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. [NRI-97] For more information: <http://www.nrcs.usda.gov/technical/NRI/>
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). 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 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. 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/>. Where listed, 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 listed individual projects can be obtained from the noted parties.