

Rapid Watershed Assessment

Pine River

(MN) HUC: 7010105



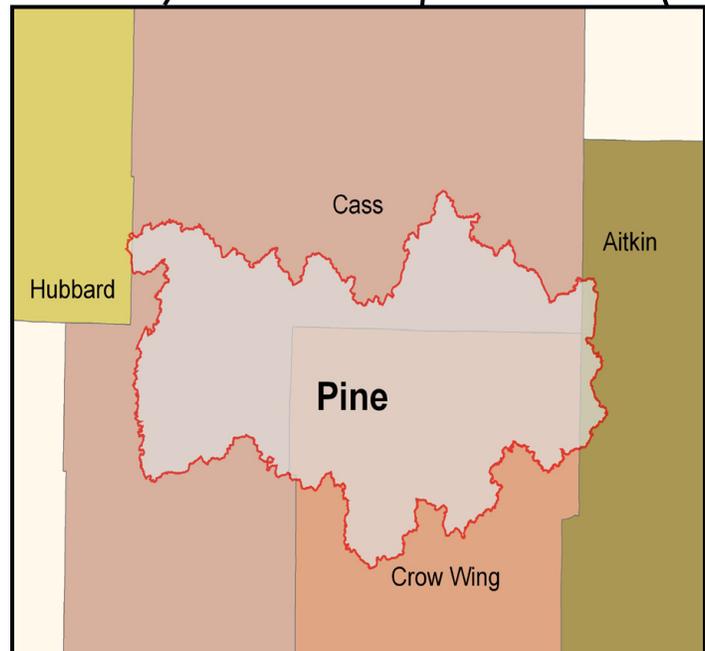
Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best actions to achieve their goals.

Introduction

The Pine River 8-Digit Hydrologic Unit Code (HUC) subbasin is located in the Northern Lakes and Forest ecoregion of Minnesota. This largely forested watershed is 502,196 acres in size. Approximately fifty six percent of the land in this HUC is privately owned, and the remainder is state, county, or federally owned public land.

Assessment estimates show 355 Farms in the watershed. Approximately fifty nine percent of the operations are less than 180 acres in size, thirty nine percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres. Fifty two percent of the producers are full time operators and do not rely on off-farm income.

The main resource concerns on the cropland are wind and water soil erosion, wetland protection, storm water management, timberland management, shoreline management and restoration, sedimentation, and cropland runoff. Associated with the cropland runoff are increased sediment and pollutant loadings to surface waters (mercury, sediment, excess nutrients). Declining wildlife habitat is also a concern.



County Totals

County	Acres in HUC	% HUC
Aitkin	11,957	2.4%
Cass	251,595	50.1%
Crow Wing	238,296	47.5%
Hubbard	347	0.1%
Total acres:	502,196	100%

Physical Description

Average elevation in the Pine River subbasin is 1,283 feet above sea level, with the highest values being in the Western and North Central portions of the watershed, while the lowest are found across the Southern regions.

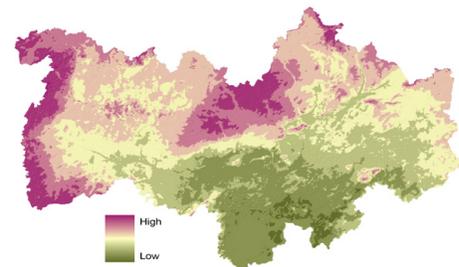
Annual precipitation in the watershed ranges from 25 to 29 inches. Estimated evaporation is 32 inches annually (Farnworth et al., 1982, Minnesota State Climatologists Office, 1999).

Most lands within this HUC are not highly erodible, and are moderately to poorly suited to agricultural uses. Predominate land uses / land covers are Forest (51%), Wetlands (21%), Open Water (13%), and Grass Pasture/Hay (7.5%).

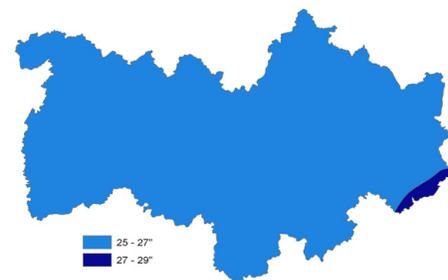
Land use within the watershed is moderately agricultural, accounting for approximately 9% of the available acres.

Development pressure is increasing, with farms, lakeshore and timberland being parceled out for recreation, lake or country homes.

Relief

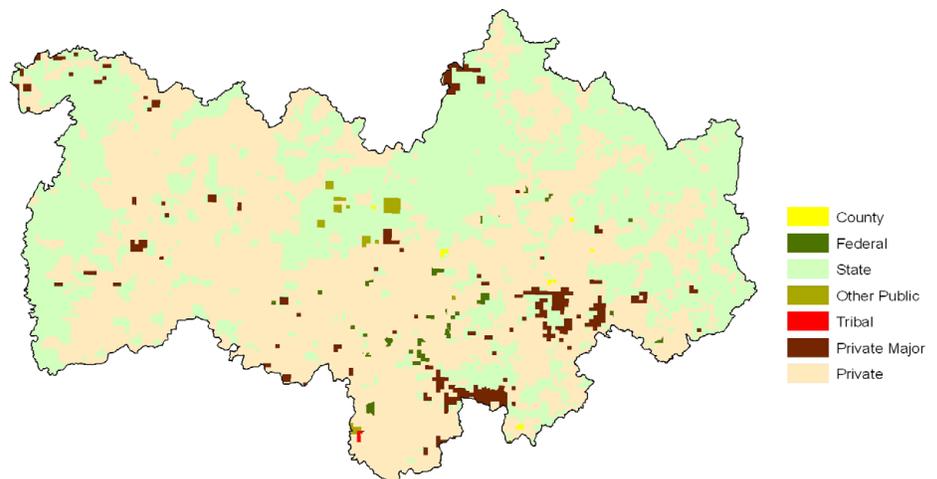


Average Precipitation



Ownership

Ownership Type	Acres	% of HUC
Conservancy	-	-
County	417	0.08
Federal	2,134	0.42
State	201,980	40.22
Other	1,724	0.34
Private Major	12,493	2.49
Private	283,332	56.42
Tribal	116	0.02
Total Acres:	502,196	100

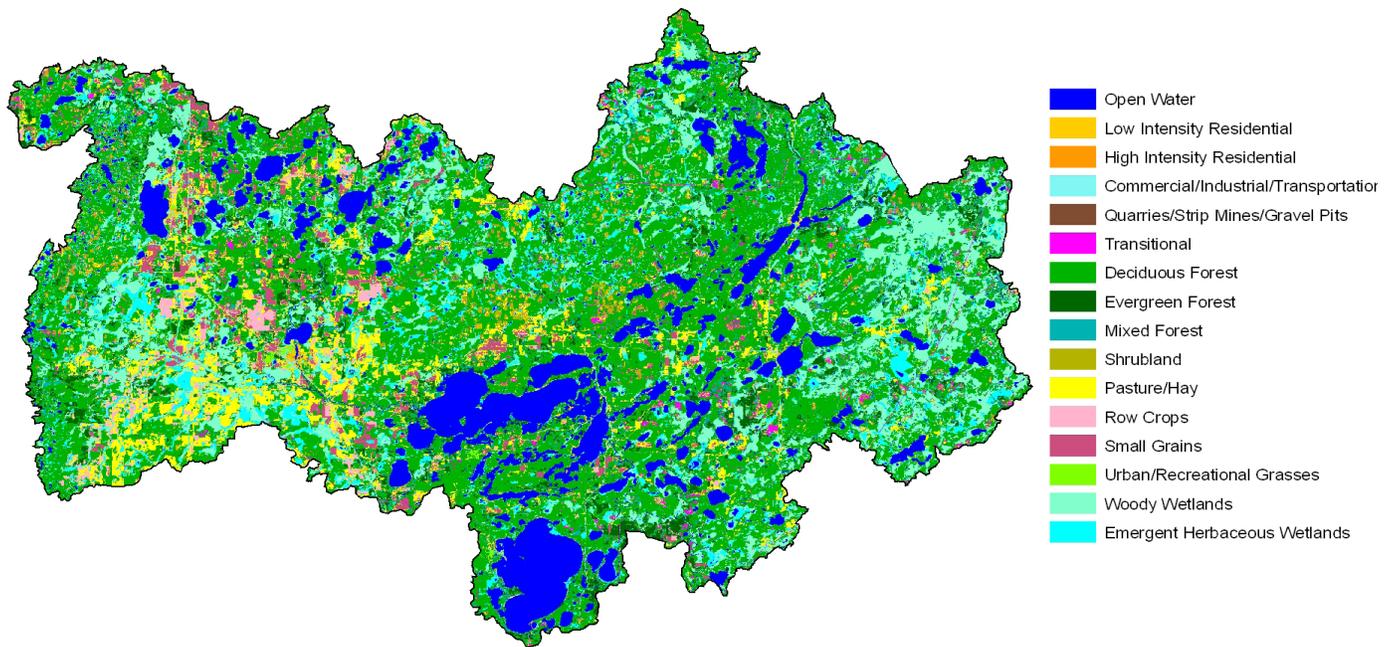


* Ownership totals derived from 2007 MN DNR GAP Stewardship Coverage data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Pine River watershed covers an area of 502,196 acres. Approximately fifty six percent of the land in the watershed is owned by private landholders (283,332 acres). The second largest ownership type is State, with approximately 201,980 acres (40.22%), followed by Private Major (Corporate Holdings) with 12,493 acres (2.5%), State with 449 acres (0.09%), Federal with 2,134 acres (0.4%), miscellaneous "Other" Public Lands amounting to 1,724 acres (0.3%), and County lands covering slightly less than 420 acres (0.1%). The smallest ownership class is Tribal, with 116 Acres (0.02%). Ownership data shows no major Conservancy 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	Percent	Acres	Percent	Acres	Percent			
Forest	122,798	24.5%	134,076	26.7%	102.2	0.0%	256,976	51.2%	
Grain Crops	124	0.0%	10,056	2.0%	0.0	0.0%	10,179	2.0%	
Grass, etc	5,422	1.1%	32,140	6.4%	0.0	0.0%	37,561	7.5%	
Orchards	0	0.0%	0	0.0%	0.0	0.0%	0	0.0%	
Row Crops	1,449	0.3%	9,300	1.9%	0.0	0.0%	10,749	2.1%	
Shrub etc	10,733	2.1%	4,158	0.8%	0.0	0.0%	14,891	3.0%	
Wetlands	58,269	11.6%	47,700	9.5%	13.8	0.0%	105,983	21.1%	
Residential/Commercial	135	0.0%	2,119	0.4%	0.0	0.0%	2,254	0.4%	
Open Water*	7,157	1.4%	56,443	11.2%	0.5	0.0%	63,601	12.7%	
* ownership undetermined		** includes private-major							
Totals:	206,086	41.0%	295,992	58.9%	116.5	0.02%	502,194	100.0%	

Physical Description (continued)

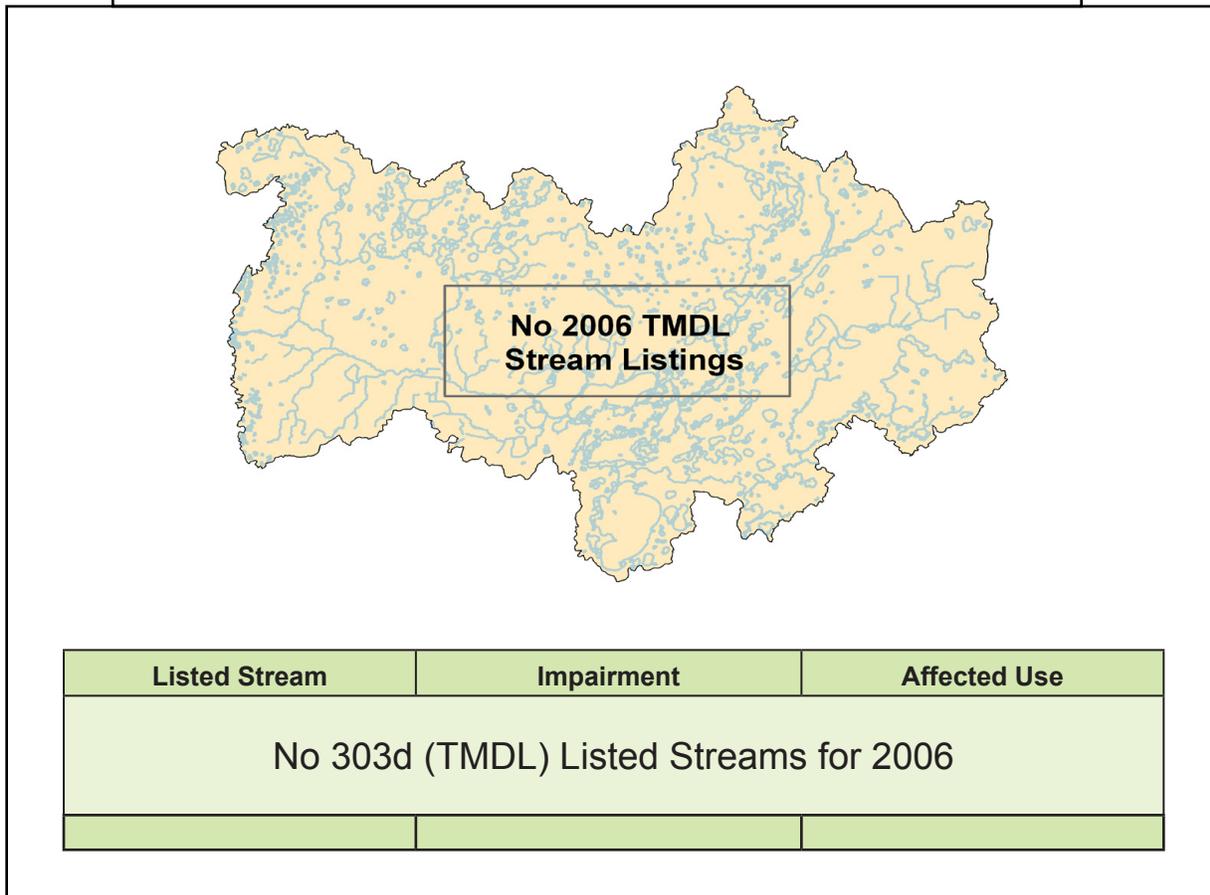
				cu. ft/sec	
Stream Flow Data	USGS 05229450 PINE RIVER NEAR PINE RIVER, MN	2006 Peak Streamflow	872		
		May – Sept. Yield	-N/A-		
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)		ACRES/MILES	PERCENT		
	Total Miles – Major (100K Hydro GIS Layer)	1,291.1	---		
	303d/TMDL Listed Streams (DEQ)	0.0	0%		
Riparian Land Cover/Land Use¹⁵ (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	Dev/Barren	190.8	0.6		
	Fallow	0	0		
	Forest	8,302.3	26.8		
	Grain Crops	43.1	0.1		
	Grass/Pasture	1,146.5	3.7		
	Orchards/Vine	0	0		
	Row Crops	485.8	1.6		
	Shrub/Range	130.2	0.4		
	Water	10,731.9	34.7		
	Wetlands	9,895.7	32.0		
	Total Buffer Acres	30,926.2	---		
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	7,300	22%		
	3 – severe limitations	8,300	25%		
	4 – very severe limitations	12,600	39%		
	5 – no erosion hazard, but other limitations	0	0%		
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	4,500	14%		
	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 Croplands & Pasturelands	32,700	---		
	TYPE OF LAND	ACRES	% of Irrigated Lands	% of HUC	
Irrigated Lands¹⁷ (1997 NRI Estimates for Non- Federal Lands Only)	Cultivated Cropland	0	0%	0%	
	Uncultivated Cropland	0	0%	0%	
	Pastureland	0	0%	0%	
	Total Irrigated Lands	0	0%	0%	

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.

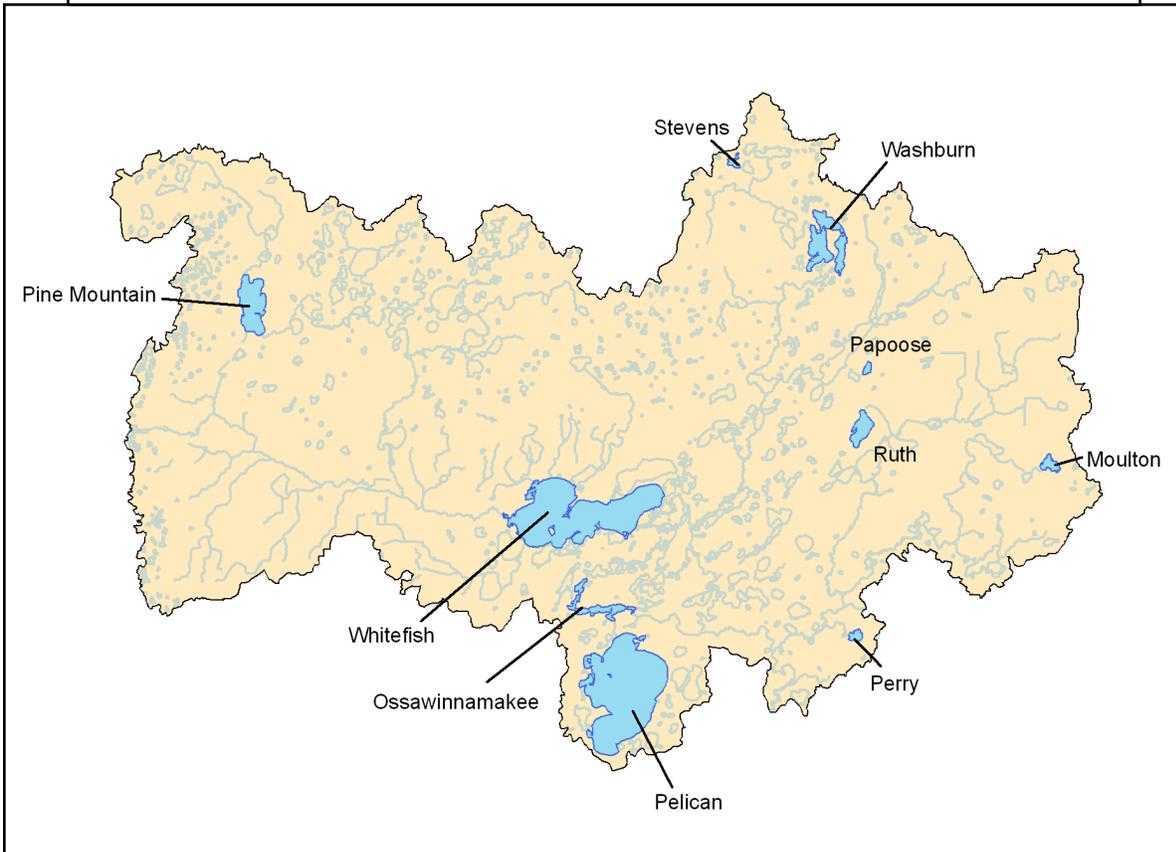
Minnesota's impaired waters list, updated every two years, identifies assessed waters that do not meet water quality standards. The primary tool for addressing impaired waters is a pollution reduction plan called a Total Maximum Daily Load, or TMDL. After impaired use(s) have been identified, the TMDL process identifies all sources of each pollutant. The plan then determines how much each source must reduce its contribution in order to meet the applicable water quality standard. The Clean Water Act requires a completed TMDL for each water quality violation identified on a state's impaired waters list. Lakes or river reaches with multiple impairments require multiple TMDLs.

2006 Minnesota 303d Listed Streams - Pine River Watershed



Assessment of Waters (continued)

2006 Minnesota 303d Listed Lakes - Pine River Watershed



Listed Lake	Impairment	Affected Use
Moulton	Toxics - Mercury	Aquatic Consumption
Washburn	Toxics - Mercury	Aquatic Consumption
Stevens	Toxics - Mercury	Aquatic Consumption
Pine Mountain	Toxics - Mercury	Aquatic Consumption
Perry	Toxics - Mercury	Aquatic Consumption
Papoose	Toxics - Mercury	Aquatic Consumption
Ruth	Toxics - Mercury	Aquatic Consumption
Pelican	Toxics - Mercury	Aquatic Consumption
Whitefish	Toxics - Mercury	Aquatic Consumption
Ossawinnamakee	Toxics - Mercury	Aquatic Consumption

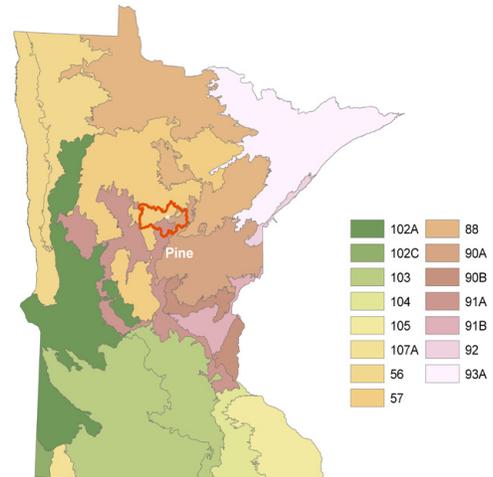
Common Resource Areas

The Pine River Watershed encompasses three common resource areas, CRA 57.1, 91A.1, and 90A.1.¹⁹

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.

90A.1 Loamy Till Ground Moraines and Drumlins: Nearly level to moderately steep, loamy, sandy, and organic soils. Mixed deciduous and coniferous forest is the primary land use with some glacial lakes and wetlands. Scattered cropland and grazing land are present. Cropland productivity is limited by the short length of the growing season. Primary resource concerns are timber management, wildlife habitat, recreation and agricultural forage production. Surface water quality is a localized concern.

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.



Only the major CRA units are described above.

 For further information, go to:

<http://soils.usda.gov/survey/geography/cra.html>

Geology / Soils¹⁰

Soils within the watershed are primarily Alfisols, which are generally underneath deciduous forests underlain by silty sands and are present in woodland and mixed woodland and cropland areas and Entisols, which are sandy soils commonly found in glacial outwash and alluvium.

Bedrock geology consists of primarily Precambrian crystalline rocks (Sims and Morey, 1972, Stark et al., 1996). The Pine River Watershed lies within calcareous glacial deposits associated with the Des Moines Lobe Association and the siliceous glacial deposits associated with the Rainy Lobe Association. The bedrock hydrogeology and ground water in the Pine River Watershed consists of primarily Precambrian igneous and metamorphic rocks.

The surficial aquifers are glacial outwash consisting of course-grained sands and finegrained alluvium of calcareous and siliceous deposits. The Glacial till consists of calcareous and siliceous deposits. In some areas these glacial deposits of sand and gravel are up to 600 feet deep.

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

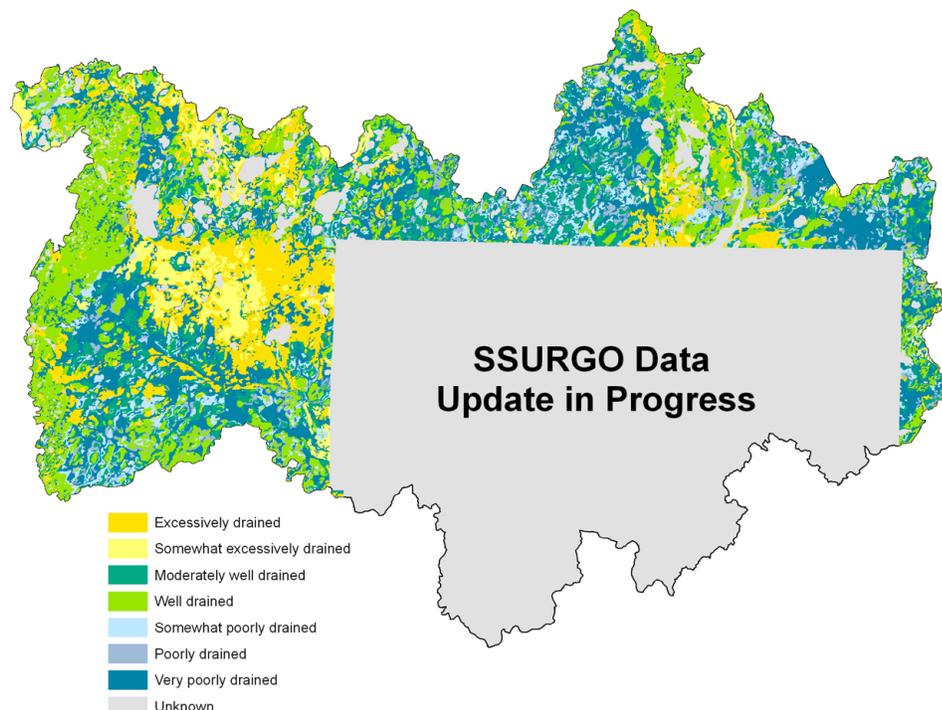
<http://soildatamart.usda.gov> to download SSURGO

 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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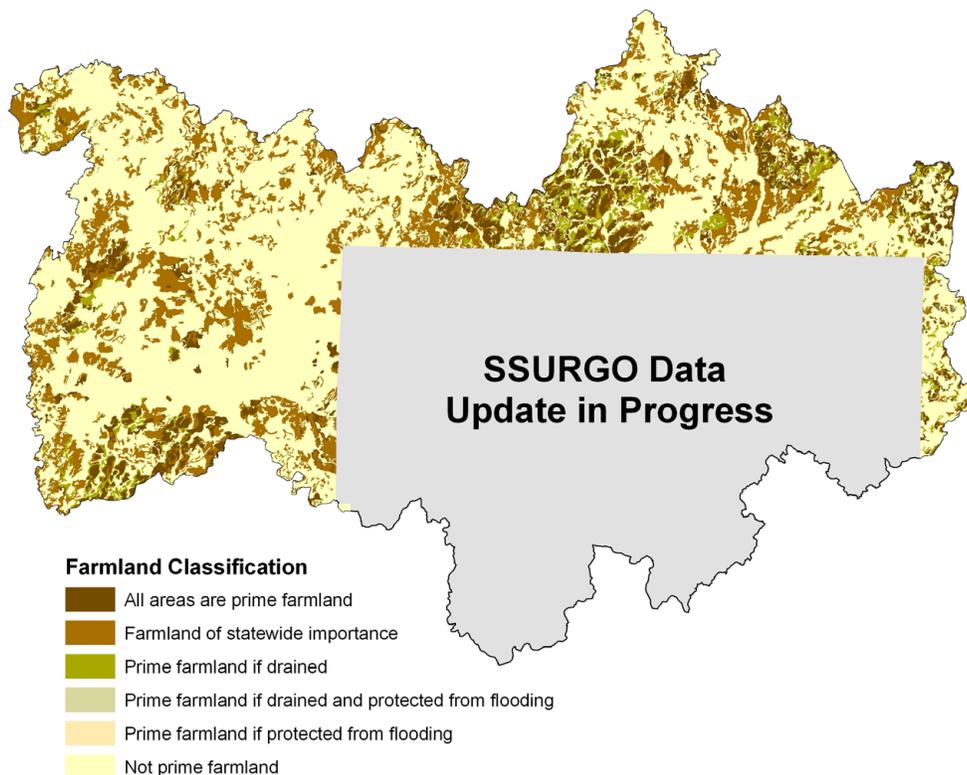
 certified soil tabular and spatial data.

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.



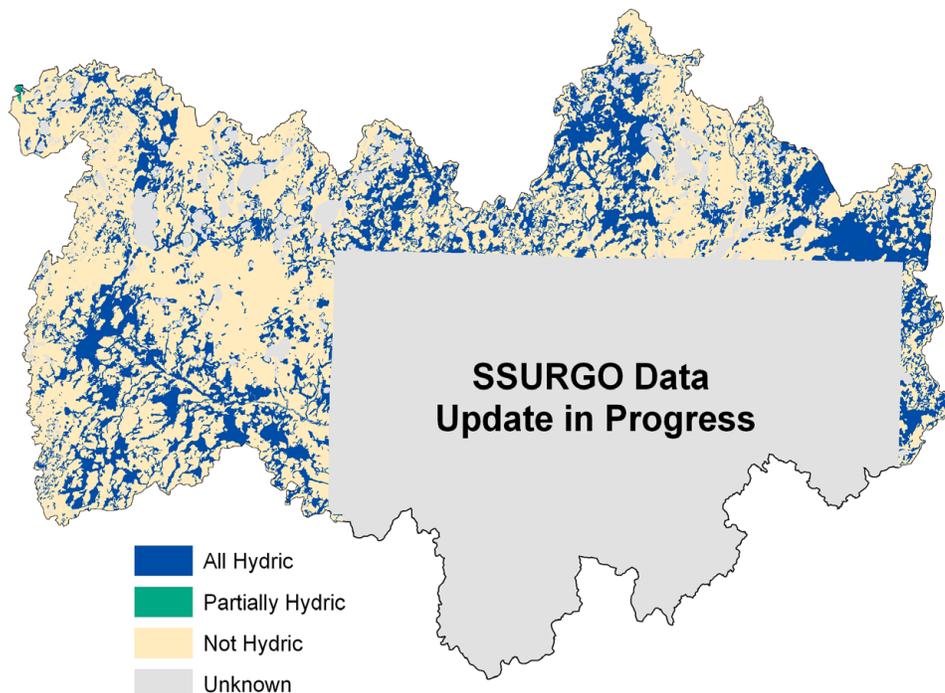
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Hydric Soils

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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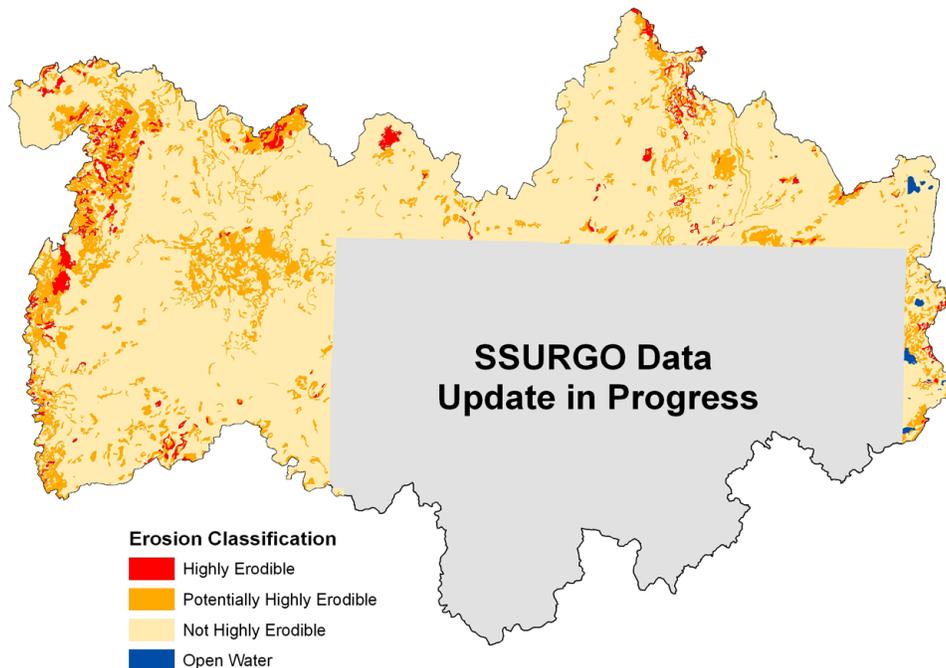
 certified soil tabular and spatial data.

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.

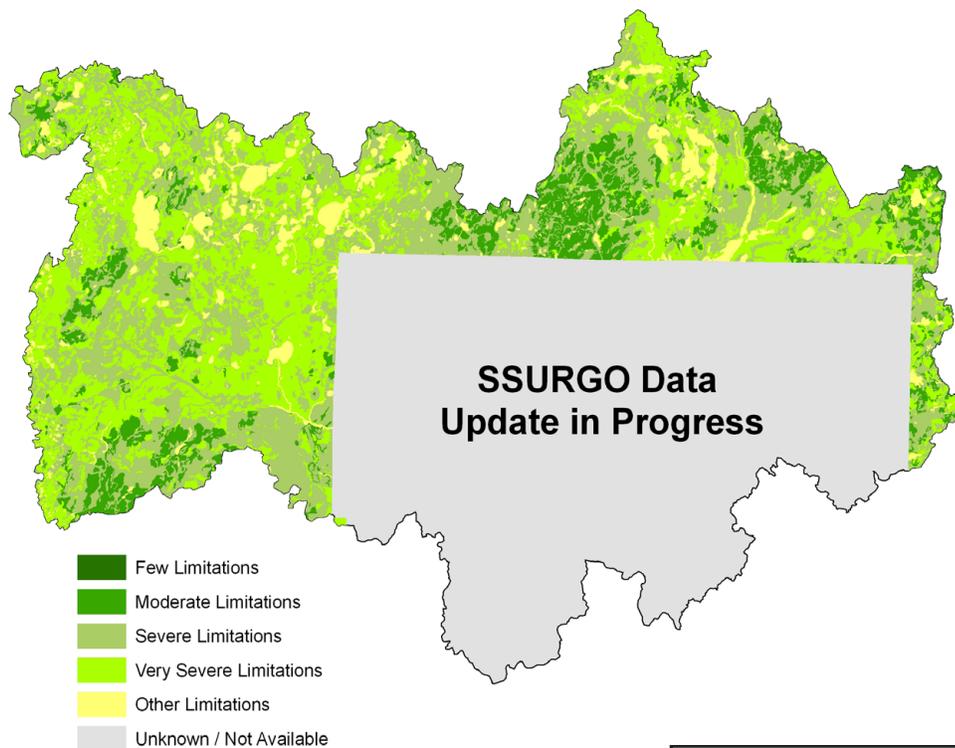


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Land Capability Classification

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: Pine				Watershed Number: 7010105						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	0	1,200	0	482	357	N/A	930	647	1,309	4,925
Total Conservation Systems Applied (acres)	0	398	0	197	197	N/A	8	1,005	999	2,804
Conservation Practices										
Total Waste Management (313) (numbers)	0	0	0	0	0	0	0	0	0	0
Riparian Forest Buffers (391) (acres)	0	0	11	9	41	41	0	0	0	102
Erosion Control Total Soil Saved (tons/year)	0	33	0	391	128	N/A	N/A	N/A	N/A	552
Total Nutrient Management (590) (Acres)	0	496	0	284	0	0	0	0	0	780
Pest Management Systems Applied (595A) (Acres)	0	257	0	0	0	0	0	0	0	257
Prescribed Grazing 528a (acres)	0	0	0	32	0	0	0	0	0	32
Tree & Shrub Establishment (612) (acres)	0	15	0	49	85	2	0	21	17	189
Residue Management (329A-C) (acres)	0	0	0	0	0	0	0	0	0	0
Total Wildlife Habitat (644 - 645) (acres)	0	244	80	838	154	12	838	18	16	2,200
Total Wetlands Created, Restored, or Enhanced (acres)	0	1	59	242	12	0	0	10	0	324
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	0	364	0	72	18	N/A	0	0	0	454
Wetlands Reserve Program	0	0	0	0	0	N/A	0	0	0	0
Environmental Quality Incentives Program	0	34	0	0	0	N/A	8	202	535	779
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 ¹⁴

Scientific Name	Common Name	Type
<i>Acipenser fulvescens</i>	Lake Sturgeon	Zoological
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	Zoological
<i>Asio flammeus</i>	Short-eared Owl	Zoological
<i>Botrychium campestre</i>	Prairie Moonwort	Botanical
<i>Botrychium lanceolatum</i>	Triangle Moonwort	Botanical
<i>Botrychium minganense</i>	Mingan Moonwort	Botanical
<i>Botrychium mormo</i>	Goblin Fern	Botanical
<i>Botrychium oneidense</i>	Blunt-lobed Grapefern	Botanical
<i>Botrychium pallidum</i>	Pale Moonwort	Botanical
<i>Botrychium rugulosum</i>	St. Lawrence Grapefern	Botanical
<i>Botrychium simplex</i>	Least Moonwort	Botanical
<i>Buteo lineatus</i>	Red-shouldered Hawk	Zoological
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological
<i>Cygnus buccinator</i>	Trumpeter Swan	Zoological
<i>Cypripedium arietinum</i>	Ram's-head Lady's-slipper	Botanical
<i>Eleocharis olivacea</i>	Olivaceous Spike-rush	Botanical
<i>Emydoidea blandingii</i>	Blanding's Turtle	Zoological
<i>Etheostoma microperca</i>	Least Darter	Zoological
<i>Fimbristylis autumnalis</i>	Autumn Fimbristylis	Botanical
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Hemidactylium scutatum</i>	Four-toed Salamander	Zoological
<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Ligumia recta</i>	Black Sandshell	Zoological
<i>Littorella uniflora</i>	American Shore-plantain	Botanical
<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	White Adder's-mouth	Botanical
<i>Najas gracillima</i>	Thread-like Naiad	Botanical
<i>Notropis anogenus</i>	Pugnose Shiner	Zoological
<i>Nymphaea leibergii</i>	Small White Water-lily	Botanical
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Platanthera clavellata</i>	Club-spur Orchid	Botanical
<i>Platanthera flava</i> var. <i>herbiola</i>	Tubercled Rein-orchid	Botanical
<i>Polemonium occidentale</i> ssp. <i>lacustre</i>	Western Jacob's Ladder	Botanical
<i>Polycentropus milaca</i>	A Caddisfly	Zoological
<i>Potamogeton bicupulatus</i>	Snailseed Pondweed	Botanical
<i>Potamogeton vaseyi</i>	Vasey's Pondweed	Botanical
<i>Ranunculus lapponicus</i>	Lapland Buttercup	Botanical
<i>Sparganium glomeratum</i>	Clustered Bur-reed	Botanical
<i>Torreyochloa pallida</i>	Torrey's Manna-grass	Botanical
<i>Xyris montana</i>	Montane Yellow-eyed Grass	Botanical

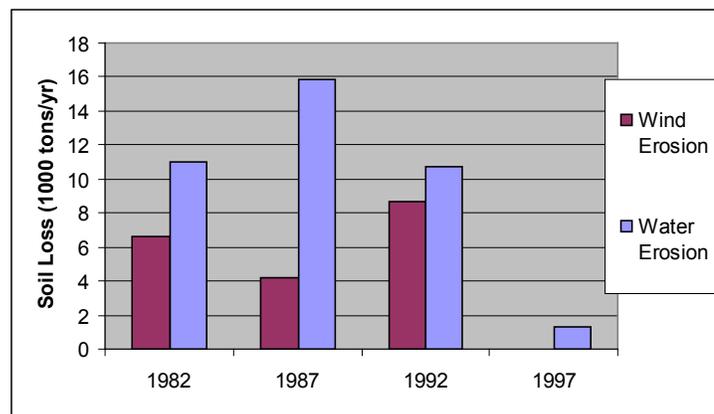
RESOURCE CONCERNS

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

- **Soil Quality, Excessive Sheet and Rill Erosion.** Soil erosion and deposition has ranked as a moderate to high concern in counties in the watershed. Despite existing soil types that facilitate water storage and drainage, erosion rates have been accelerated by excessive rainfall, riparian development, and increasing areas of impervious surface.
- **Woodland Management.** Small privately owned forest land has the potential for not being managed wisely. Management opportunities include planting trees or shrubs, restoring prairies, timber stand improvement, timber sales, enhancing wildlife habitat, prescribed burning, and other practices or projects.
- **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 levels are affecting the health of Aquatic communities, and affecting the consumption of fish in many area lakes.
- **Stormwater management.** Rapid development in portions of the watershed are leading to increased areas of impervious surfaces. Local districts are encouraging the use of bioretention and pervious surfaces to reduce the amount of stormwater runoff.
- **Wetland Management, Surface Water Management, Gully Control.** 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.
- **Riparian Development.** Increased development of riparian areas is a common theme throughout this and adjacent watersheds. While development is an economic benefit to the region, conservation districts insist it must be conducted in a wise manner that includes the restoration or improvement of shorelines.



- NRI Estimates show sheet and rill erosion by water on cropland and pastureland decreased by approximately 6,600 tons of soil (100%) between 1982 and 1997.
- NRI estimates indicate wind erosion rates decreased by 49,700 tons (88.18%) between 1982 and 1992. Estimates were not available for the 1997 reporting period.



Socioeconomic and Agricultural Data (Relevant)

Estimations for the Pine River subbasin indicate a current population of 22,325 people. Median household income throughout the district is nearly \$34,600 yearly, roughly 75% of the national average. Unemployment in the watershed is estimated at approximately 5.6%, and 11% of the residents in the watershed are living below the national poverty level.



Assessment estimates show 355 Farms in the watershed. Approximately fifty nine percent of the operations are less than 180 acres in size, thirty nine percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres.

Pine River (MN) HUC#7010105		Total HUC Acres:	502,196
Population Data*	Watershed Population	22,325	
	Unemployment Rate	5.6%	
	Median Household Income	34,595	
	% below poverty level	11%	
	Median Value of Home	100,975	
Farms	# of Farms	355	
	# of Operators	323	Percent
	# of Full Time Operators	184	52%
	# of Part Time Operators	159	48%
	Total Crop/Pasturelands:	32,700	6.51%
Farm Size	1 to 49 Acres	72	20%
	50 to 179 Acres	137	39%
	180 to 499 Acres	112	32%
	500 to 999 Acres	25	7%
	1,000 Acres or more	8	2%
Livestock & Poultry	Cattle - Beef	3,554	5%
	Cattle - Dairy	1,526	2%
	Chicken	16,754	23%
	Swine	684	1%
	Turkey	13,746	19%
	Other	37,428	51%
	Animal Count Total:	73,693	
Total Permitted AFOs:	43		
Chemicals (Acres Applied)	Insecticides	284	
	Herbicides	2,784	
	Wormicides	14	
	Fruiticides	15	
	Total Acres Treated	3,096	
	% State Chemical Totals	0.02%	

* Estimates derived from US Census, 2000. 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

- **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 Initiative**
National Audobon Society
- **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
- **Sustainable Lakes Project**
Minnesota Lakes Association - Pine River Watershed
- **Pine Mountain Lake Management Plan**
Pine Mountain Lake Conservation Club
- **WAPOA Reservoir Operating Plan**
WAPOA / US Army Corps of Engineers

Conservation Districts, Organizations & Partners

- **Aitkin County SWCD**
130 Southgate Dr, Aitkin, MN 56431
Phone (218) 927-6565
- **Cass County SWCD**
303 Minnesota Avenue W Walker, MN 56484-3000
Phone (218) 547-7399
- **Crow Wing County SWCD**
7118 Clearwater Rd, Baxter, MN 56425
Phone (218) 828-6197
- **Hubbard County SWCD**
212 1/2 - 2nd St W, Park Rapids, MN 56470
Phone (218) 732-0121
- **Friends of the Mississippi River**
360 N Robert St Saint Paul, MN 55101
Phone (651) 222-2193
- **Mississippi Headwaters Board**
Cass Co. Courthouse Box 3000 Walker, MN 56484
Phone (218) 547-7263
- **North Central Minnesota Joint Powers Board**
3217 Bemidji Ave N Suite 3 Bemidji, MN 56601
Phone (218) 755-4339
- **Pine River Watershed Protection Foundation**
P.O. Box 822 Crosslake, MN 56442
Phone: (218) 543-6884
- **Whitefish Area Property Owners Association**
P.O. Box 342 Crosslake, MN 56442
Phone 218-763-3339
- **USDA Forest Service North East Area**
1992 Folwell Ave. St. Paul MN 55108
Phone 651-649-5239

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. 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. 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/>. 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.