

Rapid Watershed Assessment

Thief River

(MN) HUC: 09020304



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 Thief 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 Plain and Northern Minnesota Wetlands EPA Level III Ecoregions. Soils range from fine loams to coarse loams, with areas of sandy soils occurring in the northern reaches of the basin.

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	368,361	59.0%
Beltrami	242,427	38.8%
Pennington	12,857	2.1%
Lake of the Woods	578	0.1%
Roseau	198	0.0%
Total acres:	624,422	100%

Physical Description

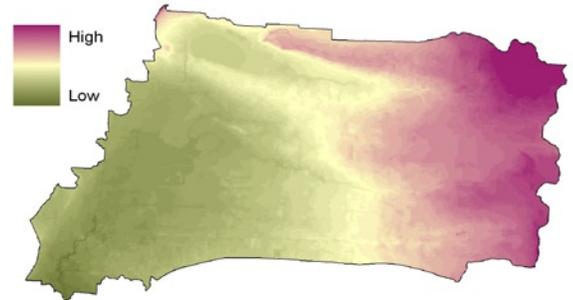
The Thief River begins its course in Marshall county at Thief Lake at an elevation of 1,168 ft above mean sea level (msl). The river flows south/southwesterly to Thief River Falls, where it converges with the red lake River at 1,132 ft above msl.

Precipitation in the watershed ranges from 21 to 23 inches annually. Above-normal amounts of precipitation in the late fall of the year or from May to October lead to high levels of soil moisture, periodically producing the snow-melt and summer floods that are known to affect the further reaches of the overall Red River Basin.

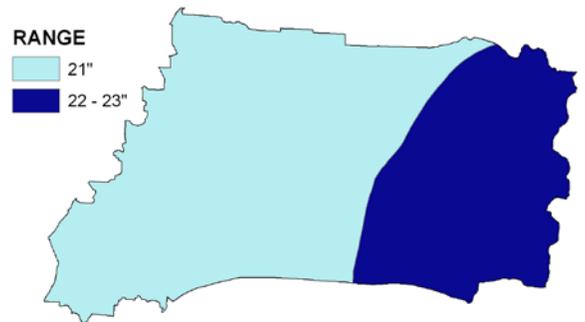
Predominate land uses / land covers are Wetlands (33%), Row Crops (33%), Forest (21%), Grass/Pasture/Hay (8%), and Residential/Commercial Development (3%). Agricultural land use in the basin accounts for approximately 40 percent of the overall watershed acres.

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

Relief

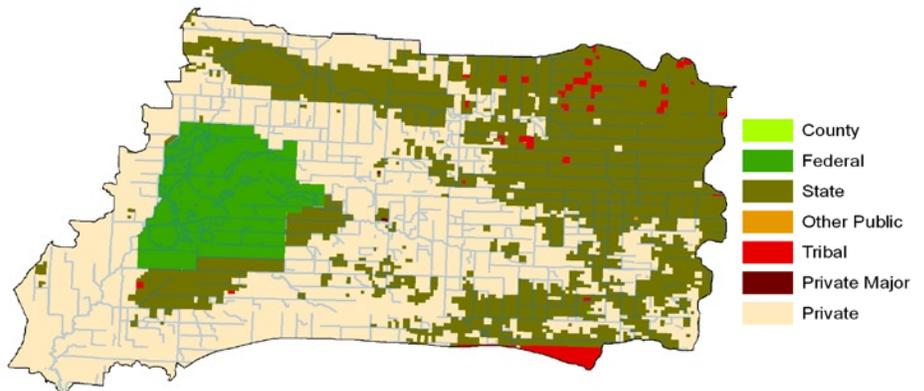


Average Precipitation



Ownership* ¹

Ownership Type	Acres	% HUC
Conservancy	-	-
County	40	0.0
Federal	61,628	9.9
State	245,002	39.2
Other	40	0.0
Tribal	8,061	1.3
Private Major	120	0.0
Private	309,530	49.6
Total Acres:	624,422	100

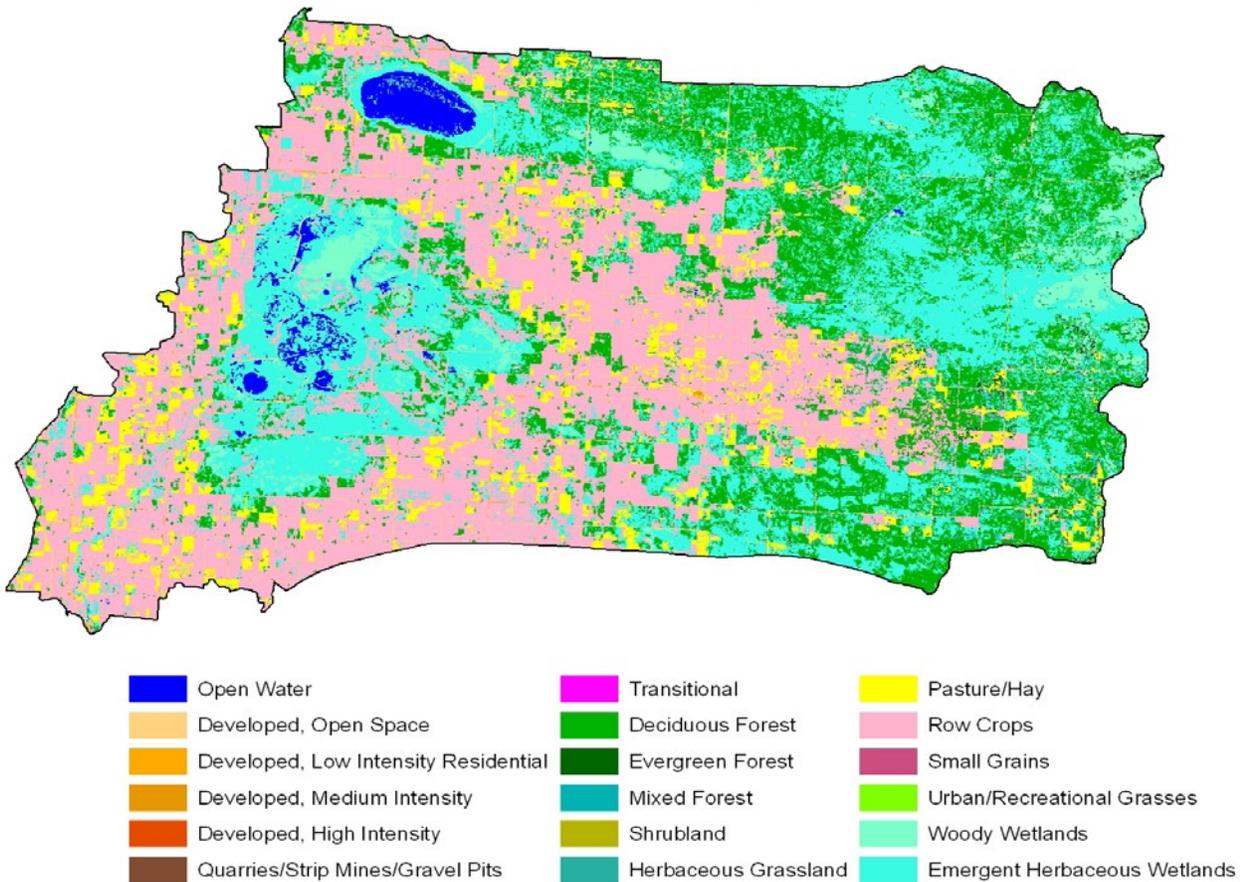


* Ownership totals derived from 2007 MN DNR GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Thief River watershed covers an area of 624,422 acres. Approximately fifty percent of the land in the watershed is owned by private landholders (309,530 acres). The second largest ownership type is State, with approximately 245,000 acres (39%). Federal lands follow with 61,628 acres (10%), Tribal with 8,061 acres (1.3%), Private-Major (corporate) land holdings of 120 acres (<1%), County with 40 acres (<1%) and miscellaneous “Other” public lands also amounting to 40 acres. Land use by ownership type is represented in the table below.

Land Use / Land Cover ^{/2}



Ownership / Land Use ^{/3}

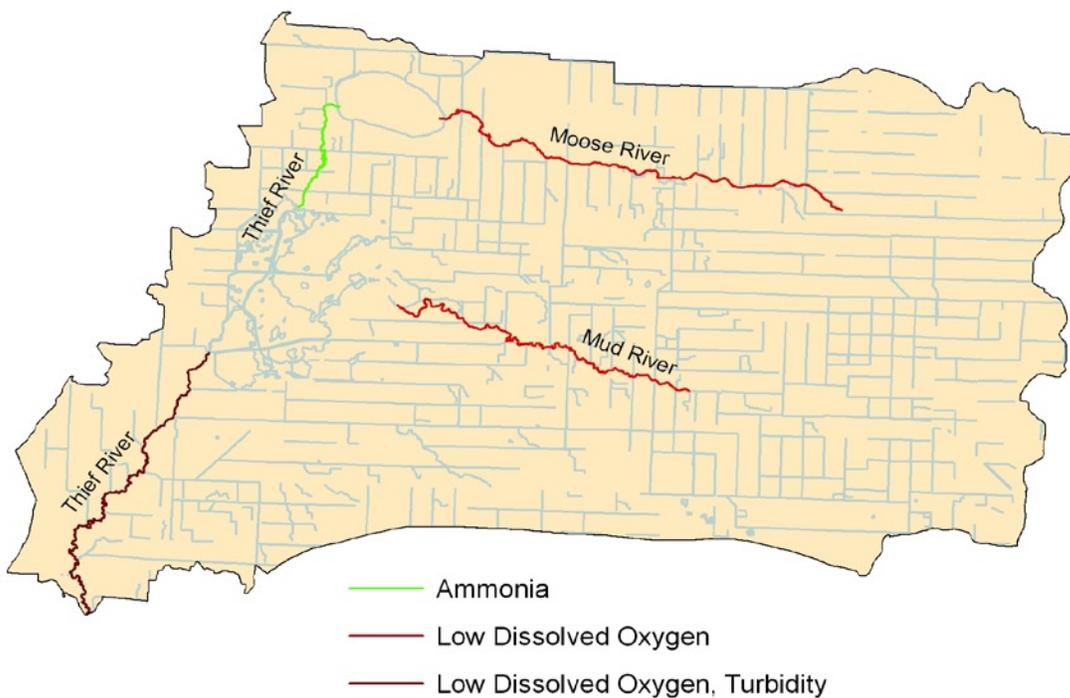
Landcover/Use	Public		Private**		Tribal		Total Acres	Percent	
	Acres	% Public	Acres	% Private	Acres	% Tribal			
Forest	97,001	15.5%	31,541	5.1%	3,930	0.6%	132,471	21.2%	
Grass, etc	3,065	0.5%	43,743	7.0%	25	0.0%	46,833	7.5%	
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%	
Row Crops	21,272	3.4%	186,146	29.8%	16	0.0%	207,434	33.2%	
Shrub etc	839	0.1%	1,068	0.2%	6	0.0%	1,913	0.3%	
Wetlands	168,975	27.1%	35,079	5.6%	4,070	0.7%	208,124	33.3%	
Residential/Commercial	3,489	0.6%	13,175	2.1%	14	0.0%	16,678	2.7%	
Open Water*	10,863	1.7%	114	0.0%	0	0.0%	10,977	1.8%	
* ownership undetermined		** includes private-major							
Watershed Totals:	305,504	48.9%	310,864	49.8%	8,061	1.3%	624,422	100%	

Physical Description (continued)

		ACRES	cu. ft/sec	
Stream Flow Data	USGS 05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN	2008 Avg.	83.6	
		May – Sept. Avg.	142.1	
		ACRES/MILES	PERCENT	
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)	Total Miles – Major (100K Hydro GIS Layer)	1,266	---	
	303d/TMDL Listed Streams (DEQ)	73.2	5.8%	
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	4,468	14.7%	
	Grain Crops	0	0.0%	
	Grass, etc	1,827	6.0%	
	Orchards	0	0.0%	
	Row Crops	9,512	31.3%	
	Shrub etc	90	0.3%	
	Wetlands	10,148	33.4%	
	Residential/Commercial	3,754	12.4%	
	Open Water*	567	1.9%	
	Total Buffer Acres:	30,366	100%	
Crop and Pastureland Land Capability Class¹⁶ (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	1,700	1%	
	2 – moderate limitations	56,900	41%	
	3 – severe limitations	27,700	20%	
	4 – very severe limitations	17,400	13%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	35,200	25%	
	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	138,900	-
	TYPE OF LAND	ACRES	% of Crop Lands	% of HUC
Irrigated Lands¹⁷ (2002 NASS Estimates)	Cultivated Cropland / Pastureland	835	0.6%	0.1%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	835	0.6%	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
Thief River Agassiz Pool to Red Lk R	Low Dissolved Oxygen	Aquatic Life
Thief River Thief Lk to Agassiz Pool	Ammonia	Aquatic Life
Moose River Headwaters to Thief Lk	Low Dissolved Oxygen, Turbidity	Aquatic Life
Mud River Headwaters to Agassiz Pool	Low Dissolved Oxygen	Aquatic Life

Common Resource Areas

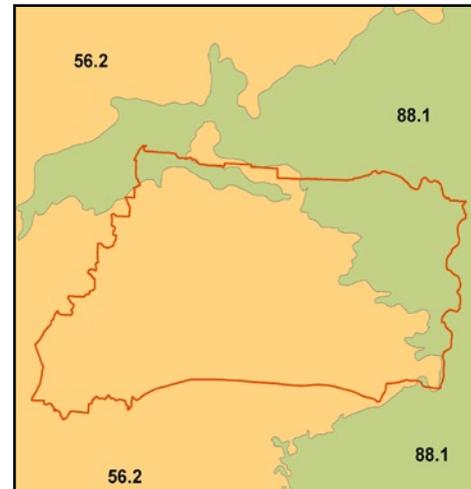
The Thief River watershed occurs in two Common Resource Areas, 56.2 and 88.1. ¹⁹

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.

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

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.



Only the major CRA units are described.

 For further information, go to:

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

Geology / Soils ¹⁰

The surficial geology of the area is dominated by lake washed till. The till is described as a sandy, clay-silt loam containing fine to medium gravel with a scattering of boulders. The till is covered in areas by a very-fine to fine grained, uniform glacial lake sand generally less than 20 feet in thickness. Throughout the watershed, the till is overlain by a thin covering of peat (only a few feet thick) that results from the water table being close to or at land surface, paired with poor drainage in the area. Localized peat deposits are also present in many closed depressions within the till.

Cretaceous sediments consisting of shales and limestones underlie the glacial lake deposits along most of the western half of the watershed. Thicknesses have been recorded at less than 50-feet. Precambrian crystalline rocks underlie the Cretaceous sediments, forming the base of the groundwater reservoir for most of the watershed.

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

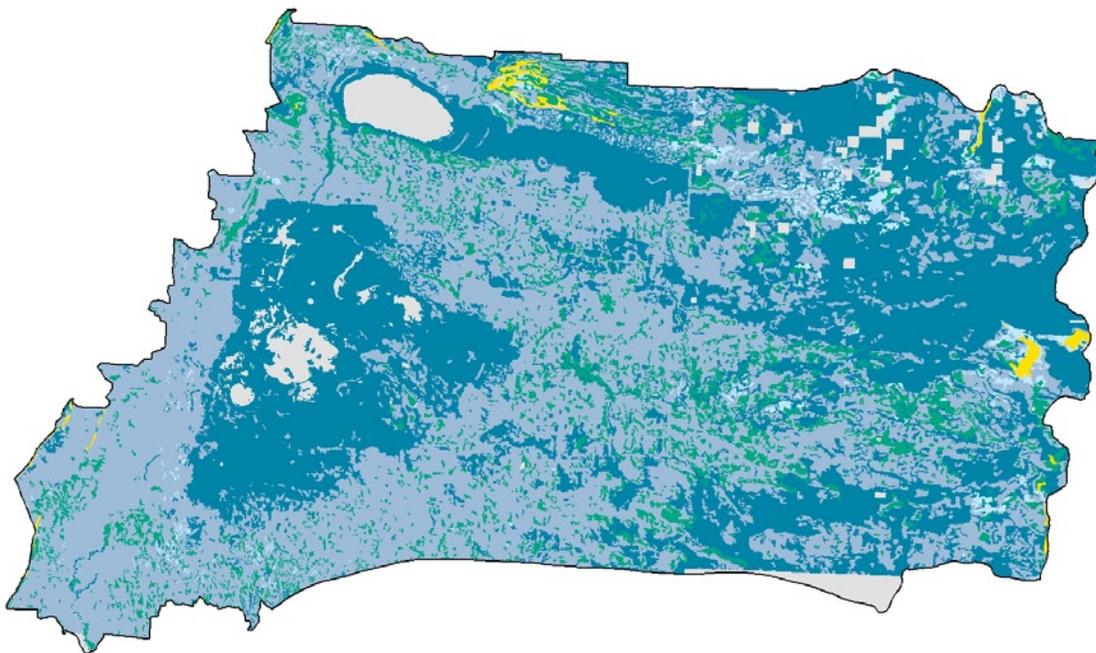
<http://soildatamart.usda.gov> to download SSURGO

 certified soil tabular and spatial data.

Drainage Classification^{1/10}

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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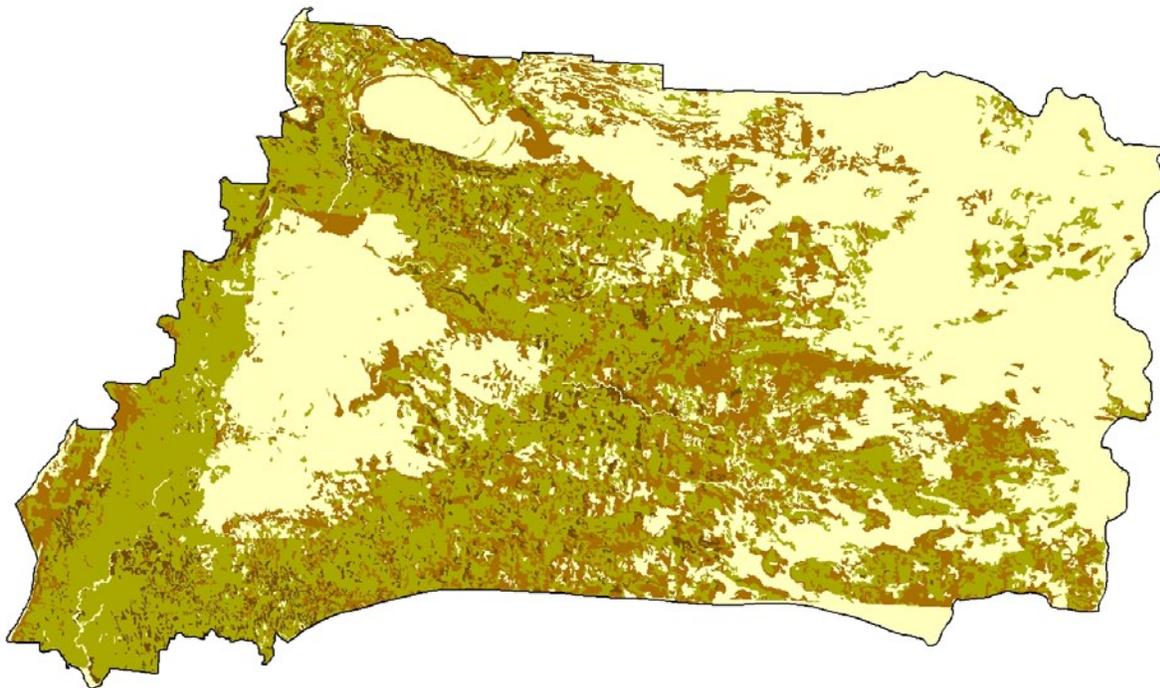
 certified soil tabular and spatial data.

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.



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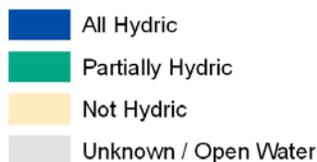
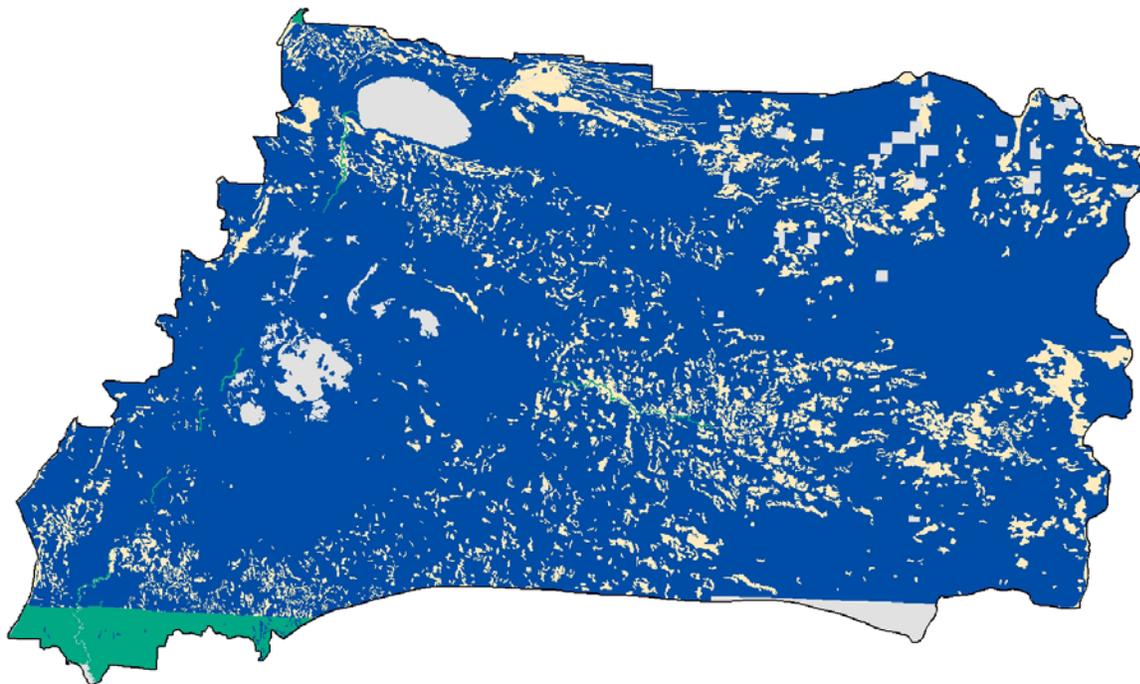
<http://soildatamart.usda.gov> to download SSURGO

 certified soil tabular and spatial data.

Hydric Soils 710

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.



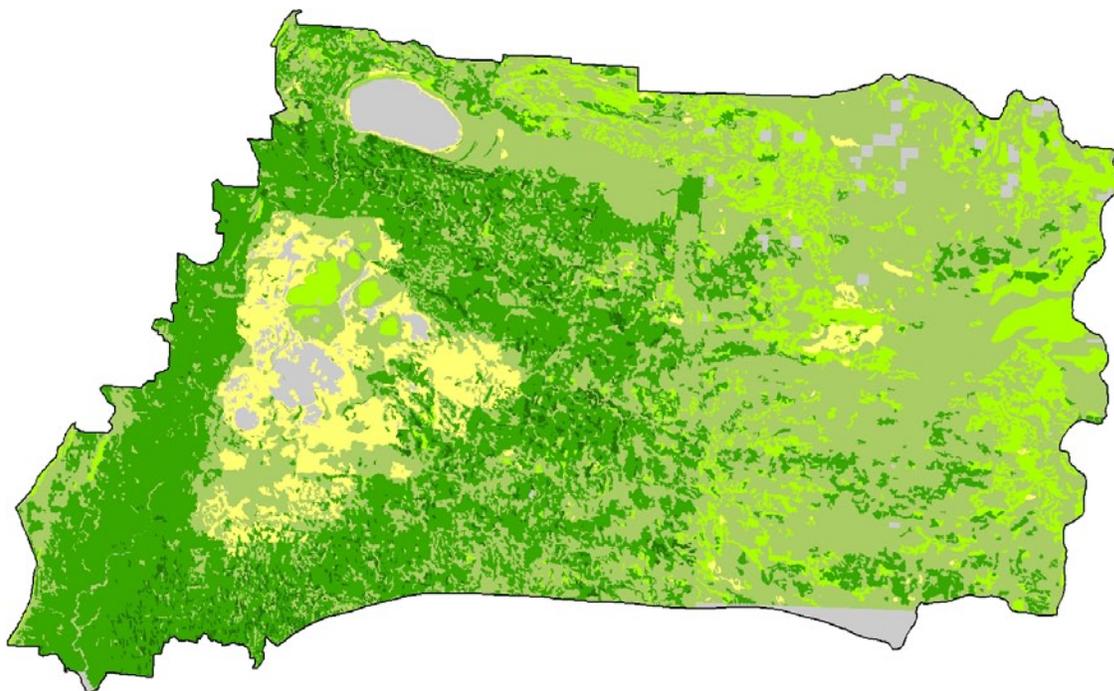
Visit the online Web Soil Survey at <http://websoilsurvey.nrcs.usda.gov> for official and current USDA soil information as viewable maps and tables. Visit the Soil Data Mart at <http://soildatamart.usda.gov> to download SSURGO certified soil tabular and spatial data.

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: Thief				Watershed Number: 9020304						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	11,505	28,985	0	3,363	6,398	N/A	2,696	4,804	28,194	85,945
Total Conservation Systems Applied (acres)	12	7,735	0	21,040	21,040	N/A	3,969	5,006	21,936	80,738
Conservation Practices										
Total Waste Management (313) (numbers)	0	0	0	0	0	0	0	0	0	0
Riparian Forest Buffers (391) (acres)	0	0	0	0	4	0	0	0	0	4
Erosion Control Total Soil Saved (tons/year)	13,012	81,838	127,070	265,031	214,019	N/A	N/A	N/A	N/A	700,970
Total Nutrient Management (590) (Acres)	0	0	5,583	3,736	154	345	1,500	1,500	1,155	13,973
Pest Management Systems Applied (595A) (Acres)	0	0	0	0	0	0	341	0	250	591
Prescribed Grazing 528a (acres)	0	0	0	0	0	102	116	0	0	218
Tree & Shrub Establishment (612) (acres)	0	9	12	351	229	326	0	27	0	954
Residue Management (329A-C) (acres)	0	0	0	0	0	0	0	0	100	100
Total Wildlife Habitat (644 - 645) (acres)	13,012	7,654	14,276	18,590	14,790	3,161	18,590	2,951	19,740	112,764
Total Wetlands Created, Restored, or Enhanced (acres)	0	369	1,982	13,194	8,889	0	70	1,247	0	25,751
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	12	7,735	13,171	19,791	20,734	N/A	803	2,796	19,824	84,866
Wetlands Reserve Program	0	0	0	0	0	N/A	0	0	0	0
Environmental Quality Incentives Program	0	0	0	0	0	N/A	2,469	1,618	1,583	5,670
Wildlife Habitat Incentive Program	0	0	0	0	0	N/A	0	0	0	0
Farmland Protection Program	0	0	0	0	0	N/A	0	0	0	0

THREATENED AND ENDANGERED SPECIES OF THE BASIN ¹⁴

NRCS assists in the conservation of threatened and endangered species and avoids or prevents activities detrimental to such species. NRCS' concern for these species includes the species listed by the Secretary of the Interior (as published in the Federal Register) and species designated by state agencies.



The following is a list of threatened, endangered, candidate species and species of special concern that occur in the subbasin.

Scientific Name	Common Name	Type
<i>Achillea sibirica</i>	Siberian Yarrow	Botanical
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	Zoological
<i>Asio flammeus</i>	Short-eared Owl	Zoological
<i>Charadrius melodus</i>	Piping Plover	Zoological
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Larus pipixcan</i>	Franklin's Gull	Zoological
<i>Limosa fedoa</i>	Marbled Godwit	Zoological
<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Podiceps auritus</i>	Horned Grebe	Zoological
<i>Sterna forsteri</i>	Forster's Tern	Zoological
<i>Tympanuchus cupido</i>	Greater Prairie-chicken	Zoological

RESOURCE CONCERNS

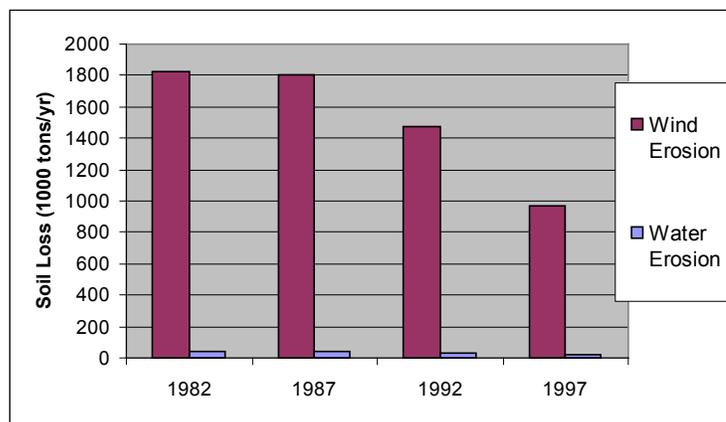
County Soil and Water Conservation Districts in the watershed have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- 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 conveyence, 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 23,500 tons (50%) between 1982 and 1997.
- NRI estimates indicate wind erosion on crop and pasture land decreased by approximately 854,000 tons (47%) between 1982 and 1997.



Socioeconomic and Agricultural Data (Relevant)

Population estimates for the subbasin indicate that approximately 3,700 people reside in the area. Median household income throughout the district is near \$36,169 yearly, roughly 78% of the national average. Figures show an unemployment rate of 5.6% for the basin, and approximately 11% of the residents in the watershed live below the national poverty level.



Data indicates there are 559 farms in the watershed. Of the 535 operators in the basin, sixty one percent are full time producers not reliant on off-farm income. Approximately forty one percent of the operations are less than 180 acres in size, forty four 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 53 acres.

(MN) HUC# 9020304		Total Acres:	624,422
Population Data*	Watershed Population	3,690	
	Unemployment Rate	5.6%	
	Median Household Income	32,169	
	% below poverty level	11%	
	Median Value of Home	63,960	
Farm Data	# of Farms	559	
	# of Operators	535	Percent
	# of Full Time Operators	328	61%
	# of Part Time Operators	207	39%
	Total Cropland Acres	281,167	45.0%
Farm Size	1 to 49 Acres	61	11%
	50 to 179 Acres	168	30%
	180 to 499 Acres	168	30%
	500 to 999 Acres	78	14%
	1,000 Acres or more	83	15%
	Average Farm Size	53	
Livestock & Poultry	Cattle - Beef	3,417	29%
	Cattle - Dairy	718	6%
	Chicken	1,049	9%
	Swine	79	1%
	Turkey	55	0%
	Other	6,302	54%
	Animal Count Total:	11,620	
	Total Permitted AFOs:	234	
Chemicals (Acres Applied)	Insecticides	7,552	
	Herbicides	96,165	
	Wormicides	2,546	
	Fruiticides	0	
	Total Acres Treated	106,263	
	% State Chemical Totals	0.7%	

* 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

- **Ditch 11 Dike Rehabilitation**

 Red Lake Watershed District, US FWS
- **Ditch 83 Study**

 Red Lake Watershed District, Houston Engineering
- **Red River Basin Turbidity TMDL Study**

 MPCA, Red River Basin Water Quality Team
- **Red River Basin Riparian Project**

 Red River RC&D
- **Red Lake River Corridor Enhancement Project**

 Red Lake Watershed District
- **Thief River Watershed Sediment Investigation**

 Red Lake 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
- **USGS Sediment to Streams Study - Red River Basin**

 USGS, Minnesota Pollution Control Agency
- **Red Lake Wildlife Habitat Enhancement & Evaluation**

 Red Lake Band DNR, US Fish and Wildlife Service

* 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

- **Beltrami SWCD**

 Bemidji Ave N Ste 3, Bemidji, MN 56601-4328

 Phone (218) 755-4339
- **Giziibii RC&D**

 3217 Bemidji Ave N Bemidji, MN 56601

 Phone (218) 751-1942, Ext 5
- **Lake of the Woods SWCD**

 119 1st Ave NW, PO Box 217, Baudette, MN 56623

 Phone (218) 634-1842
- **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
- **Pennington SWCD**

 201 Sherwood Ave S, Thief River Falls, MN 56701

 Phone (218) 683-7075
- **Roseau SWCD**

 502 - 7th St SW, Ste 8, Roseau, MN 56751

 Phone (218) 463-1903
- **Red Lake Department of Natural Resources**

 Box 279 Red Lake, MN 56671

 Phone (218) 679-3959 Ext 1306
- **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), 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, 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>.