

Rapid Watershed Assessment

Rainy Lake

(MN) HUC: 09030003



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 Rainy Lake 8-digit Hydrological Unit Code (HUC) Subbasin is located in the Northern Lakes and Forests ecoregion of Northern Minnesota, and is 583,791 acres in size. Approximately seventy three percent of the land is publicly owned and is managed by federal, state or county entities.

There are an estimated 111 Farms in the watershed. Approximately sixty three percent of the operations are less than 180 acres in size, thirty six percent are 180 to 1,000 acres in size, and one percent are equal to or greater than 1,000 acres. Average farm size in the region is 23 acres.

Primary resource concerns include Surface water quality, Wetland management, Woodland Management, Management of excessive wetness, and the short growing season.

The watershed occurs within and across the boundaries of Koochiching and St. Louis counties. As with many areas of Northern Minnesota, Principal industries include forest products harvesting, manufacturing, mining and tourism.

The Rainy Lake watershed is the fourth smallest watershed, in terms of size, in the Minnesota portion of the overall Rainy River Basin.

The greater Rainy River Basin is home to some of Minnesota's finest forest and water resources. Voyageurs National Park and the Boundary Waters Canoe Area Wilderness (BWCA) are located within the Basin, as are several of the state's most famous walleye fisheries and many top-notch trout streams.



County Totals

County	Acres in HUC	% HUC
Koochiching	210,785	36.1%
St. Louis	373,006	63.9%
Total acres:	583,791	100%

Physical Description

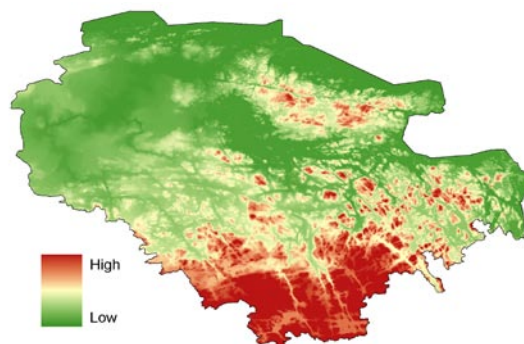
The Rainy Lake watershed includes two Ecological Classification System subsections. The watershed is located predominately in the Ecological Classification System's Border Lakes and Little Fork / Vermilion Uplands subsections.

The Rainy Lake watershed has its headwaters in St. Louis and Koochiching Counties. Most of the waters from St. Louis County flow into Kabetogama Lake which flows into Rainy Lake. The waters from Koochiching County flow into Black Bay of Rainy Lake.

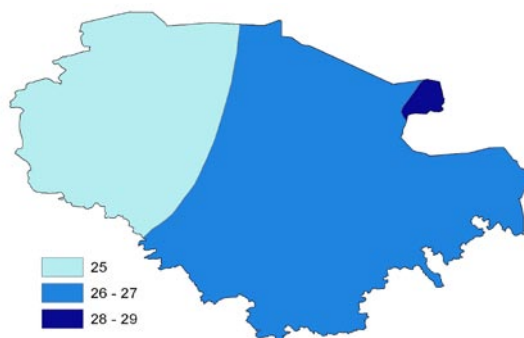
Precipitation in the watershed ranges from 25 to 29 inches annually. Most lands within this watershed are not highly erodible, and soils are often hydric. Much of the land in the subbasin is not suited or poorly suited to agricultural uses.

Development pressure is moderate throughout this subbasin, with occasional lands being parceled out for timber production or recreational uses.

Relief

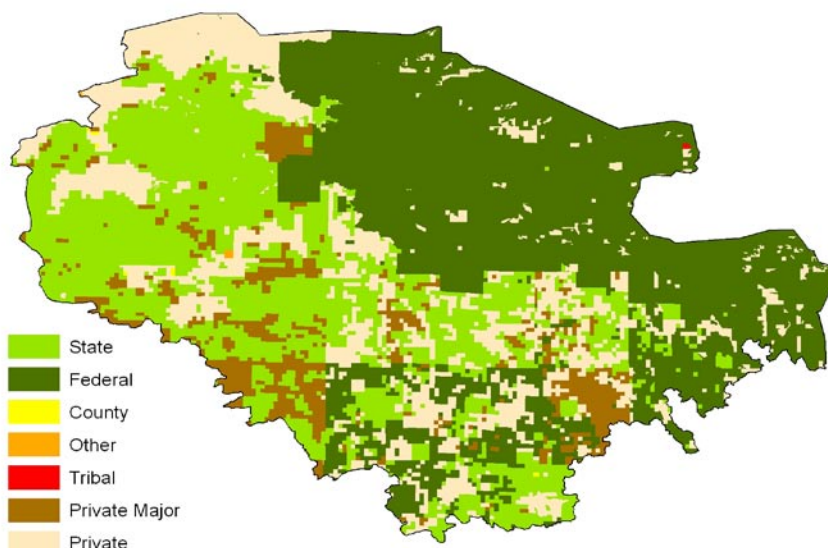


Average Precipitation (inches)



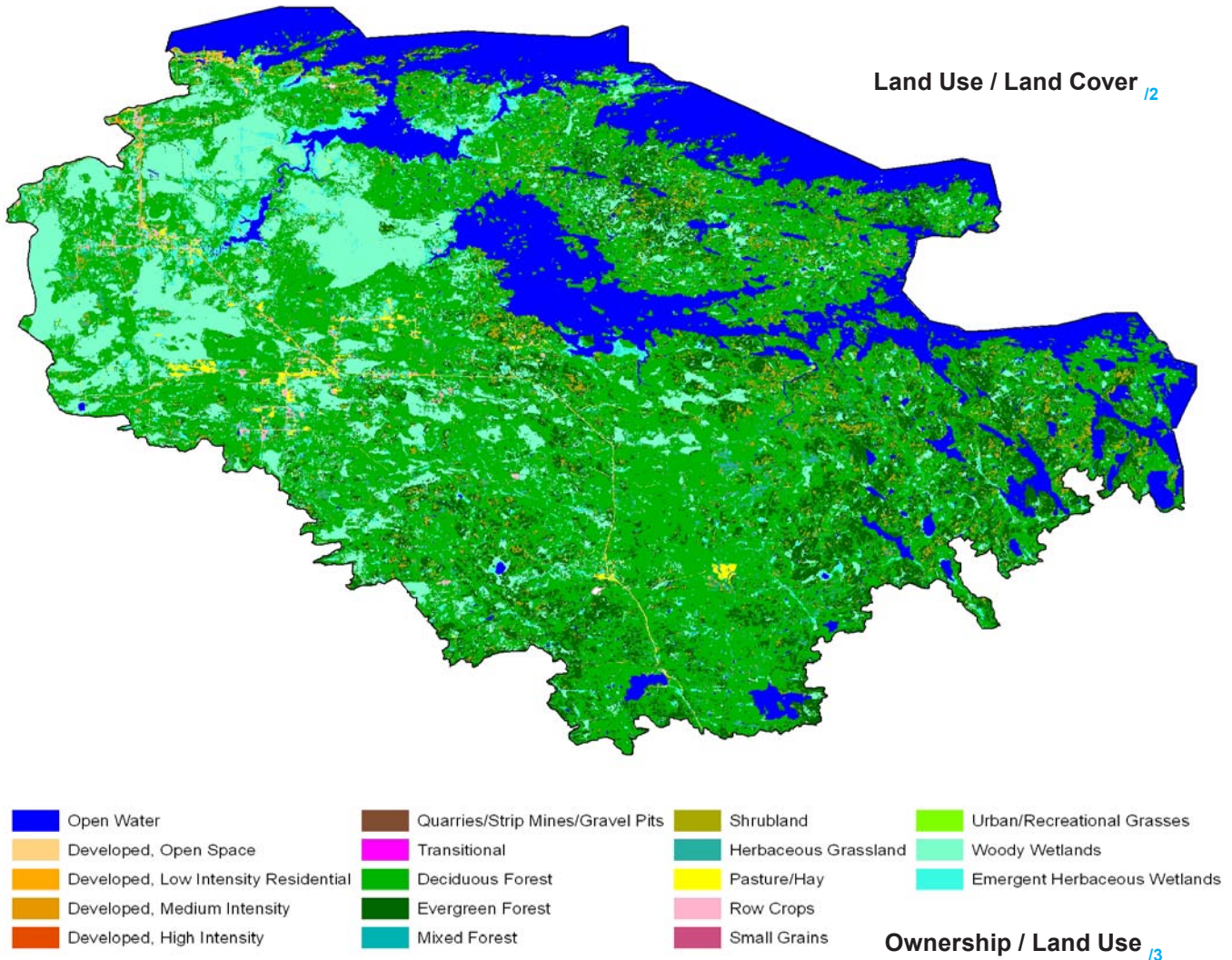
Ownership

Ownership Type	Acres	% of HUC
Conservancy	-	-
County	334	0.1
Federal	243,840	41.8
State	182,461	31.3
Other Public	227	0.0
Tribal	83	0.0
Private Major	45,471	7.8
Private	111,376	19.1
Total Acres:	583,791	100



Ownership / Land Use

The Rainy Lake watershed covers an area of 583,791 acres. Approximately 42 percent of the land is Federally owned, (243,840 acres). The second largest ownership type is State, with 182,461 acres (31.3%), followed by Private land ownership of 111,376 acres (19.1%), Private Major (Corporate) with 45,471 acres (7.8%), County with 334 acres (0.1%), and miscellaneous "Other Public" lands amounting to 227 acres (0.03%). Tribally owned lands make up the smallest ownership percentage, amounting to 83 Acres (0.01%). Land use by ownership type is represented in the table below.



Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	% Public	Acres	% Private	Acres	% Tribal		
Forest	248,974	42.7%	102,122	17.5%	47	0.0%	351,143	60.2%
Grass, etc	3,323	0.6%	5,998	1.0%	0	0.0%	9,321	1.6%
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Row Crops	424	0.1%	1,648	0.3%	0	0.0%	2,072	0.4%
Shrub etc	12,326	2.1%	5,552	1.0%	0	0.0%	17,878	3.1%
Wetlands	84,851	14.5%	17,735	3.0%	14	0.0%	102,600	17.6%
Residential/Commercial	772	0.1%	2,577	0.4%	0	0.0%	3,349	0.6%
Open Water*	75,815	13.0%	21,356	3.7%	22	0.0%	97,193	16.7%

* ownership undetermined

** includes private-major

Watershed Totals:	426,486	73.08%	156,988	26.9%	83	0.0%	583,791	100%
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Physical Description (continued)

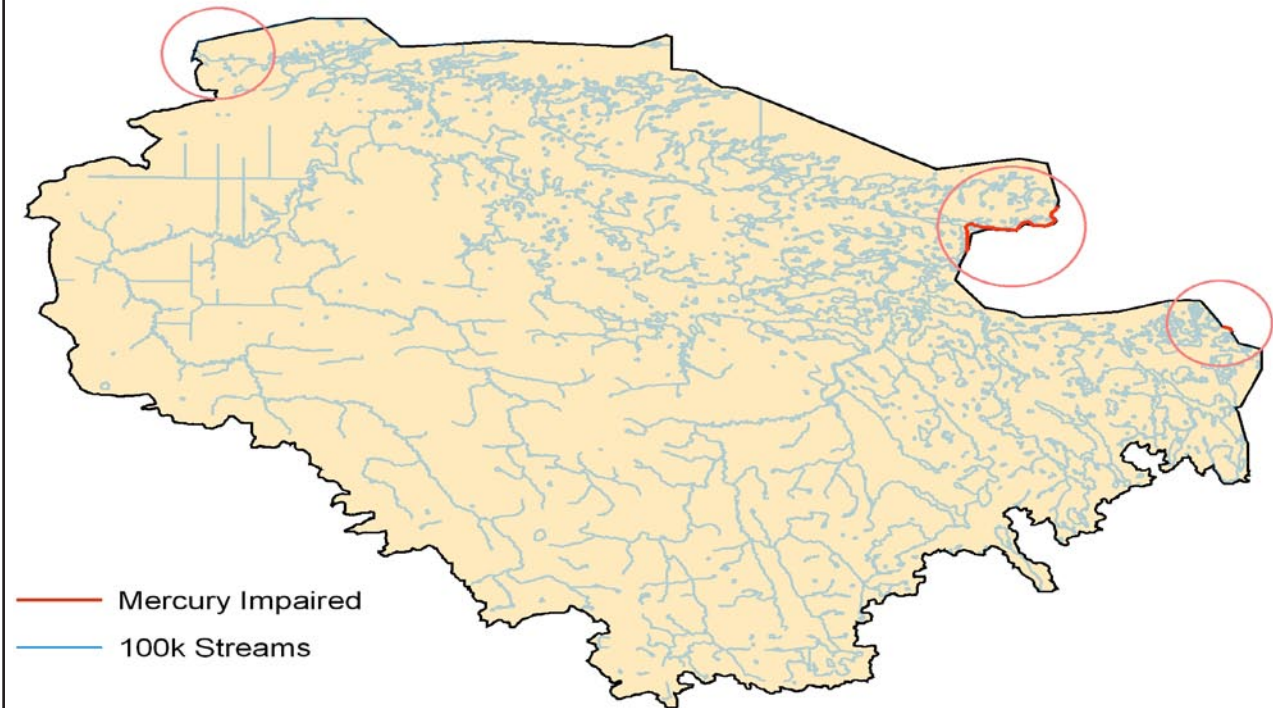
			cu. ft/sec	
Stream Flow Data	USGS 05129290 GOLD PORTAGE OUTLET FROM KABETOGAMA LK NR RAY, MN	Total Avg.	233.9	
		May – Sept. Yield	424.6	
Stream Data ¹⁴ (*Percent of Total HUC Stream Miles)		MILES	PERCENT	
	Total Miles – Major (100K Hydro GIS Layer)	1,759.5	---	
	Total Miles –303d/TMDL Listed Streams	6.5	0.37%	
Riparian Land Cover/Land Use ¹⁵ (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	Land Use Type	Acres	Percent	
	Forest	22,412	54.0%	
	Grain Crops	0	0.0%	
	Grass, etc	469	1.1%	
	Orchards	0	0.0%	
	Row Crops	78	0.2%	
	Shrub etc	1,070	2.6%	
	Wetlands	6,404	15.4%	
	Residential/Commercial	138	0.3%	
	Open Water*	10,901	26.3%	
		Total Buffer Acres	41,472	---
Crop and Pastureland Land Capability Class ¹⁶ (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	0	0%	
	2 – moderate limitations	0	0%	
	3 – severe limitations	0	0%	
	4 – very severe limitations	0	0%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	0	0%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	0	0%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	0	0%	
		Total Crop & Pastureland	0	---
Irrigated Lands ¹⁷ (1997 NRI Estimates for Non-Federal Lands Only)	TYPE OF LAND	ACRES	% of Irrigated Lands	% of HUC
	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.

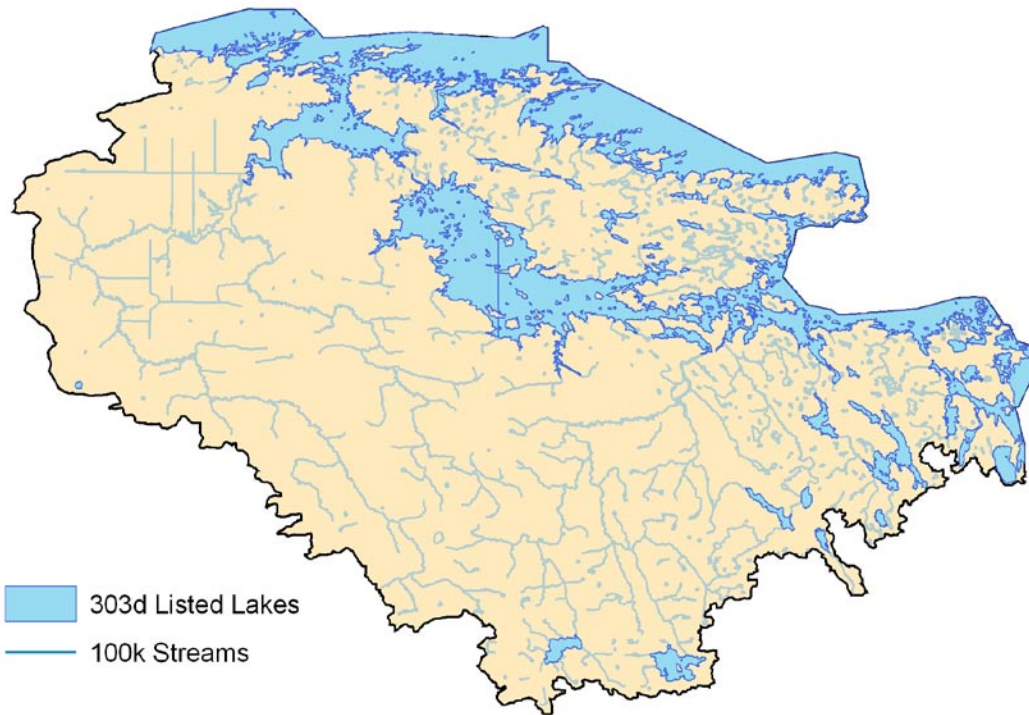
2006 Minnesota 303d Listed Streams - Rainy River Watershed



Listed Stream / Reach ¹⁸	Impairment	Affected Use
Rainy River Namakan L to Rainy Lake	Mercury	Aquatic Consumption
Rainy River Sand Point Lk to Namakan Lake	Mercury	Aquatic Consumption
Rainy River Rainy Lake to International Falls Dam	Mercury	Aquatic Consumption

Assessment of Waters (continued)

2006 Minnesota 303d Listed Lakes - Rainy Lake Watershed



Listed Lake	Impairment	Affected Use	Listed Lake	Impairment	Affected Use
Moose	Mercury	Aquatic Consumption	Net	Mercury	Aquatic Consumption
Sand Point	Mercury	Aquatic Consumption	Little Johnson	Mercury	Aquatic Consumption
Little Trout	Mercury	Aquatic Consumption	Spring	Mercury	Aquatic Consumption
Mukooda	Mercury	Aquatic Consumption	Long	Mercury	Aquatic Consumption
O'Leary	Mercury	Aquatic Consumption	Agnes	Mercury	Aquatic Consumption
Johnson	Mercury	Aquatic Consumption	Cruiser	Mercury	Aquatic Consumption
Namakan	Mercury	Aquatic Consumption	Peary	Mercury	Aquatic Consumption
Rainy	Mercury	Aquatic Consumption	Fishmouth	Mercury	Aquatic Consumption
Moose	Mercury	Aquatic Consumption	Unnamed (Ryan)	Mercury	Aquatic Consumption
Franklin	Mercury	Aquatic Consumption	Beast	Mercury	Aquatic Consumption
Marion	Mercury	Aquatic Consumption	Oslo	Mercury	Aquatic Consumption
Tooth	Mercury	Aquatic Consumption	Brown	Mercury	Aquatic Consumption
Unnamed (Quarterline)	Mercury	Aquatic Consumption	Black Duck	Mercury	Aquatic Consumption
Shoepack	Mercury	Aquatic Consumption	Ek	Mercury	Aquatic Consumption
Quill	Mercury	Aquatic Consumption	Kabetogama	Mercury	Aquatic Consumption
Loiten	Mercury	Aquatic Consumption	Ash	Mercury	Aquatic Consumption
Locator	Mercury	Aquatic Consumption	Jorgens	Mercury	Aquatic Consumption
War Club	Mercury	Aquatic Consumption	Boot	Mercury	Aquatic Consumption

Common Resource Areas

The Rainy Lake Watershed encompasses two Common Resource Areas, CRA 88.1 and 93A.1. ¹⁹

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.

93A.1 Superior Upland Bedrock and Till Complex: Gently sloping to very steep soils that generally formed in loamy, dense glacial till. Bedrock control is common and outcrops in many places, especially in the Boundary Water area. Bogs are common, both dysic and euic in reaction. Deciduous and coniferous forestland is the main land use. Small areas of cropland, pasture and hayland occur. Resource concerns are timber harvest management, wildlife habitat management, forage production, and riparian management.



Only the major CRA units are described above.

 For further information, go to:

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

Soils / Geology

Soil distribution and bedrock geology in the Rainy Lake subbasin varies regionally and is most easily summarized according to ecological classification system subsection descriptions.

Border Lakes: The soils are derived from a mantle of acid, cobbly, and gravelly glacial till of variable depth. Coarse-loamy to coarse soil textures are most common. There are small areas of sandy and clayey lacustrine soil in the western portion of the subsection. About 5 percent of the unit is occupied by organic soils. The soils are classified as Ochrepts, with localized Aquepts and Hemists (Anderson and Grigal 1984).

Thin glacial drift covers much of the subsection, and bedrock exposures are common (Department of Soil Science, University of Minnesota 1981b). The subsection has Precambrian-age (Late Archean and Early Proterozoic) bedrock, including gneiss, undifferentiated granite, and metamorphosed mafic to intermediate volcanic and sedimentary rocks (Sims et al. 1970c, Morey 1976).

Little Fork / Vermilion Uplands: Soils in this subsection are primarily moderately well to poorly drained mineral soils formed from clayey lake-laid sediments or loamy to clayey glacial till. Organic soils are common, but do not dominate the landscape (as they do to the west in the Agassiz Lowlands). Peat depths vary from shallow to deep (1 to 15 feet thick). Soils are classified primarily as Aqualfs (wet forested soils), Aquepts (wet undeveloped soils), Boralfs (well to moderately well drained forested soils), and Hemists (moderately decomposed peat) (Anderson and Grigal 1984).

Glacial drift depth grades from shallow at the northern and eastern edges of the subsection to moderately thick in the western portion. Bedrock outcrops are common in the transition zone to the Border Lakes Subsection. Drift is up to 300 feet thick on the western side of the subsection. The underlying bedrock is Precambrian (Late Archean) in age, and includes gneiss, amphibolite, undifferentiated granite, and metamorphosed mafic to intermediate volcanic and sedimentary rocks. There are also iron formation, metasediments, and metamorphosed felsic volcanic rocks (Morey 1976).

Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil.

Seven classes of natural soil drainage are recognized—excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”



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

Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland.

Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

NRCS policy and procedures on prime and unique 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.



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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 Etof 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.

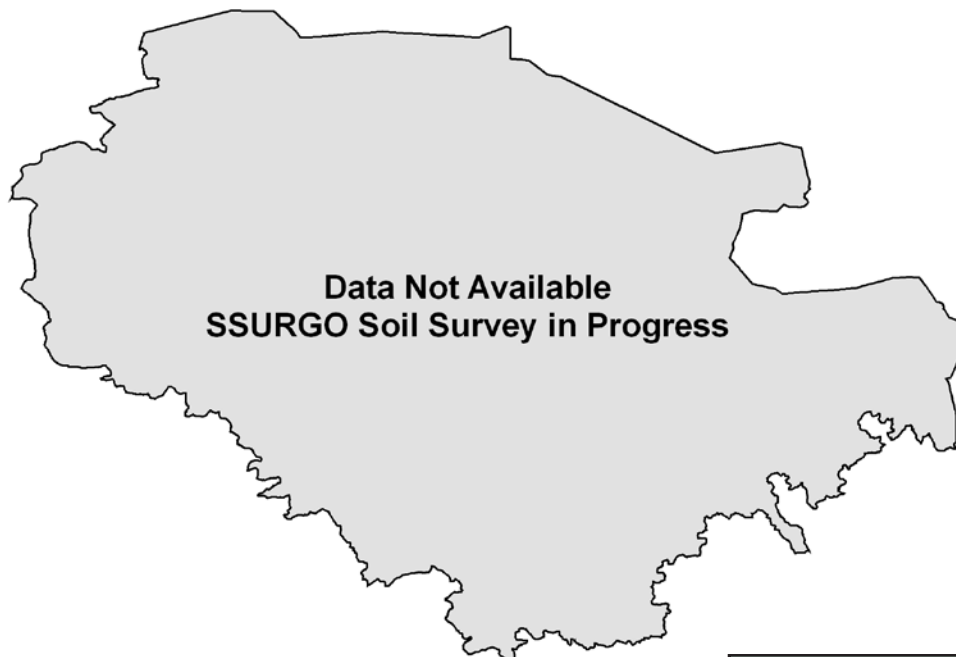


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Land Capability Classification

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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RESOURCE CONCERNS

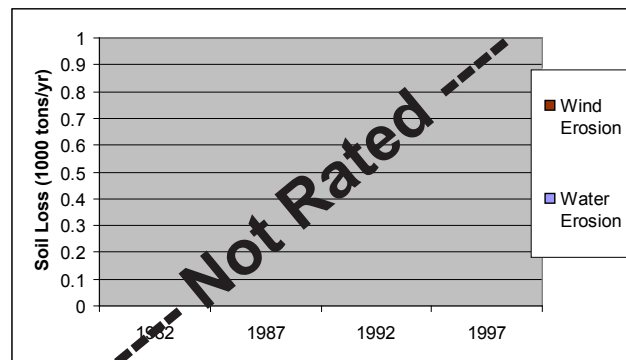
County Soil and Water Conservation Districts have identified the following concerns as top priorities for conservation and cost sharing efforts in the watershed:

- Surface Water Quality:** Enhancement of surface waters. Reduction of priority pollutants and sediments in surface waters will enhance economic development opportunities by preserving the environmental features that promote and attract tourists and fishermen to the area and improve the quality of water supply in the region.
- Wetland Management:** Natural wetland protection, wetland creation and restoration; and wetland construction for water quality improvement. Establishing high priority wetland areas and enforcing future wetlands legislation to take advantage of opportunities to enhance the wetland resources of the watershed will ensure the vitality of the resources and natural communities of the basin.
- Woodland Management:** Priorities include preventing, mitigating, or controlling diseases and pests on public and private forest lands, planting trees or shrubs, restoring prairies, timber stand improvement, timber sales, enhancing wildlife habitat, prescribed burning, and many other practices or projects.
- Implementation and management of a geographic information system and geologic atlas** for counties in the region. A comprehensive database will enable expedient decisions in resource management, protection, and area planning.
- Management of Excessive Wetness:** Hydric nature of much of the basin's soils limits productivity and viability of land for agricultural and some silvicultural uses. Efforts such as tiling, species selection, critical planting, and wetland mitigation aid in combating the wetness common to much of the area.
- Short Growing Season:** Given the short growing season, timely planting, management of moisture, and appropriate seed selection is crucial for a successful crop. Planting delay and short-time concentrated precipitation in the growth season are the main causes of yield reduction.



NRI Soil Loss Estimates ¹³

- NRI Estimates are not reported at the 8-digit HUC Level for this watershed for sheet and rill erosion and wind erosion on cropland and pastureland.



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>Acipenser fulvescens</i>	Lake Sturgeon	Zoological
<i>Caloplaca parvula</i>	A Species of Lichen	Botanical
<i>Caltha natans</i>	Floating Marsh-marigold	Botanical
<i>Cetraria aurescens</i>	Eastern candlewas lichen	Botanical
<i>Cicindela denikei</i>	Laurentian Tiger Beetle	Zoological
<i>Cladonia pseudorangiformis</i>	A Species of Lichen	Botanical
<i>Crassula aquatica</i>	Pigmyweed	Botanical
<i>Cypripedium arietinum</i>	Ram's-head Lady's-slipper	Botanical
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Juniperus horizontalis</i>	Creeping Juniper	Botanical
<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Littorella uniflora</i>	American Shore-plantain	Botanical
<i>Lobaria quercizans</i>	Smooth lungwort	Botanical
<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	White Adder's-mouth	Botanical
<i>Potamogeton vaseyi</i>	Vasey's Pondweed	Botanical
<i>Pseudocyphellaria crocata</i>	Yellow specklebelly	Botanical
<i>Ranunculus lapponicus</i>	Lapland Buttercup	Botanical
<i>Sterna hirundo</i>	Common Tern	Zoological
<i>Sticta fuliginosa</i>	Peppered moon lichen	Botanical
<i>Subularia aquatica</i>	Awlwort	Botanical

Socioeconomic and Agricultural Data (Relevant)

The Rainy Lake subbasin has a population of approximately 3,375 people. Median household income throughout the district is slightly more than \$36,930 yearly, roughly 78% of the national average. Unemployment in the basin is estimated at 5.8%, and approximately 12% of the residents in the watershed are below the national poverty level.



There are 111 Farms in the watershed. An estimated sixty three percent of the operations are less than 180 acres in size, thirty six percent are 180 to 1,000 acres in size, and data indicates two farms equal to or greater than 1,000 acres in size. Of the 107 operators in the basin, 49% are full-time producers not reliant on off-farm income.

(MN) HUC# 9030003		Total Acres:	583,791
Population Data*	Watershed Population	3,375	
	Unemployment Rate	5.8%	
	Median Household Income	36,934	
	% below poverty level	12%	
	Median Value of Home	69,150	
Farm Data	# of Farms	111	
	# of Operators	107	Percent
	# of Full Time Operators	53	49%
	# of Part Time Operators	54	51%
	Total Cropland Acres	11,860	2.0%
Farm Size	1 to 49 Acres	29	22%
	50 to 179 Acres	53	41%
	180 to 499 Acres	37	28%
	500 to 999 Acres	10	8%
	1,000 Acres or more	2	1%
	Average Farm Size	23	
Livestock & Poultry	Cattle - Beef	810	25%
	Cattle - Dairy	138	4%
	Chicken	421	13%
	Swine	49	2%
	Turkey	14	0%
	Other	1,815	56%
	Animal Count Total:	3,247	
	Total Permitted AFOs:	23	
Chemicals (Acres Applied)	Insecticides	517	
	Herbicides	4,454	
	Wormicides	0	
	Fruiticides	54	
	Total Acres Treated	5,025	
	% State Chemical Totals	0.0%	

* Adjusted by percent of county in the HUC or by percent of block group area in the HUC, depending on the level of data available

Watershed Projects, Plans and Monitoring

- Long-term water quality monitoring in the Greater Rainy River Watershed. The Northeast Region Sustainable Development Partnership joined with the Minnesota DNR and seven partners in both Canada and the United States to support water quality monitoring and environmental education involving an interagency, inter-scholastic and international cooperation. Koochiching County Environmental Services is the project coordinator. The sponsoring entity was the Rainy / Rapid River Board
- Tomorrow's Habitat for the Wild and Rare: Little Fork Vermilion Uplands; An Action Plan for Minnesota Wildlife, Minnesota DNR. Study outlining 67 Species in Greatest Conservation Need (SGCN). Though occurring in an adjacent area, the Study provides suggestions on priority conservation actions to maintain, enhance, and protect the key habitats for the SGCN's occurring within the region.
- Rainy River Management Plan, St. Louis County, MPCA. a comprehensive river initiative for northern Minnesota concentrating on the historic preservation and riparian restoration of the Rainy River. Plan seeks to balance needs in the watershed as they relate to wetlands, tourism, zoning, roads, river access and the mix of government authority.
- Minntac Water Inventory Reduction EIS, Minntac, MPCA. The objective is to determine how potential changes in surface water hydrology and water quality may affect aquatic organisms and communities in St. Louis County, Minnesota impacted by discharge from the Minntac tailings basin. Considers the impacts on state and federal threatened and endangered aquatic invertebrate species, and other sensitive invertebrate species of concern within the Dark River, Sturgeon River, and Little Fork River drainage, and the Sandy River and Pike River drainage into and including Lake Vermilion.
- Rainy River Plan (Implementation), MPCA and International Joint Commission. Goals may include delineation of specific stream segments to be restored or protected, loading reductions to be achieved, type and amount of habitat to be restored, identification of water management issues and problems, conservation district goals, priority issues and waters, and coordination of citizen monitoring programs and efforts.
- Bois Forte Nett Lake Restoration Project, Phase I. Phase I of the Nett Lake Restoration Program involves the physical removal of rooted emergent plant communities and restoration of opportunity space for wild rice re-colonization. This is a stabilizing measure, intended to stop or reduce the rate of wild rice production decline. Phase II of the program will be implemented starting in 2006. This phase will include more intensive land management actions to reduce beaver impoundment and stagnancy.



Conservation Districts, Organizations & Partners

- | | |
|--|---|
| <ul style="list-style-type: none"> • Bois Forte Department of Natural Resources
 5344 Lakeshore Drive Nett Lake, MN 55772
 Phone: 218-757-3261 | <ul style="list-style-type: none"> • Sportsmen's Club of Lake Vermilion
 P.O. Box 456 Cook, MN 55723
 http://www.lakevermilion.com/SCLV/index.html |
| <ul style="list-style-type: none"> • Iron Range Resources
 4261 Hwy 53 South Eveleth, MN 55734-0441
 Phone 218-744-7400 | <ul style="list-style-type: none"> • North St. Louis County SWCD
 307 1st St. S. Suite 114 Virginia MN 55792
 Phone 218-742-9504 |
| <ul style="list-style-type: none"> • Natural Resources Research Institute
 5013 Miller Trunk Highway Duluth, MN 55811
 Phone 218-720-4294 | <ul style="list-style-type: none"> • Koochiching County SWCD
 715 4th St, International Falls, MN 56649
 Phone 218 283-1174 |
| <ul style="list-style-type: none"> • International Joint Commission Great Lakes Office
 100 Ouellette Ave., 8th Floor Windsor, ON N9A 6T3
 Phone: 519-257-6733 | <ul style="list-style-type: none"> • Rainy River First Nations
 Box 450 Emo, ON P0W 1E0
 Phone 807-482-2479 Fax: (807) 482-2603 |
| <ul style="list-style-type: none"> • MPCA Regional Office - Duluth
 525 Lake Avenue S. # 400 Duluth, MN 55802
 Phone 218-723-4660 or 800-657-3864 | <ul style="list-style-type: none"> • Rainy River Basin Water Resources Center
 Rainy River Community College
 1501 Highway 71 International Falls, MN 56649
 Phone 218-285-2218 |

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: 20010631; 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.