

Rapid Watershed Assessment

Root River

(MN / IA) HUC: 07040008



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

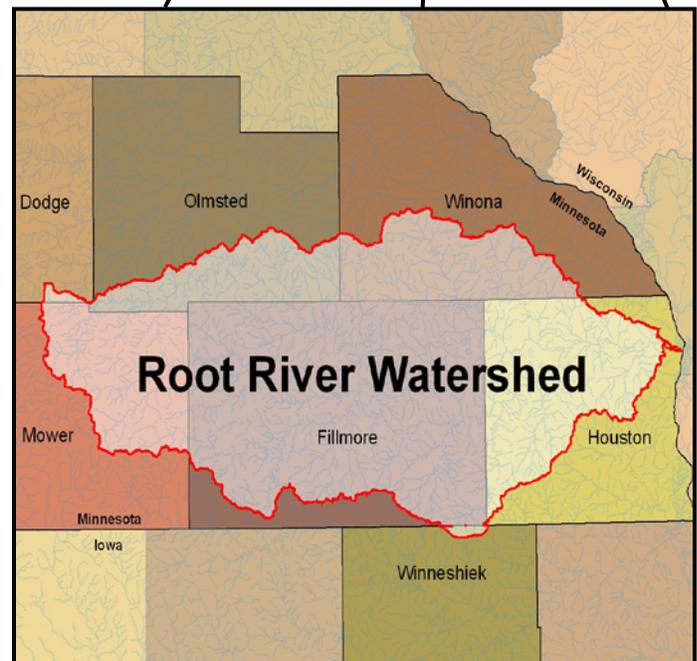
The Root River 8-Digit Hydrologic Unit Code (HUC) subbasin is located within the Western Corn Belt Plains and Driftless Area Ecoregions of southeastern Minnesota and northeastern Iowa.

Approximately ninety seven percent of the 1,064,970 acres in this HUC are privately owned. The remaining acres are state, county, federal or conservancy lands or covered by open water.

Estimates indicate 3,027 farms in the watershed. Approximately fifty seven 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 in size. Sixty four percent of the producers are full time operators and do not rely on off-farm income.

The main resource concerns in the watershed are sediment and erosion control, stormwater management, drinking and source water protection, animal waste management, nutrient management and wetland management

Many of the resource concerns relate directly to topography, agricultural practices and increased development in the region resulting in flooding and increased sediment and pollutant (fecal coliform, nitrogen, phosphorus) loadings to surface and ground waters.



County Totals

County	Acres in HUC	% HUC
Winneshiek	3,380.5	0.32%
Winona	127,686.5	11.99%
Dodge	3,814.6	0.36%
Olmsted	98,749.8	9.27%
Houston	198,803.1	18.67%
Fillmore	492,181.5	46.22%
Mower	140,353.9	13.18%
Total acres:	1,064,961	100%

Physical Description

Beginning at an elevation of 1010 feet above mean sea level, the Root River drops an average of 3.4 ft/mile from Chatfield, Minnesota, to its convergence with the Mississippi River at Navigation Pool 7.

The South Branch of the Root River rises in Mower County Minnesota in a series of agricultural drainage ditches that eventually disappear underground and re-emerge as a cool water stream at Mystery Cave near Preston, Minnesota. The 48°F water creates superb conditions for brook trout, and is a popular destination for local and visiting anglers.

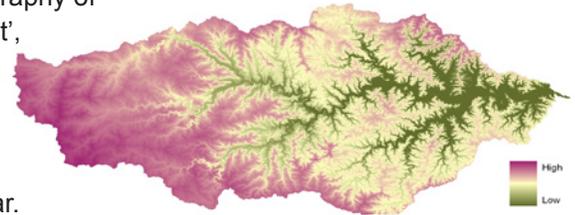
Much of the drainage area contributing to the Root River is within a geologic region known as the 'Driftless Area' of southeastern Minnesota and northeastern Iowa. Much of the region escaped the sculpting effects of the Wisconsinian glaciation, and is largely free of glacial till. The topography of much of the area is comprised of a unique landform known as 'karst', the product of water eroding thick layers of limestone for thousands of years. Karst features are characterized by numerous underground streams, sinkholes, blind valleys and springs.

Precipitation in the watershed ranges from 29 to 33 inches each year. Land use within the watershed is largely agricultural, with crop and pasture lands accounting for approximately 72% of the overall watershed acres.

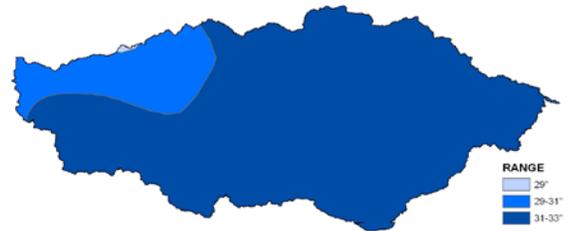
Predominate land covers / uses are Row Crops (41%), Grass, Pasture & Hay (30.7%), Forest (22%), and Residential / Commercial Development (5.3%).



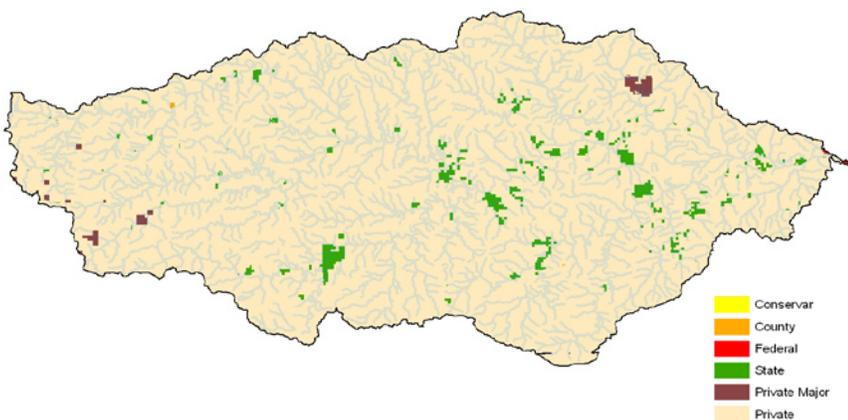
Relief



Average Precipitation



Ownership



Ownership Type	Acres	% of HUC
Conservancy	12	0.00
County	128	0.01
Federal	832	0.08
State	29259	2.75
Other	-	-
Tribal	-	-
Private Major	4582	0.43
Private	1030148	96.73
Total Acres:	1064961	100

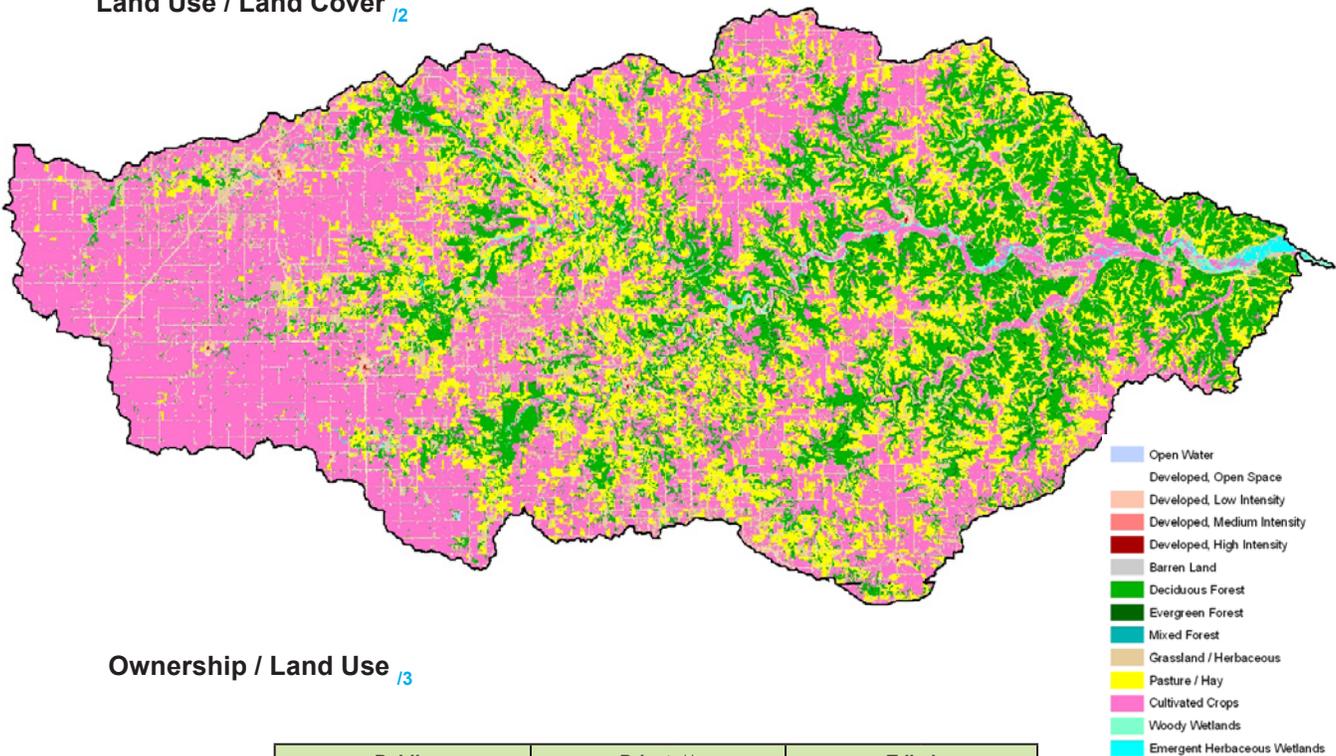
* Ownership totals derived from 2007 MN DNR GAP Stewardship and Iowa GAP Coverage data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Root River watershed covers an area of 1,064,961 acres. Approximately ninety seven percent of the land in the watershed is owned by private landholders (1,030,149 acres). The second largest ownership type is State, with approximately 29,260 acres (2.75%), followed by Private Major with 4,582 acres (0.43%), Federal with 832 acres (0.08%), County with 128 acres (0.01%) and Conservancy, with approximately 12 acres (<0.01%). Ownership data shows no major Tribal land holdings in the subbasin.

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	17,679.24	1.7%	216,939.76	20.4%	0.00	0.0%	234619.00	22.03%	
Grass, etc	3,403.77	0.3%	323,433.47	30.4%	0.00	0.0%	326837.25	30.69%	
Orchards	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.00%	
Row Crops	927.07	0.1%	435,932.46	40.9%	0.00	0.0%	436859.53	41.02%	
Shrub etc	1.56	0.0%	327.37	0.0%	0.00	0.0%	328.92	0.03%	
Wetlands	970.01	0.1%	6,695.05	0.6%	0.00	0.0%	7665.06	0.72%	
Residential/Commercial	530.85	0.0%	55,957.22	5.3%	0.00	0.0%	56488.07	5.30%	
Open Water*	222.30	0.0%	1,934.26	0.2%	0.00	0.0%	2156.56	0.20%	
* ownership undetermined		** includes private-major							
Totals:	23,734.80	2.23%	1,041,220	97.77%	0.00	0.00%	1064961.39	100.00%	

Physical Description (continued)

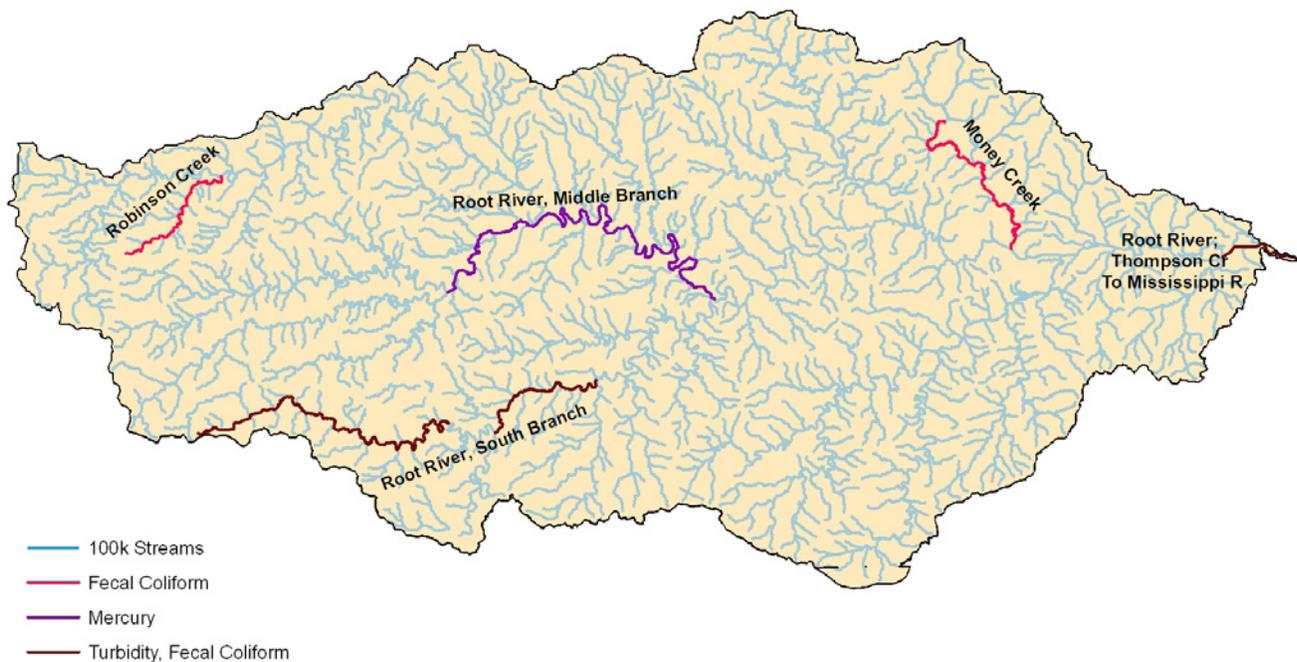
		ACRES	cu. ft/sec	
Stream Flow Data	USGS 05385000 ROOT RIVER NEAR HOUSTON, MN	2007 Total Avg.	1,188	
		May – Sept. Avg.	1,522	
		ACRES/MILES	PERCENT	
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)	Total Miles – Major (100K Hydro GIS Layer)	2,471	---	
	303d/TMDL Listed Streams (DEQ)	109	4.4%	
Riparian Land Cover/Land Use¹⁵ (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	Residential/Commercial	2,652	4.45%	
	Fallow	0	0.0%	
	Forest	20,366	34.13%	
	Grain Crops	0.0	0.0%	
	Grass/Pasture	20,092	33.68%	
	Orchards/Vine	0	0.0%	
	Row Crops	13,428	22.51%	
	Shrub/Range	11	0.02%	
	Water	1,013	1.70%	
	Wetlands	2,099	3.52%	
	Total Buffer Acres		59,661	---
Crop and Pastureland Land Capability Class¹⁶ (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	36,400	5%	
	2 – moderate limitations	402,400	58%	
	3 – severe limitations	157,000	22%	
	4 – very severe limitations	50,900	7%	
	5 – no erosion hazard, but other limitations	8,000	1%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	23,600	3%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	18,900	3%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	2,300	0.3%	
	Total Croplands & Pasturelands		699,500	---
	TYPE OF LAND	ACRES	% of Crop Lands	% of HUC
Irrigated Lands¹⁷ (1997 NRI Estimates for Non- Federal Lands Only)	Cultivated Cropland / Pastureland	0	0%	0%
	Uncultivated Cropland	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 States to identify and restore impaired waters.

Impaired waters lists, updated every two years, identify 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 it's 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 - Root River Watershed ^{1/8}



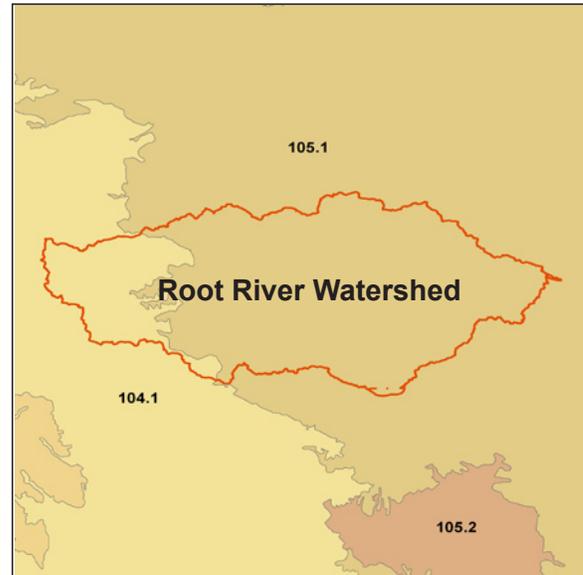
Listed Stream	Impairment	Affected Use
Root River, Middle Br ; Trout Run To South Br Root	Mercury	Aquatic Consumption
Root River, Middle Br; Rice Cr To Trout Run	Mercury	Aquatic Consumption
Root River; Thompson Cr To Mississippi R	Turbidity, Fecal Coliform	Aquatic Life and Aquatic Recreation
Robinson Creek; Headwaters To North Br Root R	Fecal Coliform	Aquatic Recreation
Root River, Middle Branch; Bear Cr To Upper Bear C	Mercury	Aquatic Consumption
Root River; Middle Branch; Upper Bear Cr To N Br R	Mercury	Aquatic Consumption
Money Creek; End Of Trout Stream Portion To Root R	Fecal Coliform	Aquatic Recreation
Root River, Middle Br ; Trout Run To South Br Root	Mercury	Aquatic Consumption
Root River, Middle Br ; Lynch Cr To Rice Cr	Mercury	Aquatic Consumption
Root River, Middle Br ; North Br To Lynch Cr	Mercury	Aquatic Consumption
Root River, South Br ; Canfield Cr To Willow Cr	Turbidity, Fecal Coliform	Aquatic Life and Aquatic Recreation
Root River, South Br ; Headwaters To Class 1B,2A,3	Turbidity, Fecal Coliform	Aquatic Life and Aquatic Recreation

Common Resource Areas

The Root River Watershed encompasses two common resource areas, 105.1 and 104.1. ^{/9}

105.1 Driftless Loess Hills and Bedrock: Highly dissected hills and valleys. Well drained and moderately well drained silty soils over bedrock residuum. Predominantly cropland and grazing land on ridge tops and valley bottoms with a mix of dairy, beef and cash grain agricultural enterprises. Deciduous forest on steep side slopes. Primary resource concerns are cropland soil erosion, surface water quality, grazing land and forestland productivity, stream bank erosion, and erosion during timber harvest.

104.1 Silty and Loamy Mantled Firm Till Plain: Gently sloping to very steep dissected till plain. Soils are predominantly well drained and are formed in thin silty material over loamy till, underlain by sedimentary bedrock. Cropland and grazing land on ridge tops and valley bottoms with a mix of dairy, beef and cash grain agricultural enterprises. Deciduous forest on side slopes. Primary resource concerns are cropland erosion, surface water quality, grazing land and woodland productivity, and soil erosion during timber harvest.



Geology / Soils ^{/10}

The soils and land types of the region have been formed largely in the deposits laid down by wind, water, and ice during the Pleistocene. An extensive mantle of loess, ranging from a few inches to more than 20 feet deep, was deposited by wind during the retreat of the lowan glacier, covering much of the watershed east of the lowan glacial border. The loess covered area resembles the larger driftless area, but shows evidence in some areas of having been covered with ice during the glacial period. This part of the area had been thoroughly dissected through long-continued and uninterrupted erosion. This came about because of differential weathering, uninterrupted by glaciation, of the underlying alternate layers of hard limestone and friable sandstone. On the steep valley slopes, particularly in the larger valleys, where geologic erosion has been active, the bedrock is exposed or the mantle of loess is thin.

Glacial drift deposits of lowan age cover the western portions of the watershed. Eastward from the thick lowan drift area the glacial deposits are thin. In some places the deposits occur in pre glacial valleys and as a thin mantle on the sides. Terraces of the Root River valley consist of stratified gravel, sand, and silt. In the glacial drift area the terraces consist of glaciofluvial deposits left by melt waters from the waning glaciers.

Limestones, Sandstones, and a few beds of soft shale, and other geologic formations that underlie the loess and glacial drift are a succession of sedimentary rocks of the Central Lowland physiographic region. Limestones form the most prominent feature of the landscape. Most outcrops are limestone, and they project along the summits of the bluffs and constitute the escarpments of benches or terraces. Except for occasional remnants, geologic erosion has, in places, removed some of the younger bedrock formations. Residues of soft shale resting on limestone occur in isolated spots across the watershed.

Where the soils are underlain by the very soluble Galena limestone, there are numerous sinkholes and depressions. They are most numerous where the Galena limestone occurs directly below the thin drift or loess mantle.

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

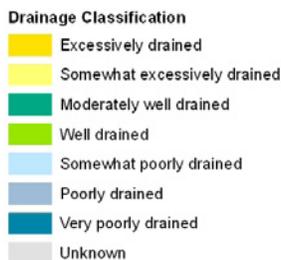
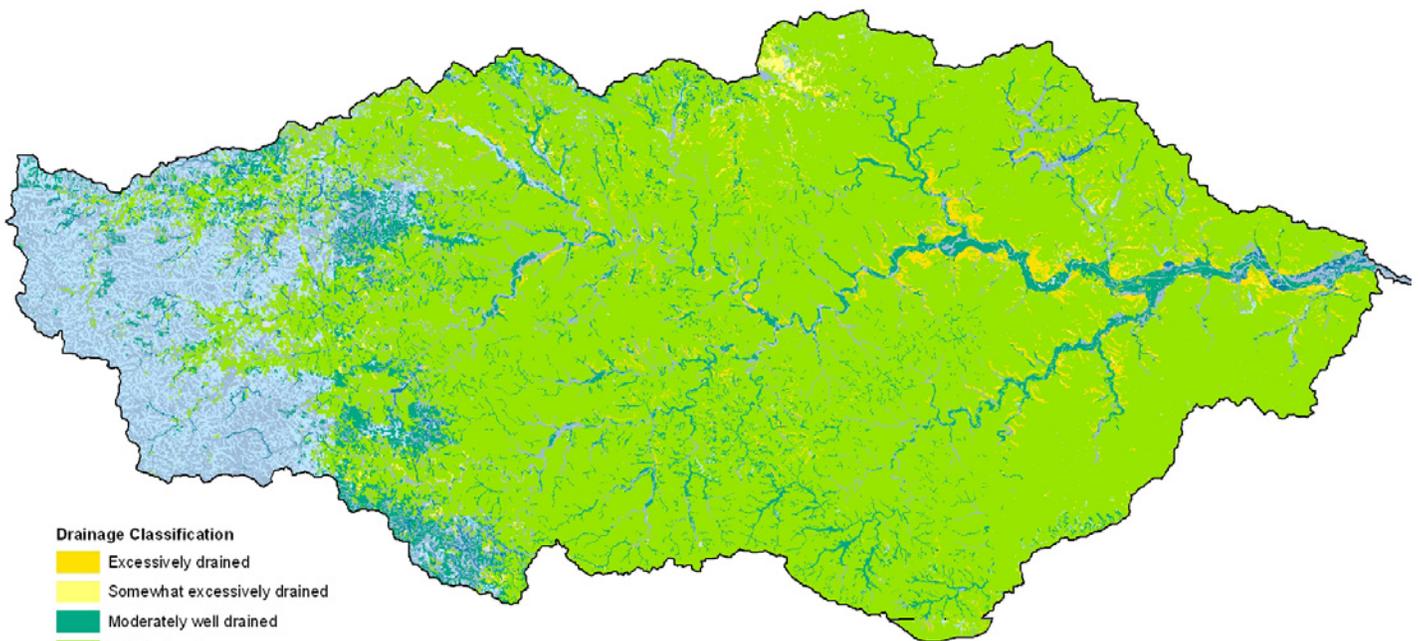
<http://soildatamart.usda.gov> to download SSURGO

 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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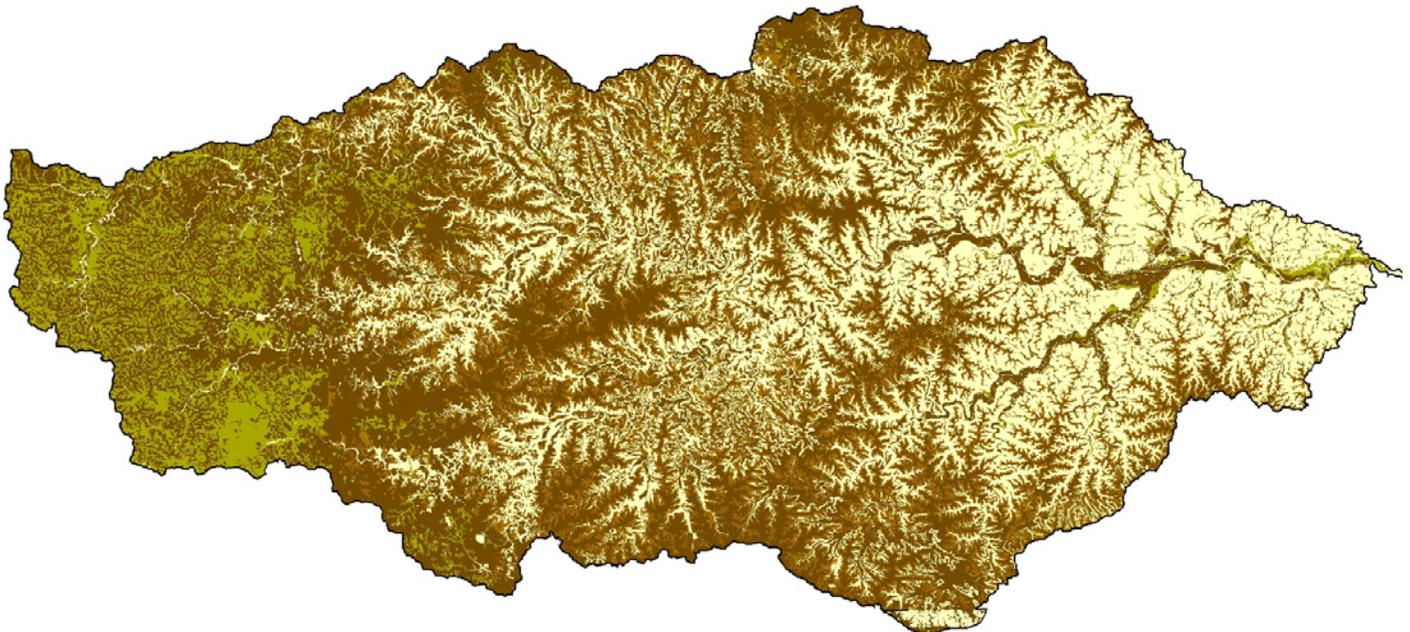
 certified soil tabular and spatial data.

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.



- 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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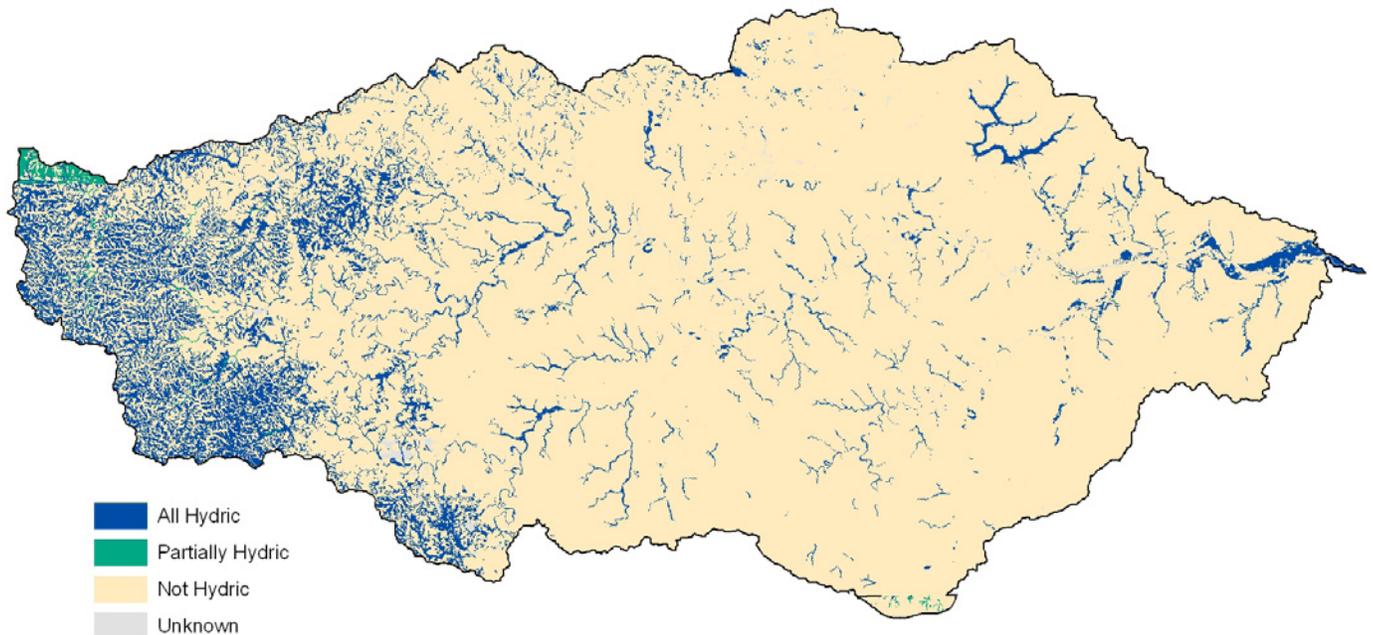
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Hydric Soils

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.

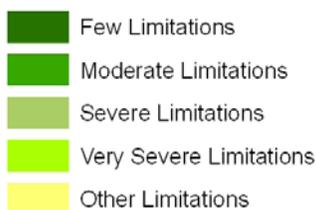
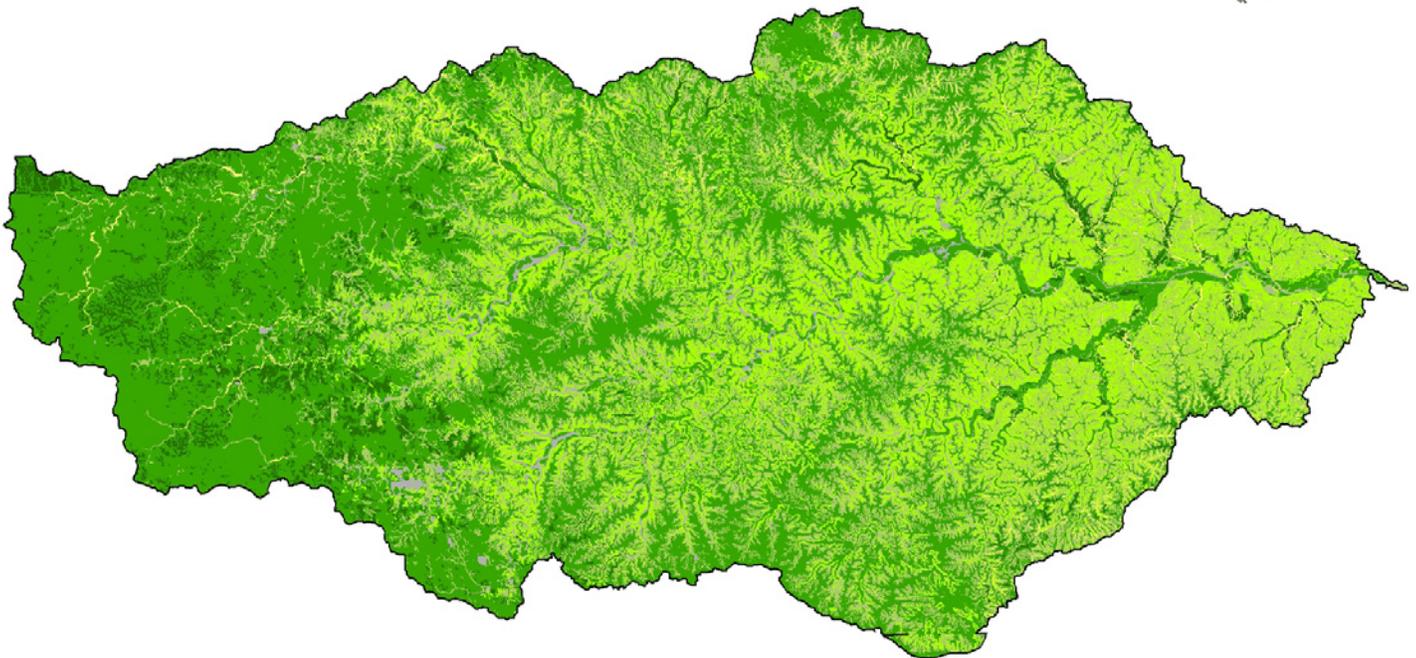


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Land Capability Classification

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.



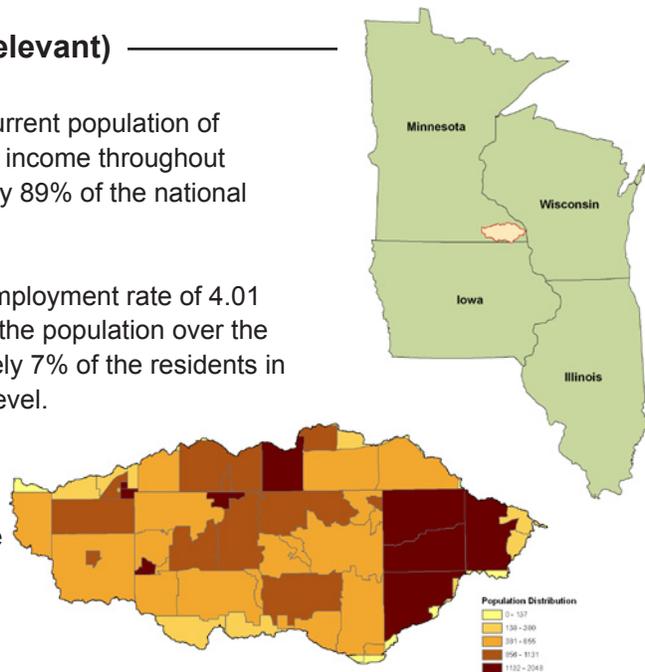
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Socioeconomic and Agricultural Data (Relevant)

Estimations for the Root River subbasin indicate a current population of slightly more than 43,600 people. Median household income throughout the district is approximately \$41,478 annually, roughly 89% of the national average.

Unemployment figures for the basin indicate an unemployment rate of 4.01 percent. Census data shows seventy two percent of the population over the age of 18 is active in the workforce, and approximately 7% of the residents in the watershed are living below the national poverty level.

Assessment estimates indicate 3,027 farms in the watershed. Approximately fifty seven 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 in size.



(MN) HUC# 07040008		Total Acres:	1,064,961
Population Data *	Watershed Population	43,606	
	Unemployment Rate	3.8 %	
	Median Household Income	41,478	
	% below poverty level	8.1%	
	Median Value of Home	96,129	
Farms	# of Farms	3,008	
	# of Operators	3,126	Percent
	# of Full Time Operators	2,014	64%
	# of Part Time Operators	1,112	36%
	Total Crop/Pasturelands:	699,500	66%
Farm Size	1 to 49 Acres	0	0%
	50 to 179 Acres	925	42%
	180 to 499 Acres	836	38%
	500 to 999 Acres	325	15%
	1,000 Acres or more	141	6%
Livestock & Poultry	Cattle - Beef	27,553	5%
	Cattle - Dairy	29,918	5%
	Chicken	8,804	2%
	Swine	192,211	34%
	Turkey	4,041	1%
	Other	296,727	53%
	Animal Count Total:	559,253	
	Total Permitted AFOs:	2,342	

* 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

Performance Results System Data

Watershed Name: Root				Watershed Number: 7040008						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	2,314	17,477	100	40,966	17,053	N/A	55,457	50,693	28,923	212,983
Total Conservation Systems Applied (acres)	3,603	9,941	100	31,584	31,584	N/A	46,286	32,822	28,556	184,476
Conservation Practices										
Total Waste Management (313) (numbers)	6	4	0	1	3	1	0	1	3	19
Riparian Forest Buffers (391) (acres)	29	262	179	679	74	20	0	24	0	1,267
Erosion Control Total Soil Saved (tons/year)	2,374	59,055	67,094	116,248	202,478	N/A	N/A	N/A	N/A	447,249
Total Nutrient Management (590) (Acres)	662	3,742	2,985	3,113	3,839	3,458	3,613	3,613	3,479	28,504
Pest Management Systems Applied (595A) (Acres)	950	1,500	1,761	1,530	2,105	545	0	2,001	2,837	13,229
Prescribed Grazing 528a (acres)	138	3,260	2,018	1,287	2,095	2,345	1,065	140	140	12,488
Tree & Shrub Establishment (612) (acres)	195	440	210	2,039	249	454	48	446	247	4,328
Residue Management (329A-C) (acres)	920	11,765	3,024	2,724	3,793	3,333	3,333	14,694	4,936	48,522
Total Wildlife Habitat (644 - 645) (acres)	1,529	6,024	1,525	2,210	2,001	1,873	2,210	8,213	13,205	38,790
Total Wetlands Created, Restored, or Enhanced (acres)	24	84	22	168	121	23	17	11	5	475
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	2,366	7,505	2,838	18,668	5,048	N/A	576	5,833	6,247	49,081
Wetlands Reserve Program	0	0	10	163	208	N/A	0	0	0	381
Environmental Quality Incentives Program	563	1,911	2,857	5,550	5,991	N/A	6,251	13,125	13,130	49,378
Wildlife Habitat Incentive Program	188	13	246	309	349	N/A	69	1,291	286	2,751
Farmland Protection Program	0	100	100	0	0	N/A	0	0	0	200

THREATENED AND ENDANGERED SPECIES

Scientific Name	Common Name	Type	Scientific Name	Common Name	Type
<i>Acris crepitans</i>	Northern Cricket Frog	Zoological	<i>Hydrastis canadensis</i>	Golden-seal	Botanical
<i>Actinonaias ligamentina</i>	Mucket	Zoological	<i>Iodanthus pinnatifidus</i>	Purple Rocket	Botanical
<i>Adoxa moschatellina</i>	Moschatel	Botanical	<i>Jeffersonia diphylla</i>	Twinleaf	Botanical
<i>Alasmidonta marginata</i>	Elktoe	Zoological	<i>Juniperus horizontalis</i>	Creeping Juniper	Botanical
<i>Allium cernuum</i>	Nodding Wild Onion	Botanical	<i>Lanius ludovicianus</i>	Loggerhead Shrike	Zoological
<i>Ammocrypta asprella</i>	Crystal Darter	Zoological	<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Ammodramus henslowii</i>	Henslow's Sparrow	Zoological	<i>Lasmigona costata</i>	Fluted-shell	Zoological
<i>Aphredoderus sayanus</i>	Pirate Perch	Zoological	<i>Lechea tenuifolia</i>	Narrow-leaved Pinweed	Botanical
<i>Aristida tuberculosa</i>	Sea-beach Needlegress	Botanical	<i>Melica nitens</i>	Three-flowered Melic	Botanical
<i>Arnoglossum plantagineum</i>	Tuberous Indian-plantain	Botanical	<i>Microtus ochrogaster</i>	Prairie Vole	Zoological
<i>Asclepias amplexicaulis</i>	Clasping Milkweed	Botanical	<i>Microtus pinetorum</i>	Woodland Vole	Zoological
<i>Asclepias stenophylla</i>	Narrow-leaved Milkweed	Botanical	<i>Minuartia dawsonensis</i>	Rock Sandwort	Botanical
<i>Asclepias sullivantii</i>	Sullivant's Milkweed	Botanical	<i>Myotis septentrionalis</i>	Northern Myotis	Zoological
<i>Asplenium platyneuron</i>	Ebony Spleenwort	Botanical	<i>Napaea dioica</i>	Glade Mallow	Botanical
<i>Aster shortii</i>	Short's Aster	Botanical	<i>Notropis nubilus</i>	Ozark Minnow	Zoological
<i>Baptisia alba</i>	White Wild Indigo	Botanical	<i>Novasuccinea n. sp. minnesota a</i>	Minnesota Pleistocene Ambersnail	Zoological
<i>Baptisia bracteata var. leucophaea</i>	Plains Wild Indigo	Botanical	<i>Novasuccinea n. sp. minnesota b</i>	Iowa Pleistocene Ambersnail	Zoological
<i>Buteo lineatus</i>	Red-shouldered Hawk	Zoological	<i>Obovaria olivaria</i>	Hickorynut	Zoological
<i>Cacalia suaveolens</i>	Sweet-smelling Indian-plantain	Botanical	<i>Oenothera rhombipetala</i>	Rhombic-petaled Evening Primrose	Botanical
<i>Carex careyana</i>	Carey's Sedge	Botanical	<i>Orobancha fasciculata</i>	Clustered Broomrape	Botanical
<i>Carex jamesii</i>	James' Sedge	Botanical	<i>Orobanche uniflora</i>	One-flowered Broomrape	Botanical
<i>Carex laevivaginata</i>	Smooth-sheathed Sedge	Botanical	<i>Panax quinquefolius</i>	American Ginseng	Botanical
<i>Carex laxiculmis</i>	Spreading Sedge	Botanical	<i>Paronychia canadensis</i>	Canadian Forked Chickweed	Botanical
<i>Carex sterilis</i>	Sterile Sedge	Botanical	<i>Parthenium integrifolium</i>	Wild Quinine	Botanical
<i>Carex woodii</i>	Wood's Sedge	Botanical	<i>Pellaea atropurpurea</i>	Purple Cliff-brake	Botanical
<i>Chrysosplenium iowense</i>	Iowa Golden Saxifrage	Botanical	<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Cicindela splendida cyanocephalata</i>	Splendid Tiger Beetle	Zoological	<i>Phegopteris hexagonoptera</i>	Broad Beech-fern	Botanical
<i>Cirsium hillii</i>	Hill's Thistle	Botanical	<i>Phidippus apacheanus</i>	A Jumping Spider	Zoological
<i>Clemmys insculpta</i>	Wood Turtle	Zoological	<i>Pipistrellus subflavus</i>	Eastern Pipistrelle	Zoological
<i>Coluber constrictor</i>	Eastern Racer	Zoological	<i>Pituophis catenifer</i>	Gopher Snake	Zoological
<i>Crotalus horridus</i>	Timber Rattlesnake	Zoological	<i>Pleurobema coccineum</i>	Round Pigtoe	Zoological
<i>Cycleptus elongatus</i>	Blue Sucker	Zoological	<i>Poa paludigena</i>	Bog Bluegrass	Botanical
<i>Cypripedium candidum</i>	Small White Lady's-slipper	Botanical	<i>Poa wolfii</i>	Wolf's Bluegrass	Botanical
<i>Dendroica cerulea</i>	Cerulean Warbler	Zoological	<i>Polytaenia nuttallii</i>	Prairie-parsley	Botanical
<i>Desmodium cuspidatum var. longifolium</i>	Big Tick-trefoil	Botanical	<i>Psoraleidium tenuiflora</i>	Slender-leaved Scurf Pea	Botanical
<i>Desmodium nudiflorum</i>	Stemless Tick-trefoil	Botanical	<i>Rudbeckia triloba</i>	Three-leaved Coneflower	Botanical
<i>Diarrhena obovata</i>	American Beakgrain	Botanical	<i>Sanicula trifoliata</i>	Beaked Snakeroot	Botanical
<i>Dicentra canadensis</i>	Squirrel-corn	Botanical	<i>Scirpus clintonii</i>	Clinton's Bulrush	Botanical
<i>Diplazium pycnocarpon</i>	Narrow-leaved Spleenwort	Botanical	<i>Scutellaria ovata</i>	Ovate-leaved Skullcap	Botanical
<i>Draba arabisans</i>	Rock Whitlow-grass	Botanical	<i>Sedum integrifolium ssp. leedyi</i>	Leedy's Roseroot	Botanical
<i>Dryopteris goldiana</i>	Goldie's Fern	Botanical	<i>Seiurus motacilla</i>	Louisiana Waterthrush	Zoological
<i>Dryopteris marginalis</i>	Marginal Shield-fern	Botanical	<i>Silene nivea</i>	Snowy Champion	Botanical
<i>Elliptio dilatata</i>	Spike	Zoological	<i>Solidago sciaphila</i>	Cliff Goldenrod	Botanical
<i>Empidonax virescens</i>	Acadian Flycatcher	Zoological	<i>Sullivantia sullivantii</i>	Reniform Sullivantia	Botanical
<i>Emydoidea blandingii</i>	Blanding's Turtle	Zoological	<i>Symphoricarpos orbiculatus</i>	Coralberry	Botanical
<i>Erimystax x-punctata</i>	Gravel Chub	Zoological	<i>Talinum rugospermum</i>	Rough-seeded Farnetflower	Botanical
<i>Eryngium yuccifolium</i>	Rattlesnake-master	Botanical	<i>Tephrosia virginiana</i>	Goat's-rue	Botanical
<i>Eumeces fasciatus</i>	Five-lined Skink	Zoological	<i>Trillium nivale</i>	Snow Trillium	Botanical
<i>Eupatorium sessilifolium</i>	Upland Boneset	Botanical	<i>Valeriana edulis ssp. ciliata</i>	Valerian	Botanical
<i>Falco peregrinus</i>	Peregrine Falcon	Zoological	<i>Venustaconcha ellipsiformis</i>	Ellipse	Zoological
<i>Floerkea proserpinacoides</i>	False Mermaid	Botanical	<i>Vertigo hubrichti hubrichti</i>	Midwest Pleistocene Vertigo	Zoological
<i>Gallinula chloropus</i>	Common Moorhen	Zoological	<i>Vertigo hubrichti variabilis n. subsp.</i>	Variable Pleistocene Vertigo	Zoological
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological	<i>Vitis aestivalis</i>	Silverleaf Grape	Botanical
<i>Hamamelis virginiana</i>	Witch-hazel	Botanical	<i>Wilsonia citrina</i>	Hooded Warbler	Zoological

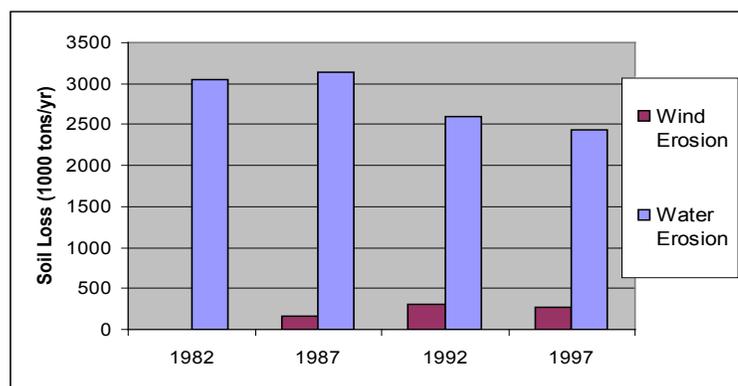
RESOURCE CONCERNS

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

- Sediment and Erosion Control.** Excessive amounts of suspended solids from cropland, urban lands, streambanks and streambeds is a primary threat to area waters. Working hand-in-hand with stormwater pollution and prevention plans and nutrient management plans, counties in the watershed seek to retain water on the landscape to reduce flooding and subsequent soil erosion, and improve water resources.
- Stormwater Management.** Local districts recognize that stormwater runoff volume from impervious surfaces will likely increase as development of the watershed continues. Existing stormwater systems typically bypass treatment plants and discharge storm water directly into sinkholes and stream
- Drinking Water and Source Water Protection.** The Root River region is particularly susceptible to groundwater contamination as a result of permeable soils and karst features. Ease of infiltration, aging septic systems, abandoned wells and historical tiling practices threaten public drinking water supplies.
- Feedlot and Animal Waste Management.** Managing farms to minimize excess nutrients, pathogens, and odors released into the environment is important to the health of surface and ground water. Setback of open tile intakes and placement of agricultural waste systems in high priority riparian areas and areas with highly permeable soils will greatly reduce the effects of animal feed operations on area waters.
- Nutrient Management.** Excessive amounts of nutrients, namely phosphorus and nitrogen, contaminate groundwater and create nuisance algae presence in area waters. Major contributors are cropland, urban grasses, municipal wastewater, aging or non-compliant septic systems, and internal cycling.
- Wetland Management.** Due to the historical draining of much of the areas wetlands, homgenic agricultural practices priority is given to both wetlands preservation and restoration. 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 estimates for sheet and rill erosion by water on the cropland and pastureland have **decreased** by approximately 119,700 tons (29.75%) of soil from 1982 to 1997.

- NRI estimates indicate wind erosion rates **increased** by 624,900 tons (20.47%) between 1982 and 1997. [/13](#)



Watershed Projects, Plans and Monitoring

- **Agricultural Land Buffer Incentive Program**
Minnesota Department of Agriculture
- **Olmsted Storm Water Prevention Program**
Olmsted County Public Works
- **Southeast Minnesota Wastewater Initiative**
U of M, MPCA, BALMM
- **South Fork Root River Water Quality Restoration**
Fillmore County, MN BWSR
- **South Branch Root River CWP**
MN DNR - Div of Waters, Fillmore County, U of M
- **Root River Fecal Coliform TMDL Plan**
Minnesota Pollution Control Agency
- **South Branch Root River Watershed Project**
Fillmore county, Mower county, MPCA
- **Driftless Area Restoration Effort**
Trout Unlimited, US Fish and Wildlife Service
- **Driftless Area Initiative**
DAI, NRCS, FSA, FWS, Forest Service, State DNRs
- **Mississippi River Defense Network**
Legislative Commission on Minnesota Resources
- **Basin Alliance for the Lower Mississippi in MN**
(BALMM)
- **Mississippi River Env. Management Program**
US Army Corps of Engineers
- **Mississippi Source Water Protection Project**
Minnesota Department of Health
- **Mississippi River WS Forest Partnership**
USDA Forest Service
- **Mississippi River Watershed Fund**
USDA Forest Service / National Fish & Wildlife Federation
- **Mississippi River Basin W.Q. Plan**
Minnesota Pollution Control Agency

Conservation Districts, Organizations & Partners

- **Dodge County SWCD**
916 2nd St SE, Dodge Center, MN 55927-9601
Phone (507) 374-6364
- **Fillmore County SWCD**
900 Washington St NW, Preston, MN 55965
Phone (507) 765-3878
- **Mower County SWCD**
1408 21st Ave NW Ste 2, Austin, MN 55912
Phone (507) 434-2603
- **Olmsted County SWCD**
41485 Industrial Dr NW Rochester, MN 55901
Phone (507) 280-2850
- **Root River SWCD**
805 N Hwy 44/76 Ste 1, Caledonia, MN 55921
Phone (507) 724-5261
- **Winneshiek County SWCD**
903 Commerce Drive Decorah, Iowa 52101
Phone (563) 382-4352
- **Winona County SWCD**
PO Box 39, Lewiston, MN 55952
Phone (507) 523-2171
- **Northeast Iowa RC&D, Inc.**
101 E. Greene Street Postville, Iowa 52162
Phone (563) 864-7112
- **Driftless Area Initiative**
150 West Alona Lane Lancaster, WI 53813
Phone (608) 723-6377 ext.135
- **Green Lands, Blue Waters**
1991 Buford Circle #411 St. Paul, MN 55108
Phone (612) 625-8235
- **Hiawatha Valley RC&D**
1485 Industrial Drive NW Rochester, MN 55901
Phone (507) 282-6153
- **Basin Alliance for the Lower Mississippi in MN**
18 Wood Lake Drive SE Rochester, MN 55904
Phone (507) 280-3592
- **Southeast Minnesota Wastewater Initiative**
863 30th Ave SE Rochester, MN 55904
Phone (507) 280-5575
- **Trout Unlimited Hiawatha Chapter**
Web: <http://www.mntu.org/index.php>
Phone (507) 287-6101

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.