

Rapid Watershed Assessment Resource Profile

Otter Tail Watershed (MN) HUC: 09020103



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.

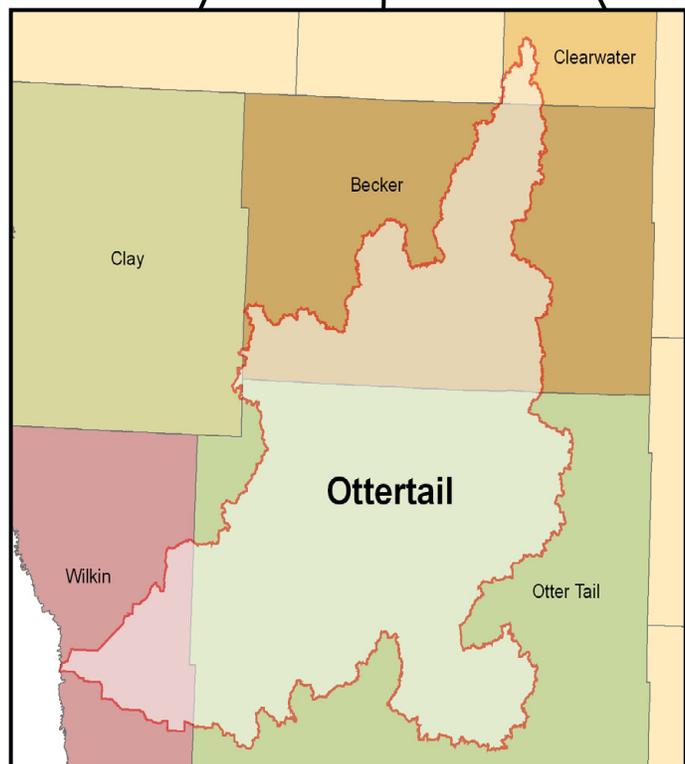
Introduction

The Otter Tail 8-Digit Hydrologic Unit Code (HUC) subbasin encompasses three different ecoregions. The southwest portion of the watershed - the mouth of the watershed, is located in the Red River Valley ecoregion. The northeast portion of the watershed - the headwaters of the watershed, is in the Northern Lakes and Forests ecoregion. The majority of the watershed found between these two areas is characterized by the North Central Hardwood Forest ecoregion.

The eastern three-fourths of the watershed contains thousands of lakes and wetlands. The watershed is a drainage basin of the Red River and the major tributaries of the watershed are the Otter Tail and Pelican Rivers. The headwaters of the Red River are considered to be where the Otter Tail River joins the Bois de Sioux River. The majority of the lakes in the greater Red River Basin are found in this watershed.

Assessment estimates indicate 2,241 Farms in the watershed. Approximately fifty one percent of the operations are less than 180 acres in size, thirty nine percent are from 180 to 1000 acres in size, and eleven percent of the farms are equal to or greater than 1000 acres in size. Average Farm size in the basin is 84 acres.

The main resource concerns in the watershed are wind and water soil erosion, wetland management, surface water quality, stormwater runoff, and wildlife habitat. Many of the resource concerns relate directly to changing landuse and increased development in the region, resulting in fragmentation and increased sediment/pollutant (mercury, excess nutrients) loadings to surface waters.



County Totals

County	Acres in HUC	% HUC
Clearwater	12,765	1.0%
Mahnomen	91	0.0%
Clay	1,319	0.1%
Becker	350,690	28.1%
Otter Tail	787,335	63.0%
Wilkin	97,341	7.8%
Total acres:	1,249,541	100%

Physical Description

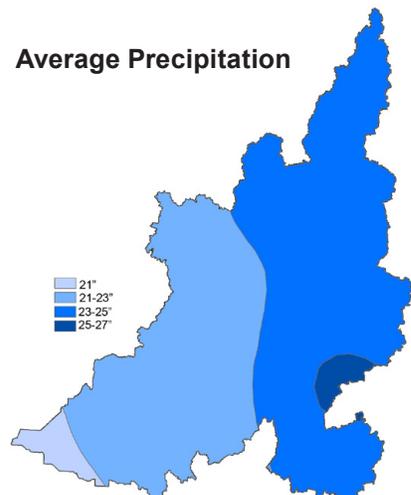
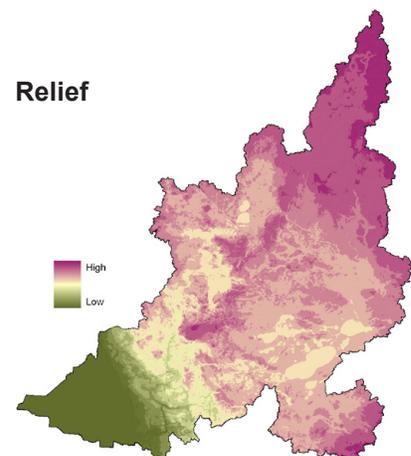
Average elevation in the Otter Tail subbasin is 1,323 feet above sea level, with the highest values being in the Northeastern and Eastern portions of the watershed, while increasingly lower values are found across the central and southwestern regions approaching the Red River Valley.

Precipitation in the watershed ranges from 21 to 27 inches annually. Evaporation estimates are between 27 to 31 inches annually (Minnesota State Climatologists Office, 1999).

Of all of the watersheds in the Red River Basin, the Otter Tail River Watershed is one of the least impacted by flooding. According to the Minnesota Pollution Control Agency, annual average flood damage (in 1996 dollars) in the watershed is estimated at \$457,784 with 99% of the damages being rural. The watershed suffers only 2.3% of flood damages occurring in the Red River Basin, outside of damages occurring along the main stem of the Red River.

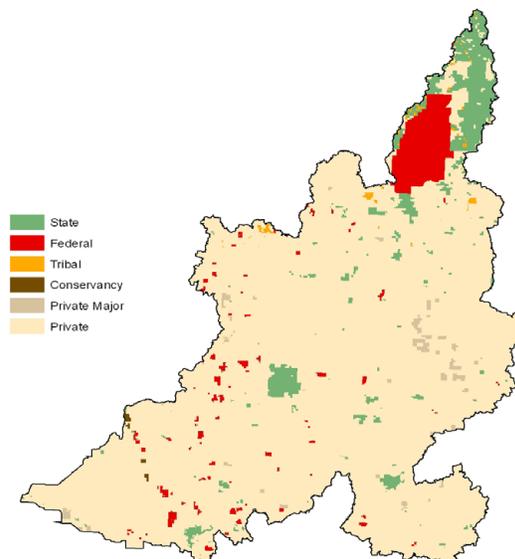
A significant portion of the land within this HUC is considered highly erodible, or potentially highly erodible. Soils are well to moderately suited to agricultural uses. Predominate land uses / land covers are Row Crops (28.6%), Forest (27.4%), Grass/Pasture/Hay (17.7%), Open Water (14.3%, and Wetlands (6.0%). Land use within the watershed is largely agricultural, accounting for approximately 45% of the overall watershed acres.

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



Ownership* ¹

Ownership Type	Acres	% of HUC
Conservancy	1,039	0.1
County	-	-
Federal	54,599	4.4
State	82,253	6.6
Other	-	-
Tribal	3,971	0.3
Private Major	11,509	0.9
Private	1,096,170	87.7
Total Acres:	1,249,541	100

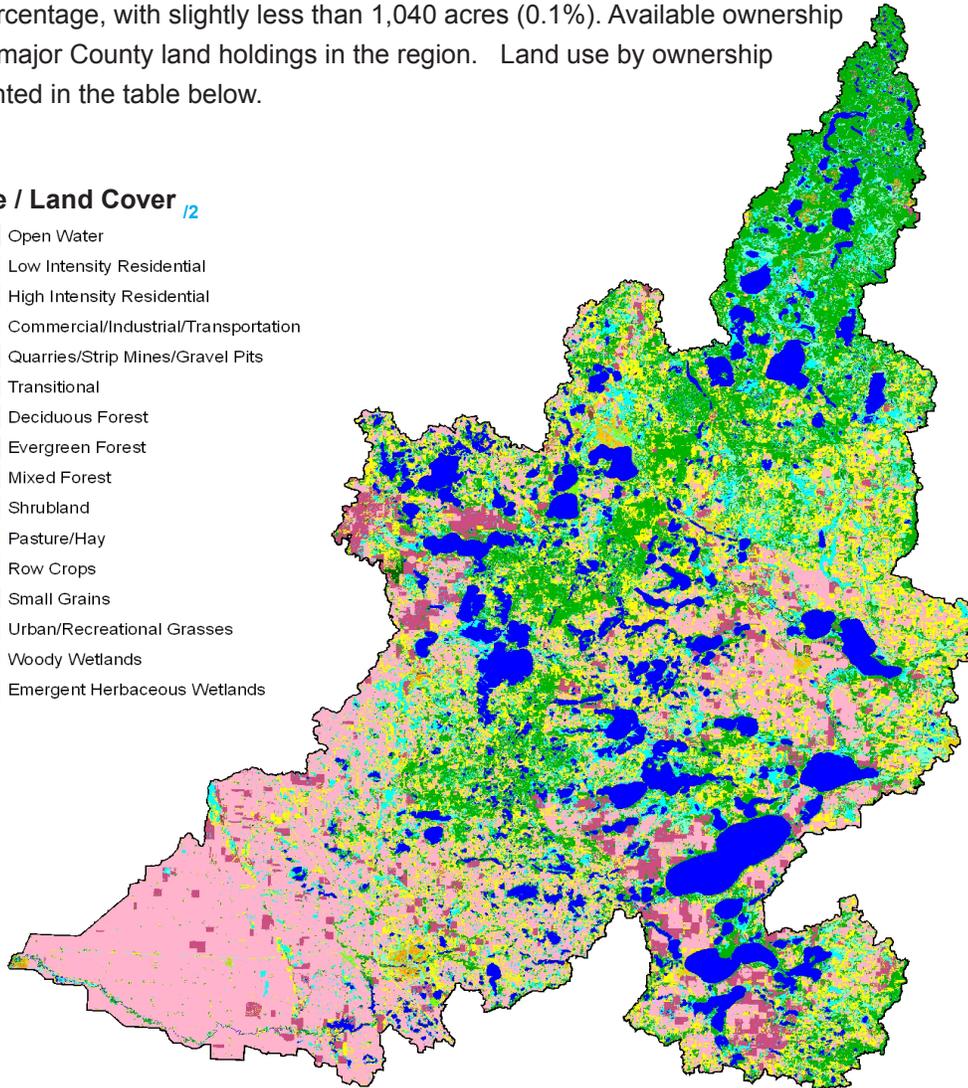


* Ownership totals derived from 2007 MN DNR GAP Stewardship data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Otter Tail watershed covers an area of 1,249,541 acres. Approximately eighty eight percent of the land in the watershed is owned by private landholders (1,096,170 acres). The second largest ownership type is State, with approximately 82,253 acres (6.6%), followed by Federal with nearly 54,600 acres (4.4%), Private-Major with 11,509 acres (0.9%), and Tribal with 3,971 acres (0.3%). Conservancy lands account for the smallest percentage, with slightly less than 1,040 acres (0.1%). Available ownership data shows no major County land holdings in the region. Land use by ownership type is represented in the table below.

Land Use / Land Cover ¹²



Ownership / Land Use ¹³

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent	
	Acres	% Public	Acres	% Private	Acres	% Tribal			
Forest	79,812	6.4%	260,706	20.9%	2,212	0.2%	342,730	27.4%	
Grass, etc	7,694	0.6%	213,802	17.1%	118	0.0%	221,614	17.7%	
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%	
Row Crops	5,974	0.5%	351,109	28.1%	32	0.0%	357,115	28.6%	
Shrub etc	3,810	0.3%	7,231	0.6%	30	0.0%	11,072	0.9%	
Wetlands	13,223	1.1%	61,506	4.9%	182	0.0%	74,911	6.0%	
Residential/Commercial	2,390	0.2%	60,616	4.9%	89	0.0%	63,094	5.0%	
Open Water*	12,771	1.0%	164,976	13.2%	1,260	0.1%	179,007	14.3%	
Watershed Totals:		125,673	10.06%	1,119,945	89.6%	3,923	0.3%	1,249,541	100%

* ownership undetermined

** includes private-major

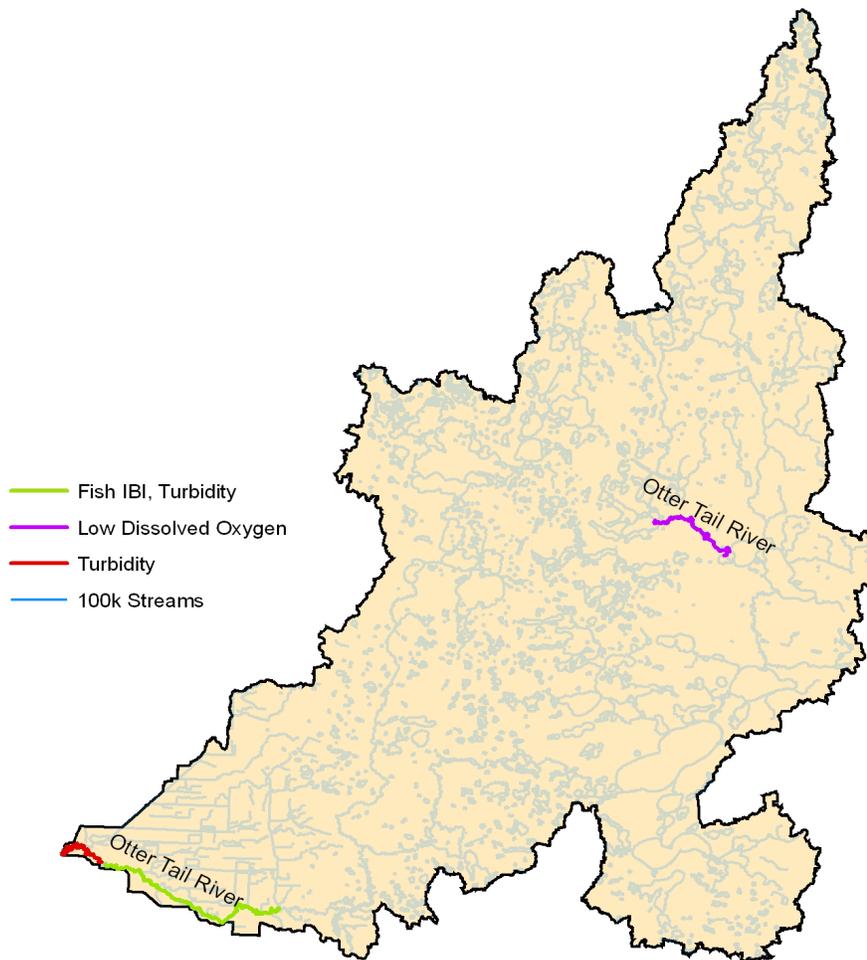
Physical Description (continued)

		ACRES	cu. ft/sec	
Stream Flow Data	USGS 05046000 OTTER TAIL RIVER BELOW ORWELL DAM NEAR FERGUS FALLS, MN	2006 Avg.	755.7	
		May – Sept. Yield	724.4	
		ACRES/MILES	PERCENT	
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)	Total Miles – Major (100K Hydro GIS Layer)	2856.6	---	
	2008 303d/TMDL Listed Streams (DEQ)	55.02	1.9%	
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	18,737	27.4%	
	Grain Crops	0	0.0%	
	Grass, etc	5,136	7.5%	
	Orchards	0	0.0%	
	Row Crops	7,749	11.3%	
	Shrub etc	383	0.6%	
	Wetlands	9,779	14.3%	
	Residential/Commercial	2,145	3.1%	
	Open Water	24,495	35.8%	
	Total Buffer Acres:	68,424	100%	
Crop and Pastureland Land Capability Class¹⁶ (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	44,800	8%	
	2 – moderate limitations	209,100	36%	
	3 – severe limitations	145,100	25%	
	4 – very severe limitations	111,800	19%	
	5 – no erosion hazard, but other limitations	0	0%	
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	49,300	8%	
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	15,900	3%	
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	11,900	2%	
		Total Croplands & Pasturelands	587,900	---
	TYPE OF LAND	ACRES	% of Crop Lands	% of HUC
Irrigated Lands¹⁷ (2002 NASS Estimates for Non-Federal Lands Only)	Cultivated Cropland / Pastureland	33,405	5.7%	2.7%
	Uncultivated Cropland	0	0%	0%
	Total Irrigated Lands	33,405	5.7%	2.7%

Assessment of Waters

Section 303(d) of the Clean Water Act states that water bodies with impaired use(s) must be placed on a state's impaired waters list. A water body is "Impaired" or polluted when it fails to meet one or more of the Federal Clean Water Act's water quality standards. Federal Standards exist for basic pollutants such as sediment, bacteria, nutrients, and mercury. The Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to identify and restore impaired waters.

2006 Minnesota 303d Listed Streams - Otter Tail Watershed



Listed Stream / Reach ¹⁸	Impairment	Affected Use
Otter Tail River Breckenridge Lk to Bois de Sioux R	Turbidity	Aquatic Life
Otter Tail River JD 2 to Breckenridge Lk	Fish IBI	Aquatic Life
Otter Tail River Rice Lk to Mud Lk	Low Dissolved Oxygen	Aquatic Life

Assessment of Waters (continued)

2006 Minnesota 303d Listed Lakes - Otter Tail Watershed



Listed Lake	Impairment	Affected Use	Listed Lake	Impairment	Affected Use
Toad	Mercury	Aquatic Consumption	West Battle	Mercury	Aquatic Consumption
Many Point	Mercury	Aquatic Consumption	Otter Tail	Mercury	Aquatic Consumption
Elbow	Mercury	Aquatic Consumption	Marion	Mercury	Aquatic Consumption
Cotton	Mercury	Aquatic Consumption	Walker	Mercury	Aquatic Consumption
Sallie	Mercury	Aquatic Consumption	Little McDonald	Mercury	Aquatic Consumption
Muskrat	Mercury	Aquatic Consumption	Dead	Mercury	Aquatic Consumption
Detroit	Mercury	Aquatic Consumption	Star	Mercury	Aquatic Consumption
Little Floyd	Mercury	Aquatic Consumption	Long	Mercury	Aquatic Consumption
Floyd	Mercury	Aquatic Consumption	Pickerel	Mercury	Aquatic Consumption
Big Cormorant	Mercury	Aquatic Consumption	Wall	Mercury	Aquatic Consumption
Ida	Mercury	Aquatic Consumption	Fish	Mercury	Aquatic Consumption
Big Pine	Mercury	Aquatic Consumption	North Lida	Mercury	Aquatic Consumption
East Battle	Mercury	Aquatic Consumption	Lizzie	Mercury	Aquatic Consumption
Rush	Mercury	Aquatic Consumption	Pelican	Mercury	Aquatic Consumption
Little Pine	Mercury	Aquatic Consumption	Dayton Hollow Reservoir	Mercury	Aquatic Consumption
Clitherall	Mercury	Aquatic Consumption	Pebble	Mercury	Aquatic Consumption
Prairie	Mercury	Aquatic Consumption	Jewett	Mercury	Aquatic Consumption

Common Resource Areas

Otter Tail Watershed encompasses five Common Resource Areas, CRA 102A.1, 91A.1, 57.1, 56.2 and 56.1.¹⁹

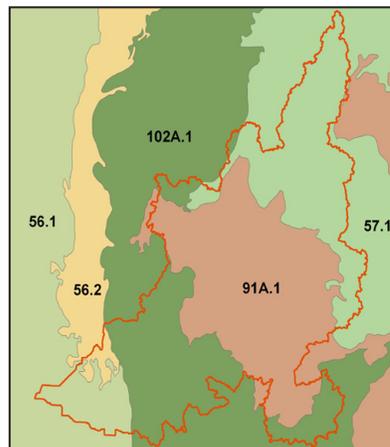
102A.1 Rolling Till Prairie: Gently sloping to steep, loamy glacial till soils with scattered sandy outwash soils and silty alluvial flood plains soils. This area is part of the Prairie Pothole region of the upper Midwest. Predominantly cropped to corn and soybeans with increasing hayland and pasture and small grains in the western part. Resource concerns are water and wind erosion, nutrient management and water quality.

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

57.1 Northern Minnesota Till Moraine: Rolling glacial moraine and associated outwash with short, choppy and complex slopes. Soils are generally loamy with some clayey and sandy soils included. Organic soils occur in depressions. Land use is cropland, pasture timber and recreation. Numerous lakes occur in this region. Main crops are small grain, soybeans and forage crops. Resource concerns include improved drainage for crop production, grazing management of forest and grassland, water and wind erosion and water quality impacts.

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.

56.1 Red River Valley: The Red River Valley (Glacial Lake Agassiz) is an extremely flat landscape composed of thick lacustrine sediments. Soils range from silty to clayey in texture. Most soils have a high water table and are very productive. Saline soils exist in places. Most areas are farmed with main crops being small grain, sugar beets, and soybeans. The native vegetation was tall grass prairie. Primary resource concerns are soil erosion and deposition by wind.



Only the major CRA units are described above.

 For further information, go to:

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

Geology / Soils¹⁰

Portions of the Watershed lie within calcareous glacial deposits associated with the Des Moines Lobe and the Wadena Lobe Associations, and steeper dry moraine. The bedrock hydrogeology and ground water in Ottertail Watershed consists of primarily Precambrian igneous and metamorphic rocks.

Much of the glacial deposits in the watershed are till, made up of clay, silt, sand and gravel. Also, in the east-central portion of the watershed, outwash, ice-contact, terrace and alluvium deposits made of mostly sand and gravel are plentiful. Glacial lake deposits of clay and silt are found at the mouth of the watershed. Soils vary widely from clayey soils of the lakeplain and black, limey and clayey soils at the mouth of the watershed; to black, loamy soils and sandy soils in the west central portion of the watershed; and rolling, wooded soils, sandy soils and loamy soils in the northeastern portion of the watershed.

The central, east and northeast portions of the watershed are underlain with a surficial aquifer. Large amounts of ground water are available from sand and gravel deposits throughout much of the watershed. The glacial lake plain and glacial till areas have more limited supplies. Except for the southwestern corner of the glacial lake plain, most of the watershed provides ground water recharge from precipitation. The same area is a discharge area to lakes and streams. Ground water is used primarily for irrigation, public water supplies and industrial uses, and averages 18,000 acre-feet per year.

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

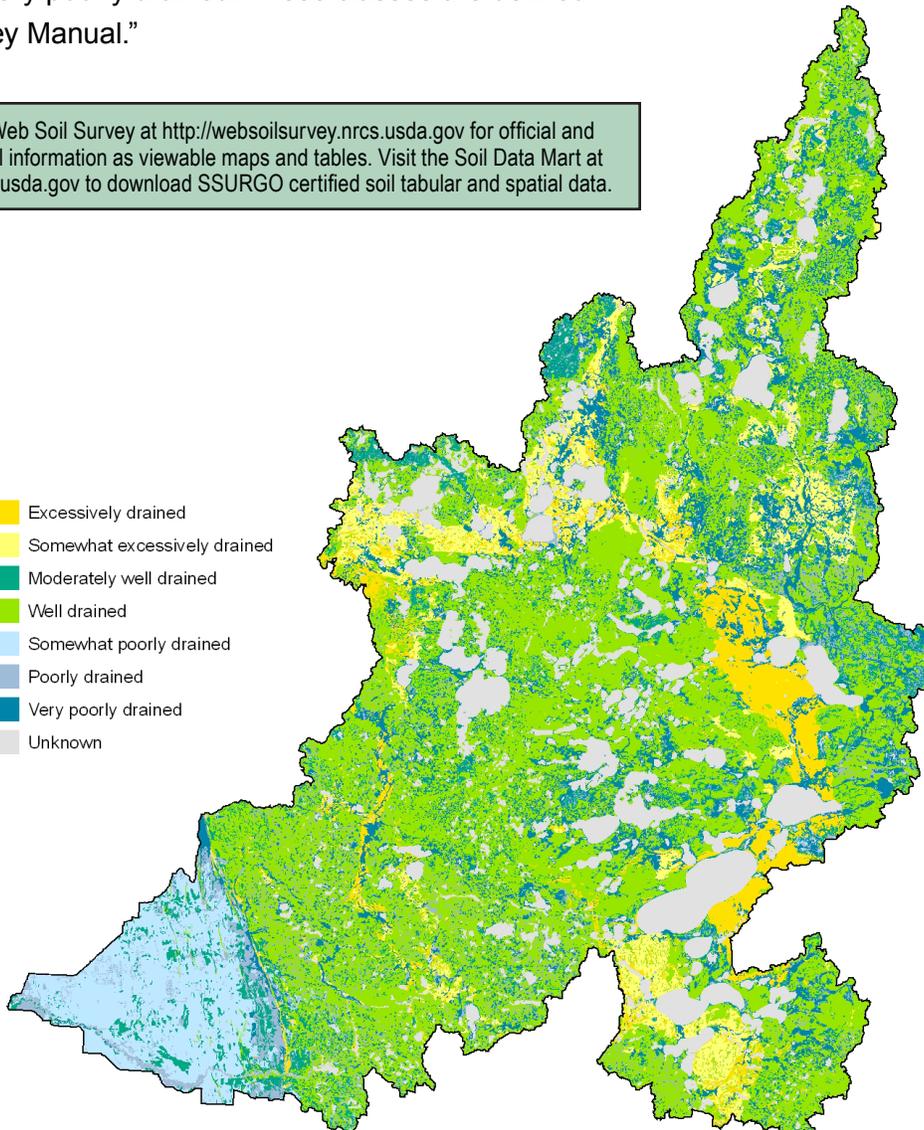
Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology 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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-  Excessively drained
-  Somewhat excessively drained
-  Moderately well drained
-  Well drained
-  Somewhat poorly drained
-  Poorly drained
-  Very poorly drained
-  Unknown



Farmland Classification

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

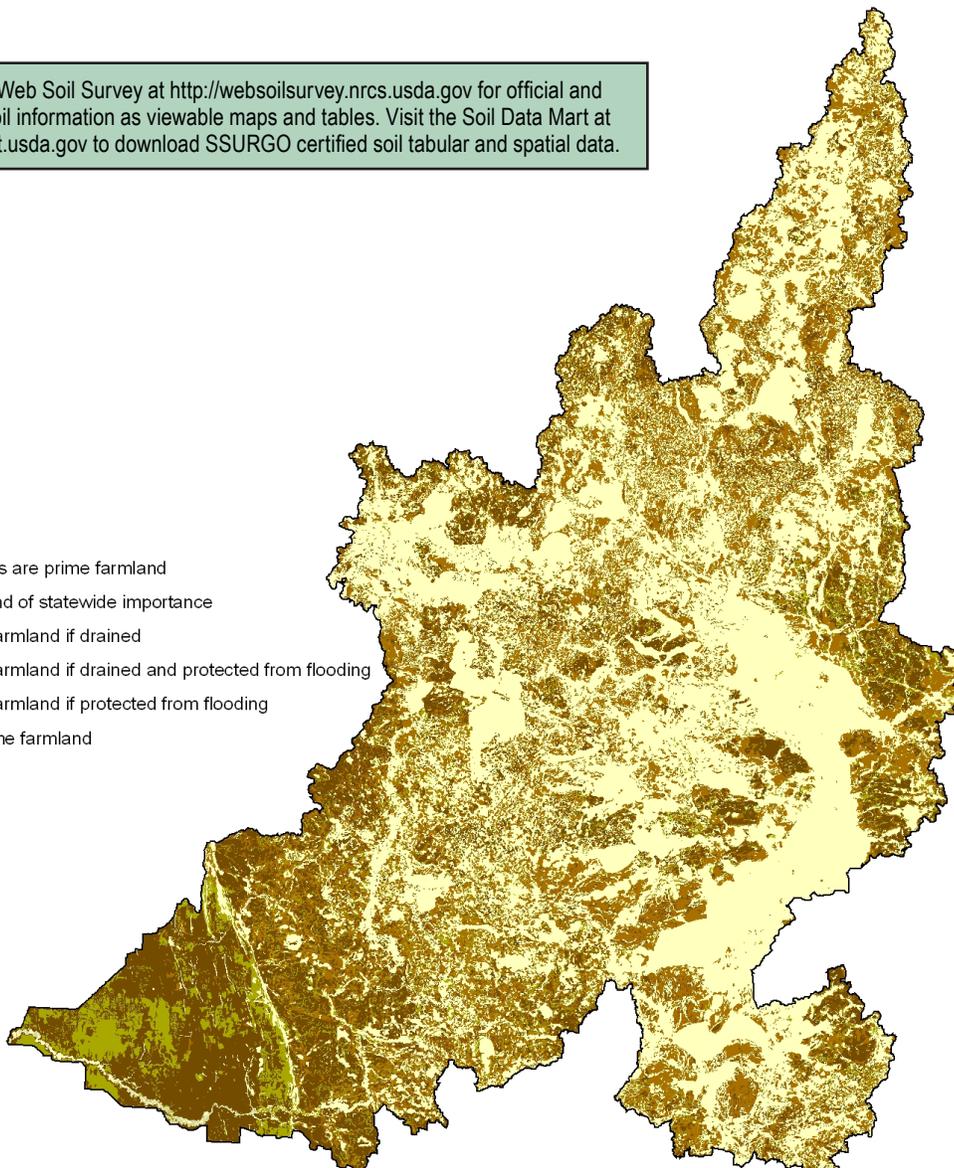
Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

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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-  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



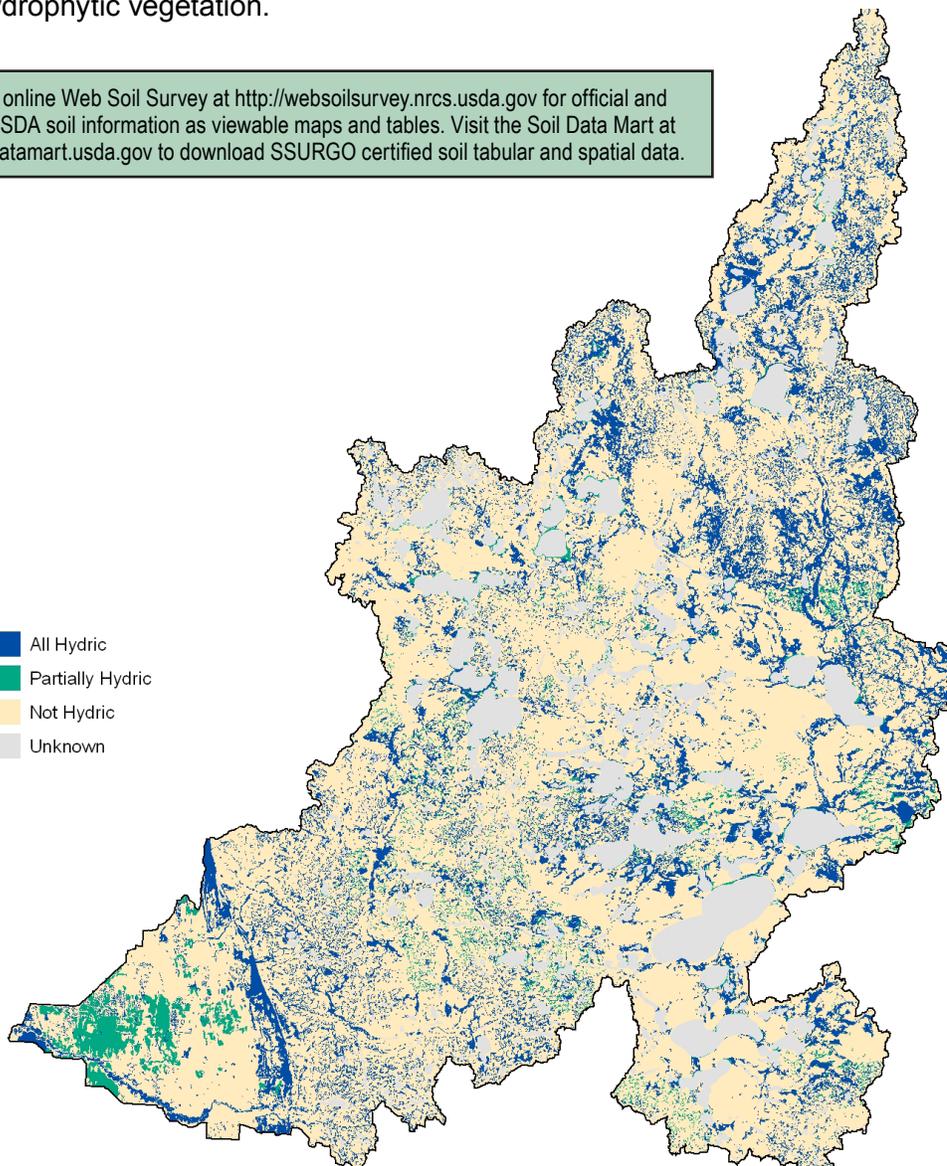
Hydric Soils

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)

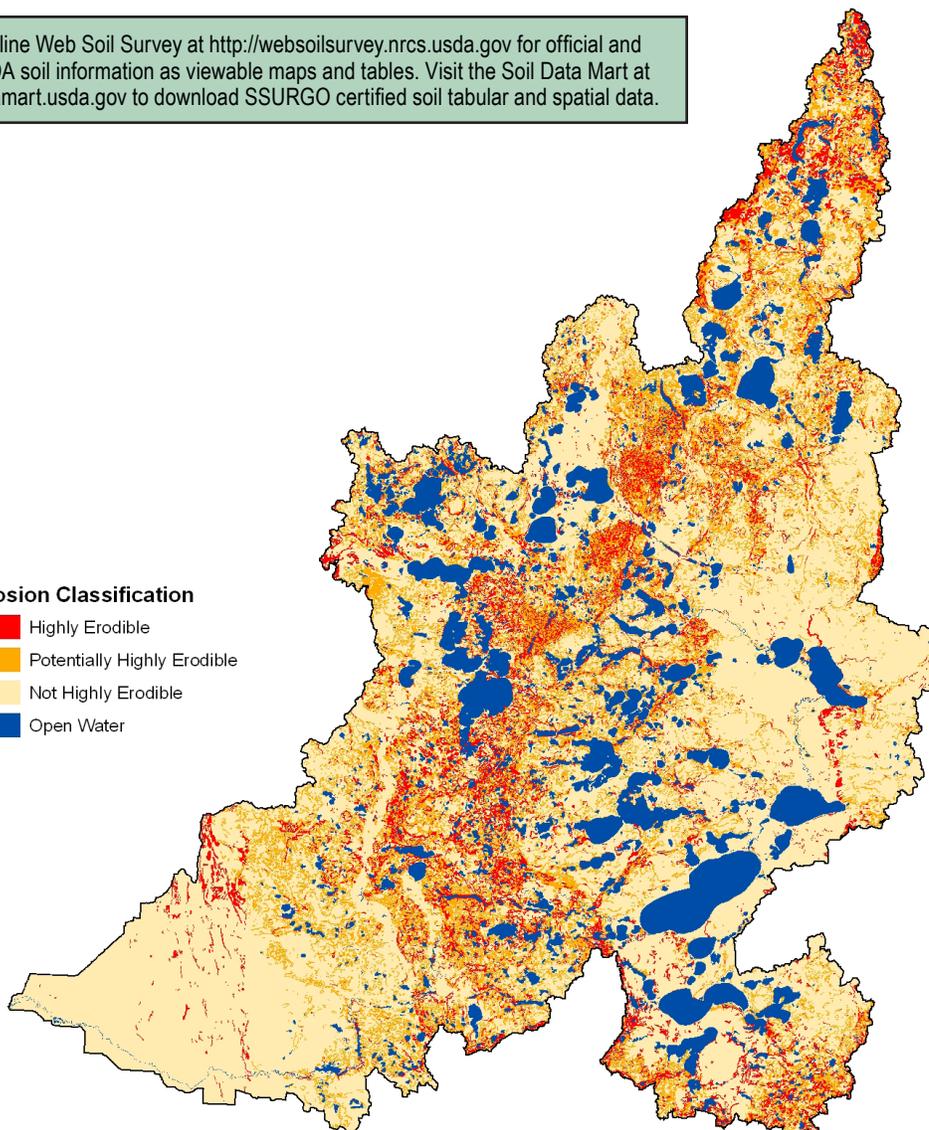
The erodibility index (EI) for a soil map unit is determined by dividing the potential erodibility for the soil map unit by the soil loss tolerance (T) value established for the soil in the FOTG as of January 1, 1990.

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

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



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Land Capability Classification

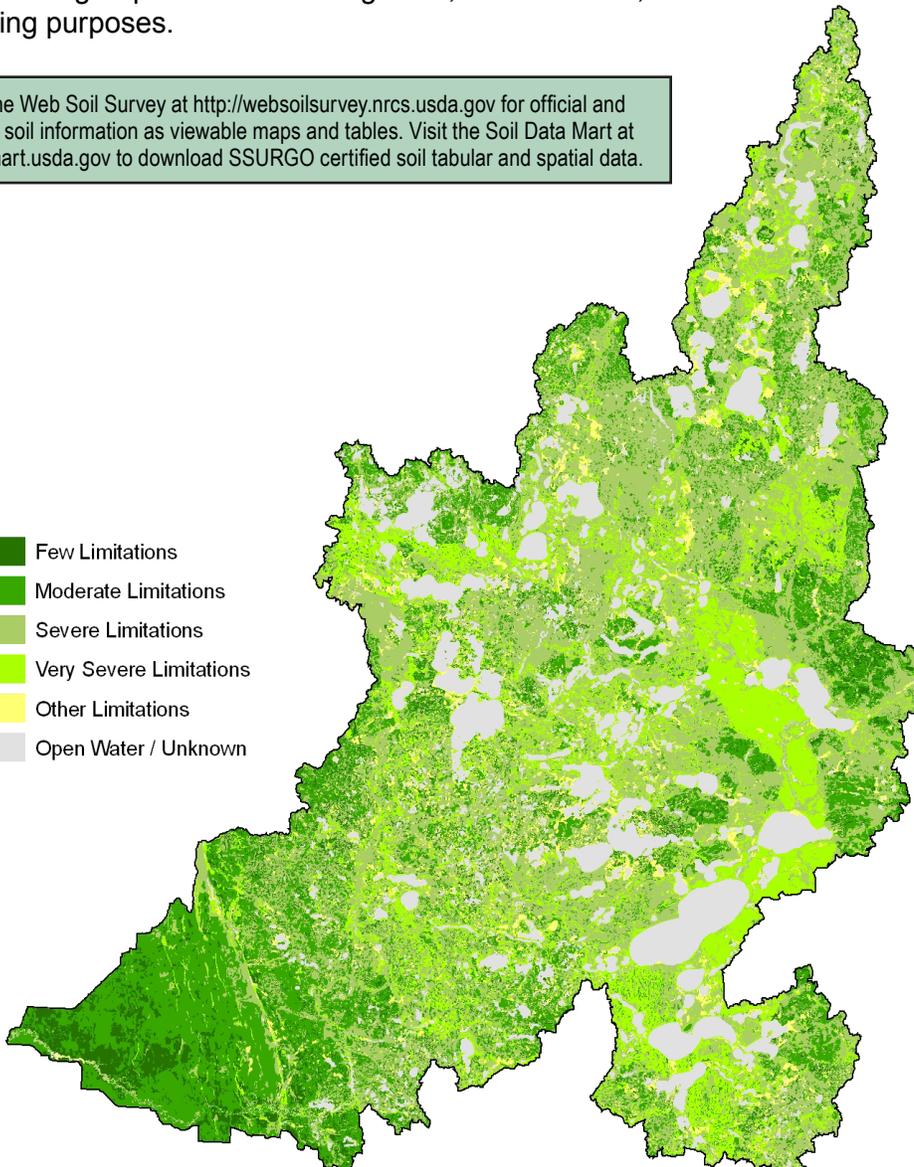
Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

The criteria used in grouping the soils does not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.



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-  Few Limitations
-  Moderate Limitations
-  Severe Limitations
-  Very Severe Limitations
-  Other Limitations
-  Open Water / Unknown



Performance Results System Data

Watershed Name: Otter Tail				Watershed Number: 09020103						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	4,600	14,838	0	10,748	10,012	N/A	10,660	18,275	58,135	127,268
Total Conservation Systems Applied (acres)	0	12,048	0	19,054	19,054	N/A	21,987	20,355	19,717	112,215
Conservation Practices										
Total Waste Management (313) (numbers)	2	0	0	2	3	0	1	2	0	10
Riparian Forest Buffers (391) (acres)	53	731	151	889	2,001	256	890	38	10	5,019
Erosion Control Total Soil Saved (tons/year)	2,831	727,228	39,258	47,368	69,782	N/A	N/A	N/A	N/A	886,467
Total Nutrient Management (590) (Acres)	0	624	1,413	2,603	1,496	1,682	2,246	2,246	4,601	16,911
Pest Management Systems Applied (595A) (Acres)	0	1,000	500	527	412	972	736	500	1,849	6,496
Prescribed Grazing 528a (acres)	0	0	0	339	528	130	241	0	0	1,238
Tree & Shrub Establishment (612) (acres)	253	1,826	1,845	3,533	2,148	380	1,556	386	0	11,927
Residue Management (329A-C) (acres)	0	42,374	2,982	622	492	3,807	3,807	12,890	1,661	68,635
Total Wildlife Habitat (644-645) (acres)	2,908	9,555	5,830	7,287	4,719	303	7,287	808	2,090	40,787
Total Wetlands Created, Restored, or Enhanced (acres)	311	343	92	451	476	153	34	15	7	1,882
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	0	8,091	3,775	7,206	3,530	N/A	5,807	1,919	4,161	34,489
Wetlands Reserve Program	0	0	275	0	80	N/A	0	0	0	355
Environmental Quality Incentives Program	0	888	470	0	2,269	N/A	13,746	12,450	11,204	41,027
Wildlife Habitat Incentive Program	0	6	0	12	0	N/A	179	154	48	399
Farmland Protection Program	0	0	0	0	0	N/A	0	0	0	0

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, and candidate species as well as species of special concern that occur in or near the subbasin.



Scientific Name	Common Name	Type	Scientific Name	Common Name	Type
<i>Acipenser fulvescens</i>	Lake Sturgeon	Zoological	<i>Lasmigona compressa</i>	Creek Heelsplitter	Zoological
<i>Actinonaias ligamentina</i>	Mucket	Zoological	<i>Lasmigona costata</i>	Fluted-shell	Zoological
<i>Ammodramus henslowii</i>	Henslow's Sparrow	Zoological	<i>Ligumia recta</i>	Black Sandshell	Zoological
<i>Aristida purpurea</i> var. <i>longiseta</i>	Red Three-awn	Botanical	<i>Limosa fedoa</i>	Marbled Godwit	Zoological
<i>Botrychium campestre</i>	Prairie Moonwort	Botanical	<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	White Adder's-mouth	Botanical
<i>Botrychium minganense</i>	Mingan Moonwort	Botanical	<i>Marpissa grata</i>	A Jumping Spider	Zoological
<i>Botrychium pallidum</i>	Pale Moonwort	Botanical	<i>Microtus ochrogaster</i>	Prairie Vole	Zoological
<i>Buellia nigra</i>	A Species of Lichen	Botanical	<i>Minuartia dawsonensis</i>	Rock Sandwort	Botanical
<i>Buteo lineatus</i>	Red-shouldered Hawk	Zoological	<i>Najas marina</i>	Sea Naiad	Botanical
<i>Carex hallii</i>	Hall's Sedge	Botanical	<i>Notropis anogenus</i>	Pugnose Shiner	Zoological
<i>Carex sterilis</i>	Sterile Sedge	Botanical	<i>Oarisma powesheik</i>	Powesheik Skipper	Zoological
<i>Cirsium hillii</i>	Hill's Thistle	Botanical	<i>Oxyethira ecornuta</i>	A Caddisfly	Zoological
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological	<i>Perognathus flavescens</i>	Plains Pocket Mouse	Zoological
<i>Cygnus buccinator</i>	Trumpeter Swan	Zoological	<i>Phalaropus tricolor</i>	Wilson's Phalarope	Zoological
<i>Cypripedium candidum</i>	Small White Lady's-slipper	Botanical	<i>Potamogeton vaginatus</i>	Sheathed Pondweed	Botanical
<i>Dendroica cerulea</i>	Cerulean Warbler	Zoological	<i>Rhynchospora capillacea</i>	Hair-like Beak-rush	Botanical
<i>Eleocharis quinqueflora</i>	Few-flowered Spike-rush	Botanical	<i>Ruppia maritima</i>	Widgeon-grass	Botanical
<i>Etheostoma microperca</i>	Least Darter	Zoological	<i>Sparganium glomeratum</i>	Clustered Bur-reed	Botanical
<i>Gaillardia aristata</i>	Blanket-flower	Botanical	<i>Speyeria idalia</i>	Regal Fritillary	Zoological
<i>Gentiana affinis</i>	Northern Gentian	Botanical	<i>Sterna forsteri</i>	Forster's Tern	Zoological
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological	<i>Sterna hirundo</i>	Common Tern	Zoological
<i>Helianthus nuttallii</i> ssp. <i>rydbergii</i>	Nuttall's Sunflower	Botanical	<i>Torreyochloa pallida</i>	Torrey's Manna-grass	Botanical
<i>Juniperus horizontalis</i>	Creeping Juniper	Botanical	<i>Trimorpha lonchophylla</i>	Shortray Fleabane	Botanical
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Zoological	<i>Tympanuchus cupido</i>	Greater Prairie-chicken	Zoological

RESOURCE CONCERNS

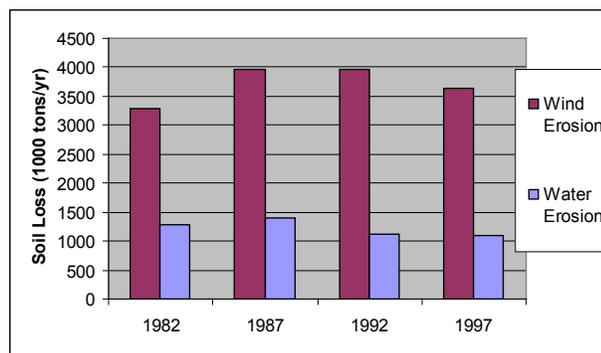
County Soil and Water Conservation Districts have identified the following resource concerns as top priorities for conservation and cost sharing efforts:



- Soil Quality, Excessive Sheet and Rill Erosion.** In addition to erosion on the cropland, sedimentation caused by the clearing and grading of shoreland property is neither desirable nor necessary. Erosion issues relate directly to lake pollution/eutrophication and shoreland development, and compound effects of erosion from agricultural lands.
- Stormwater Management.** Local districts recognize that runoff volume will likely increase as development of the watershed continues. Districts seek to require that peak runoff rates be kept below the capacity of downstream conveyance facilities using retention structures or conservation practices.
- Surface Water Quality, Nutrients, Priority Pollutants.** Reduction of priority pollutants and sediments in surface waters is a priority issue throughout the watershed. Excessive amounts of sediments, nutrients, and bacteria degrade the water quality causing a fish community with depressed populations and limited diversity. Increased levels of phosphorus and chlorophyll-a are reaching area lakes as impervious surface increases and natural buffers disappear.
- Wildlife Habitat.** Given the fragmentation caused by increased shoreland development, there are few to no natural corridors of natural habitat for wildlife. The watershed is made up of many long, narrow wet areas, in which habitat for wildlife is increasingly compromised as development pressure mounts.
- Wetland Management.** Due to documented development pressures within shoreland 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 Erosion Estimates

- Sheet and rill erosion by water on the cropland and pastureland decreased by approximately 187,500 tons (14.58%) of soil from 1982 to 1997.
- NRI estimates indicate wind erosion rates increased by 347,500 tons (10.5%) between 1982 and 1997. /13



Socioeconomic and Agricultural Data (Relevant)

Estimations for the Otter Tail subbasin indicate a current population of just under 64,280 people. Median household income throughout the district is \$36,135 yearly, roughly 78% of the national average. Unemployment is estimated at 5.3%, and approximately 12% of the residents in the watershed are below the national poverty level.



Assessment estimates indicate 2,241 Farms in the watershed. Approximately fifty one percent of the operations are less than 180 acres in size, thirty nine percent are from 180 to 1000 acres in size, and eleven percent of the farms are equal to or greater than 1000 acres in size. Average Farm size in the basin is 84 acres. Of the 2,085 operators in the watershed, fifty seven percent are full-time producers not reliant on off-farm income.

(MN) HUC# 9020103		Total Acres:	1,249,541
Population Data*	Watershed Population	64,278	
	Unemployment Rate	5.3%	
	Median Household Income	36,135	
	% below poverty level	12%	
	Median Value of Home	73,533	
Farm Data	# of Farms	2,241	
	# of Operators	2,085	Percent
	# of Full Time Operators	1,190	57%
	# of Part Time Operators	895	43%
	Total Cropland Acres	538,023	43.1%
Farm Size	1 to 49 Acres	20	16%
	50 to 179 Acres	44	35%
	180 to 499 Acres	36	29%
	500 to 999 Acres	13	10%
	1,000 Acres or more	13	11%
	Average Farm Size	84	
Livestock & Poultry	Cattle - Beef	13,221	1%
	Cattle - Dairy	17,405	1%
	Chicken	5,403	0%
	Swine	15,706	1%
	Turkey	618,761	46%
	Other	676,406	50%
	Animal Count Total:	1,346,902	
	Total Permitted AFOs:	466	
Chemicals (Acres Applied)	Insecticides	31,615	
	Herbicides	254,060	
	Wormicides	3,275	
	Fruiticides	14,433	
	Total Acres Treated	303,383	
	% State Chemical Totals	2.1%	

* 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

- **Lower Otter Tail TMDL Implementation Plan**
Minnesota Pollution Control Agency, Wilkin County
- **Otter Tail River Watershed Plan**
Otter Tail, Wilkin County, MPCA
- **Pine Lakes District Lakes Management Plan**
Pine Lakes Improvement District
- **Whiskey Creek Watershed Project**
Wilkin County SWCD
- **International Trans-boundary Case Study**
Red River Basin Commission
- **Aggassiz Basin White Pine Restoration**
Minnesota Civilian Conservation Corps
- **Red River Basin Riparian Project**
Red River RC&D
- **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

* 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

- **Becker County SWCD**
809 - 8th St SE, Detroit Lakes, MN 56501
Phone (218) 846-7360
- **Clay County SWCD**
1615 30th Ave S, Moorhead, MN 56560
Phone (218) 287-2255
- **Clearwater County SWCD**
312 Main Ave N Ste 3, Bagley, MN 56621
Phone (218) 694-6845
- **Mahnomen County SWCD**
PO Box 381, Mahnomen, MN 56557
Phone (218) 935-2987
- **MN DNR Area Fisheries Supervisor:**
1509 1st Ave N Fergus Falls, MN 56537
Phone (218) 739-7576
- **North Central Minnesota Joint Powers Board**
3217 Bemidji Ave N Suite 3 Bemidji, MN 56601
Phone (218) 755-4339
- **Otter Tail County SWCD, East**
801 Jenny Ave SW Ste 2, Perham, MN 56573
Phone (218) 346-4260
- **Otter Tail County SWCD, West**
506 Western Ave N, Fergus Falls, MN 56537
Phone (218) 739-1308
- **Otter Tail Co Coalition of Lake Associations**
PO Box 53 Otter Tail, MN, 56571
Phone (218) 736-4021
- **Pine Lakes Improvement District**
Box 174, Perham, MN 56573
Phone (218) 346-6676
- **Red River Basin Commission**
119th 5th St. P.O. Box 66 Moorhead, MN 56561
www.reddriverbasincommission.org
- **Red River RC&D**
516 cooper Ave, Suite 101 Grafton, ND 58237
Phone (701) 352-0127
- **Red River Basin Riparian Project**
516 Cooper Ave Grafton, ND 58237
Phone (701) 352-3550
- **Wilkin County SWCD**
1150 Hwy 75 N, Breckenridge, MN 56520
(218) 643-2933

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 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 (7/30/07). CREP Acres: <http://www.bwsr.state.mn.us/easements/crep/easementssummary.html> (7/31/08). WRP Acres: NRCS (8/16/08). 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 block group 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, 2007 Annual Averages <http://www.bls.gov> Data were also taken from MPCA AFO/CAFO counts provided by county for 2006.

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 present, 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.