

Lower Souris River 09010003

8-Digit Hydrologic Unit Profile

August 2008

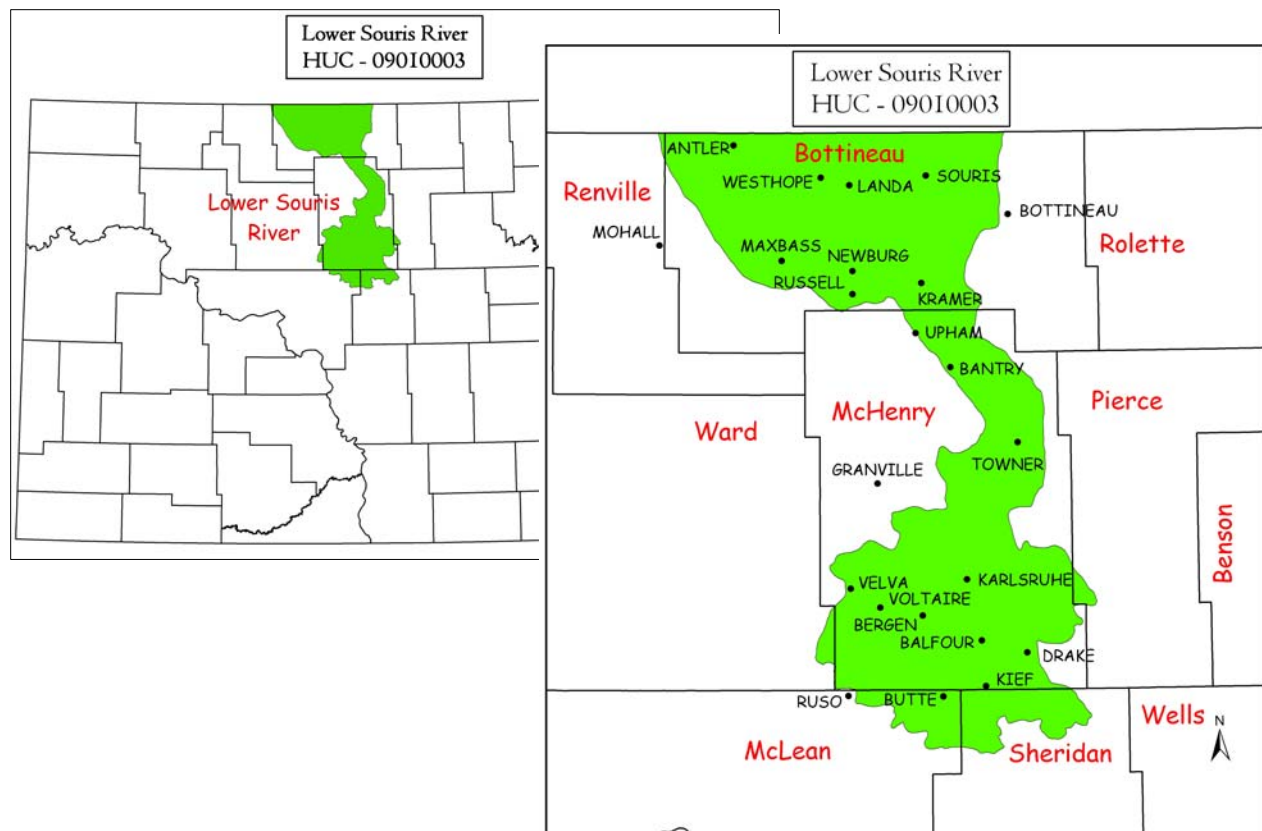
Introduction

The Lower Souris River 8-Digit Hydrologic Unit Code (HUC) (9010003) sub-basin includes land in the United States of America (USA) and Canada (CAN). There are approximately 1,436,700 acres in the USA portion of the sub-basin. This sub-basin is located in Souris-Red-Rainy Region, Souris Sub-Region.

This report addresses only the portion located within North Dakota. The Lower Souris River covers parts of seven counties (McHenry, Bottineau, Sheridan, McLean, Ward, Pierce, and Renville) in North Dakota. Of the 1,436,700 acres, McHenry County contains 47%, Bottineau 43%, Sheridan 5%, McLean 3%, Ward 0.6%, Pierce 0.5%, and Renville 0.1%. There are approximately 1,100 farms in the sub-basin. The following map shows the sub-basin and where it is located within North Dakota.

This sub-basin encompasses commodities ranging from durum wheat, spring wheat, barley, sunflowers, and canola to beef cattle, swine, poultry, and bees.

Conservation assistance is provided by seven Natural Resources Conservation Service (NRCS) Service Centers and two Resource Conservation & Development (RC&D) Offices.



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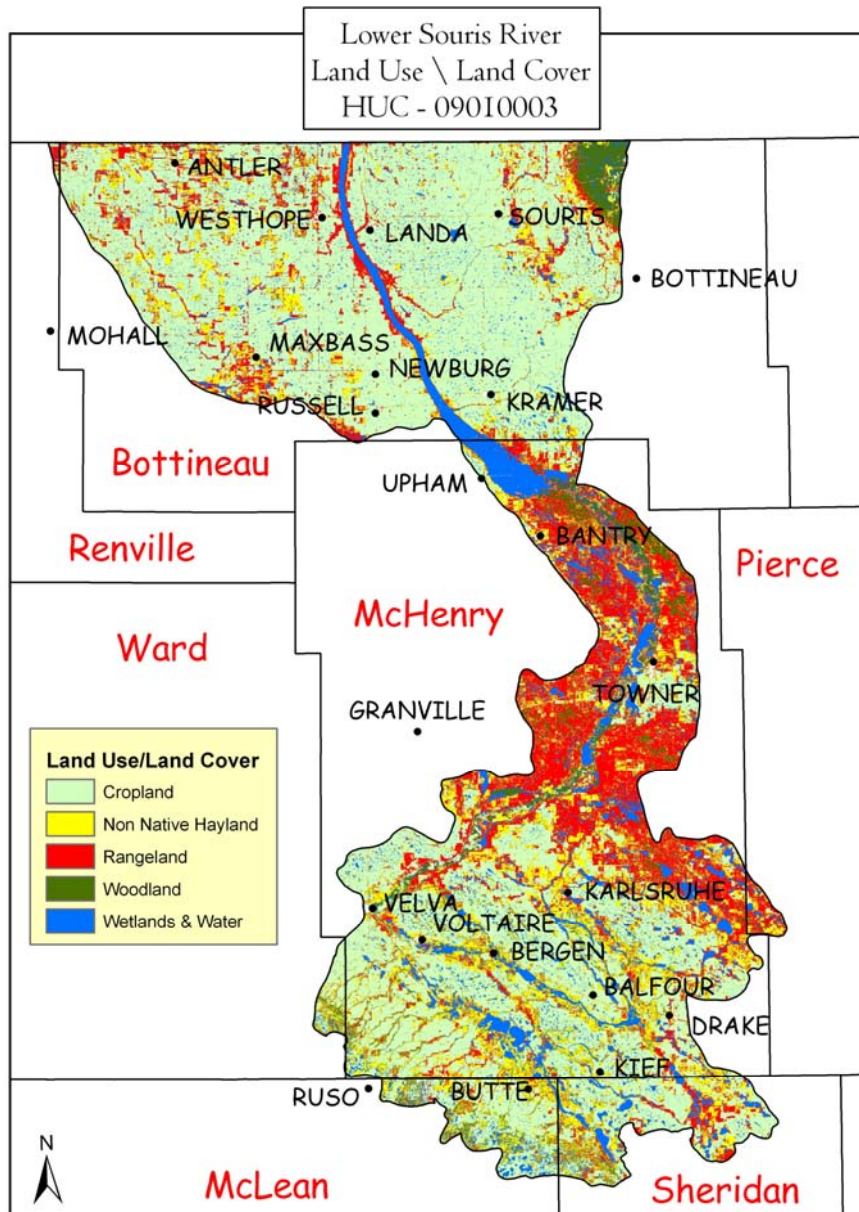
Physical Description

The following table and map show land use / land cover within the sub-basin.

Land Use/ Land Cover (<i>National Resources Inventory [NRI]</i>) ¹	Acres	Percent of HUC
Forestland	27,100	2%
Cropland	755,200	53%
Conservation Reserve Program (CRP) Land ^{2 a}	127,800	9%
Tame Grass/Hayland	127,800	9%
Pastureland	22,000	2%
Rangeland	234,800	16%
Urban/Farmstead/ Transportation Land	67,000	4%
Water/Wetlands	30,000	2%
Federal Lands	45,000	3%
Minor Lands **		
North Dakota HUC Totals^b	1,436,700	100% *
<p><i>* Less than one percent of total acres. See below for special considerations. ** Minor land includes farmsteads, windbreaks, marshland, etc. a: Estimate from Farm Service Agency records and include CRP/CREP. b: Totals may not add due to rounding and small unknown acreages.</i></p>		
Irrigated Land <i>(Farm Services Agency)²</i>	13,400	1% *

Physical Description – Continued

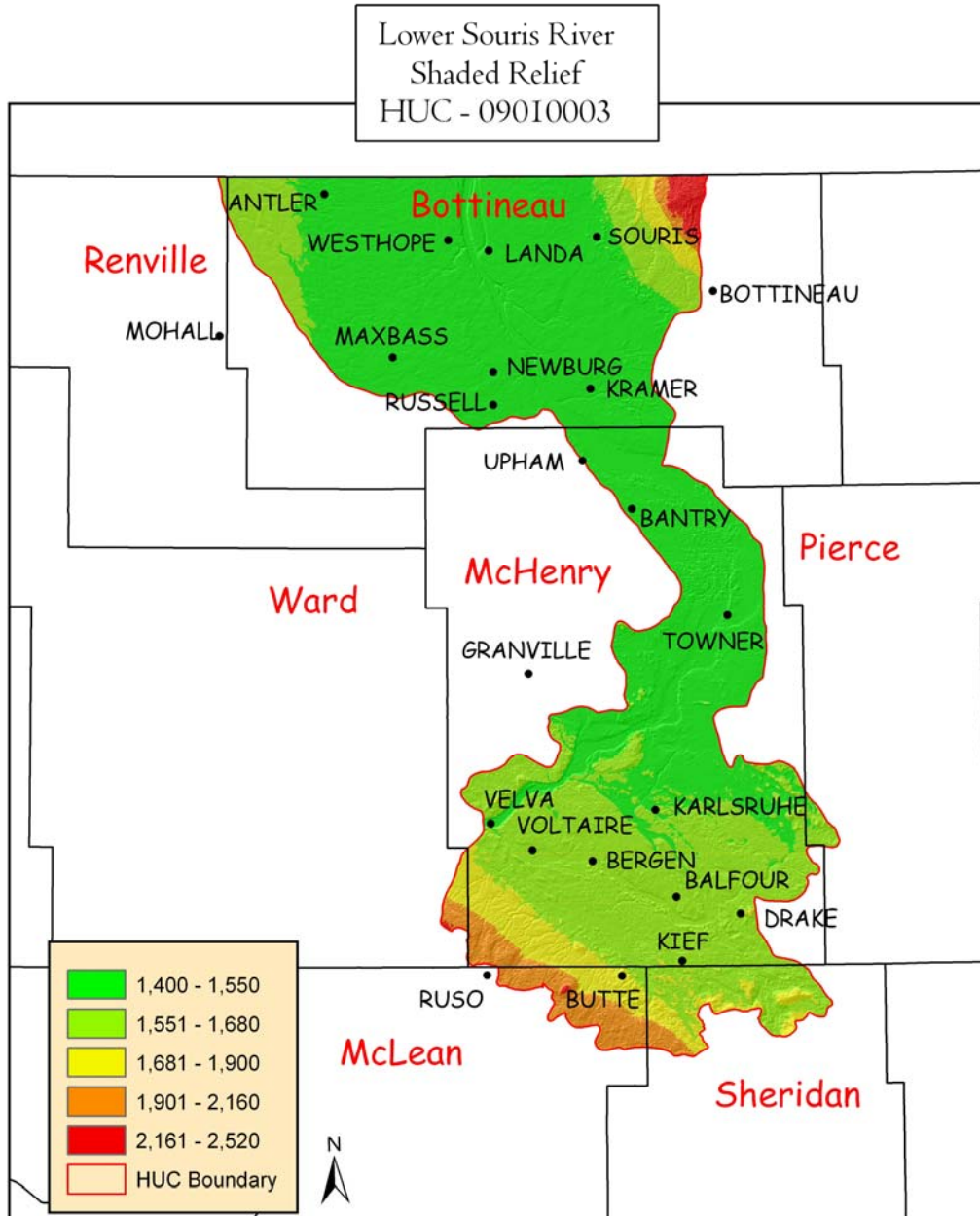
Land Use/Land Cover Map



The above map was developed from U.S. Geologic Survey's (USGS) ND Gap Analysis Program data.³

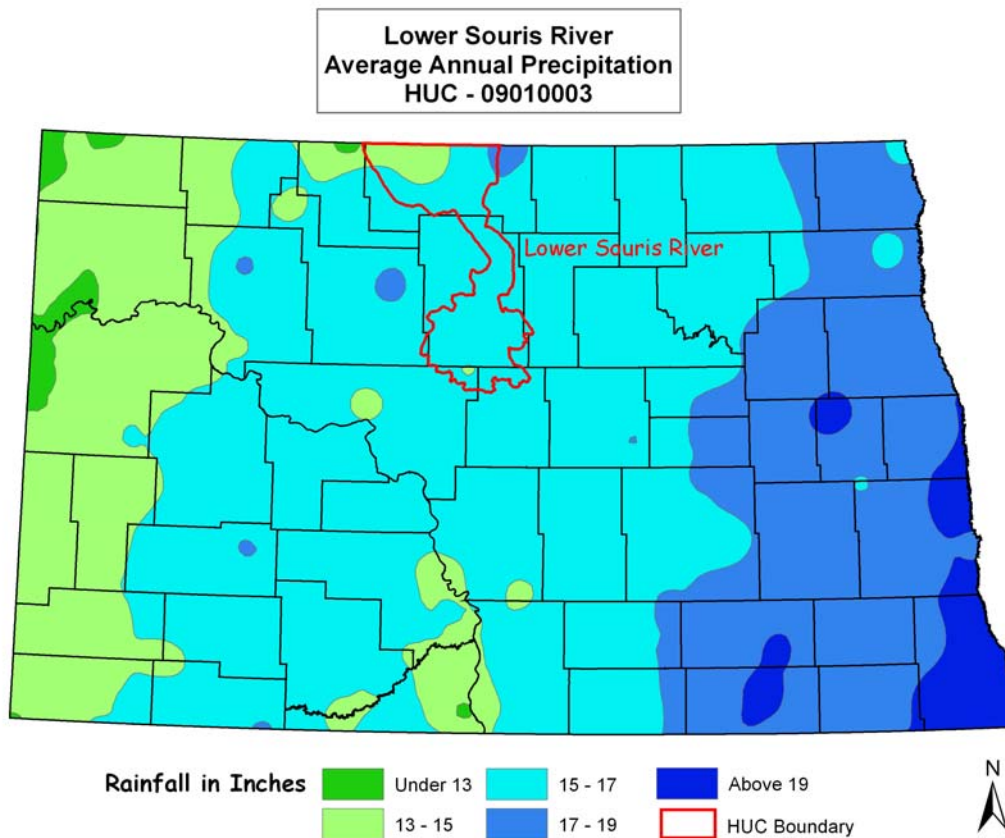
Physical Description – Continued

The sub-basin is part of the Souris-Red-Rainy Region - Red River Sub-Region. All drainage patterns flow north into Canada. The following map shows the relief for the sub-basin.⁴



Physical Description – Continued

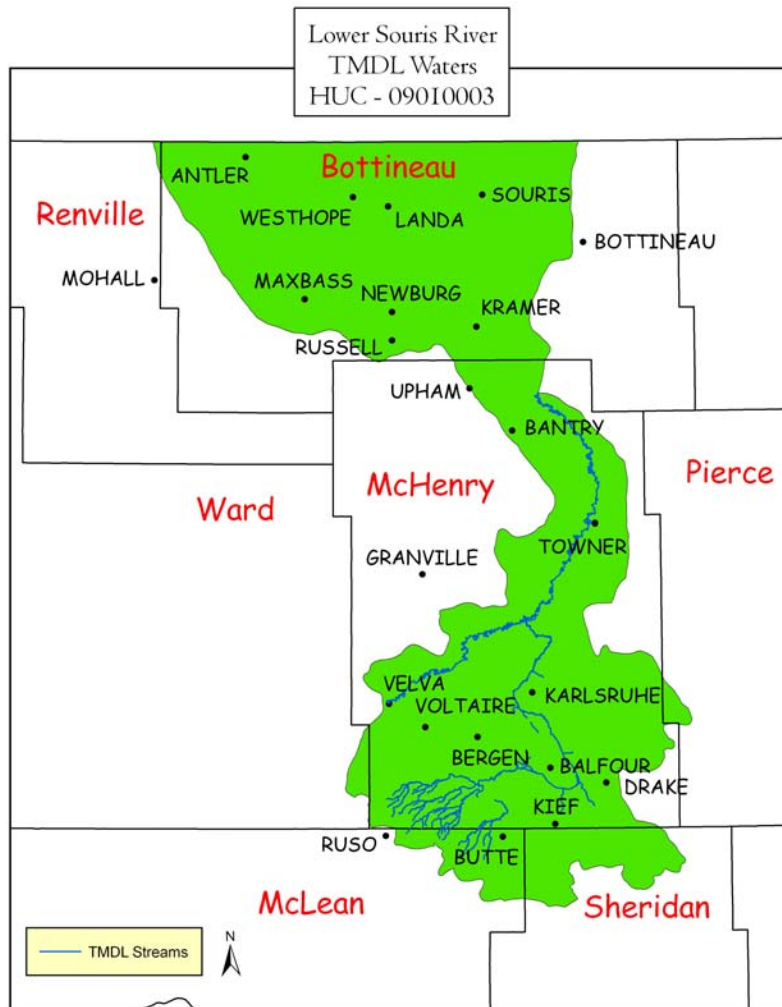
The following map is a plot of 1961-1990 annual average precipitation contours from National Oceanic and Atmospheric Administration (NOAA) Cooperative Stations and (where appropriate) USDA-NRCS Snowpack Telemetry (SNOTEL) Stations. Christopher Daly used the PRISM (Parameter-elevation Regressions on Independent Slopes Model) model to generate the gridded estimates from which this map was derived: the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisberg and Nathaniel DeYoung. Funding was provided by USDA-NRCS National Water and Climate Center. (4/20/98)



Physical Description – Continued

The North Dakota Department of Health (NDDH) collects water quality data on major water bodies. The following table shows the total miles of streams and acres of lakes/reservoirs within the sub-basin and also the miles and acres with a water quality limitation. A map showing the Total Maximum Daily Load (TMDL) waters within the watershed follows the table. TMDL is the amount of a particular pollutant a stream, lake, estuary, or other waterbody can "handle" without violating State water quality standards.

		Units	Lower Souris River Sub-basin ⁵	Lower Souris River Impaired Water Quality (303d) ⁶	Percent Impaired* Lower Souris River
Water Quality Data <i>*Percent of Total Miles and acres in HUC</i>	Total – Major Water Bodies	No.	4	2	50%
	Rivers/Streams	Miles	781.4	333.7	42.5%
	Lakes/Reservoirs	Acres	998	210	0%



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Physical Description – Continued

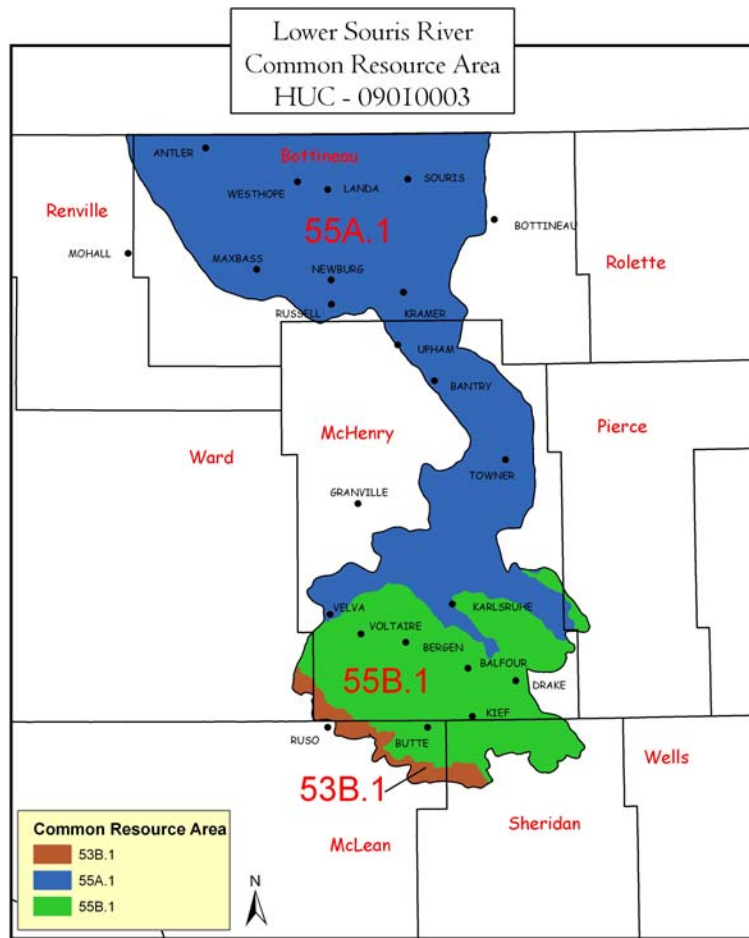
The following two tables show feeding operations, permitted operations, and livestock numbers. The first table lists the number of animal feeding operations and animals as tracked by the NDDH. The second table shows livestock numbers for all cattle, beef cows, dairy cows, swine, sheep and lambs. These livestock numbers were extrapolated from 2002 Agricultural Census county data to 8-digit HUCs.

Animal Feeding Facilities – North Dakota Department of Health Permit⁷					
Animal Type	Dairy	Beef	Swine	Other	Total
Number of Animal Feeding Operations	5	7	3	3	18
Number of Animals	1,419	1,475	6,000	8	8,902
Number of State Permitted Operations					10

Livestock Numbers (rounded to nearest 100)⁸					
	Cattle and Calves	Beef Cows	Dairy Cows	Hogs and Pigs	Sheep and Lambs
North Dakota	1,873,200	982,300	34,500	138,800	114,000
Lower Souris River	67,400	36,400	1,100	500	4,600
Lower Souris River as a percent of North Dakota	3.6%	3.7%	3.2%	0.4%	4.0%

Physical Description – Continued

Common Resource Areas (CRAs) are geographical areas where resource concerns, problems, or treatments are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information were used to determine the geographic boundaries. CRAs are subsets of Major Land Resource Areas (MLRA's). The following map⁹ shows the CRAs for the Lower Souris River sub-basin with the descriptions below.



53B.1 - Central Dark Brown

Glaciated Plains: The Central Dark Brown Glaciated Plains are nearly level to rolling with steeper areas along rivers. Land use is a mosaic of cropland and rangeland. Soil textures are dominantly loamy in glacial till, sandy in outwash areas, and clayey in lacustrine areas. Most soils are moderately deep or deep, well drained or moderately well drained, and have a frigid temperature regime.

55A.1 - Northern Black

Glaciated Drift Plain: The Northern Black Glaciated Drift Plain is a nearly level to undulating landscape composed of glacial till and lacustrine sediments. Temporary and seasonal wetlands are numerous throughout the area. Agriculture is limited by a very short growing season and the coldest January temperatures in the Northern Plains.

55B.1 - Central Black Glaciated Drift Plain: The Central Black Glaciated Drift Plains are a gently rolling to undulating landscape with a thick layer of glacial till. Temporary and seasonal wetlands are numerous throughout the area. These soils are very fertile, but agricultural success is subject to annual climatic fluctuations. Most of the soils are deep, well drained and moderately well drained, sandy to clayey, and have a frigid temperature regime.

Soil Productivity¹⁰

The northern area of the Lower Souris River sub-basin is predominantly soils with marginal to high productivity indexes (PI). The soils with marginal PIs commonly have sodic-claypan subsoils and some have moderate salinity, as well. The middle area of the sub-basin is dominated by soils with poor to marginal PIs. These are sandy soils with low natural fertility and low water holding capacity. The southern area of the sub-basin has widely varying soils with PIs ranging from high to poor. The soils with marginal to poor PIs have either steep slopes, sandy textures, or sodic-claypan subsoils.

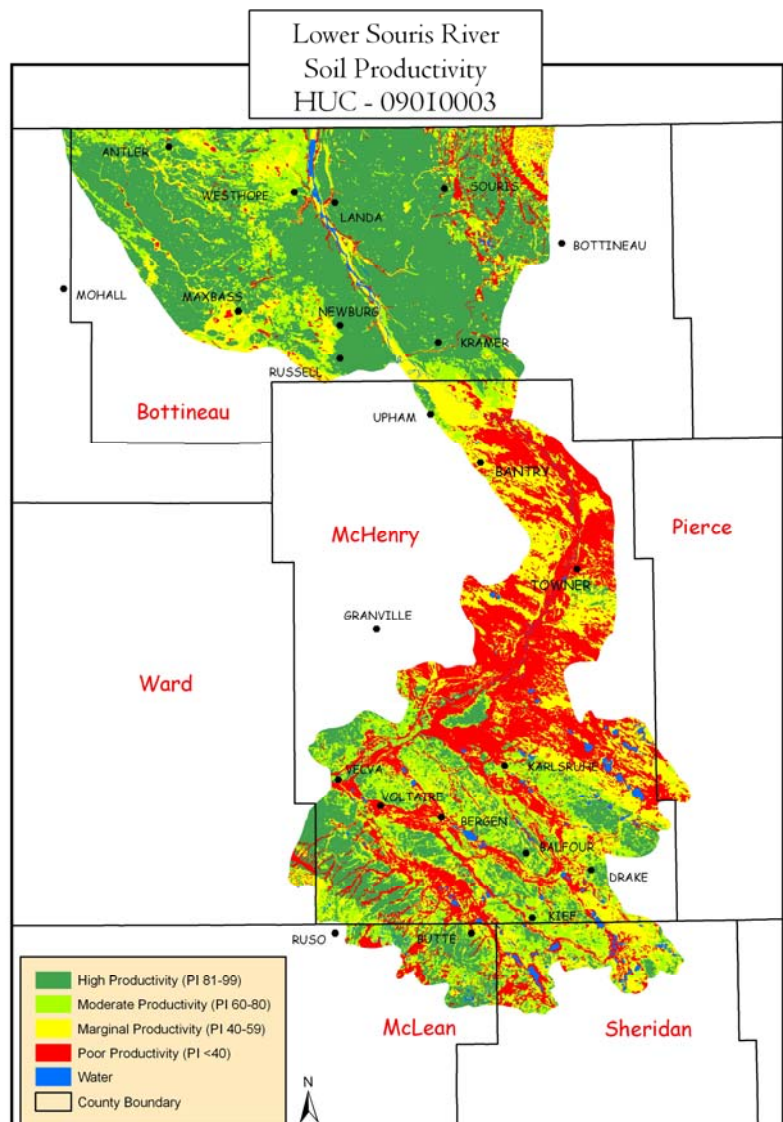
The term "Productivity Index" used in this document reflects soil properties and the inherent production capacity of the soil to produce spring wheat.

Common Land Unit

The entire sub-basin has the common land unit digitized by Farm Services Agency (FSA).

Resource Concerns

One of the goals of NRCS is to help quantify the types and amounts of resources that may be of concern in an area. This helps identify priority areas for the types and amounts of assistance given to a particular watershed.



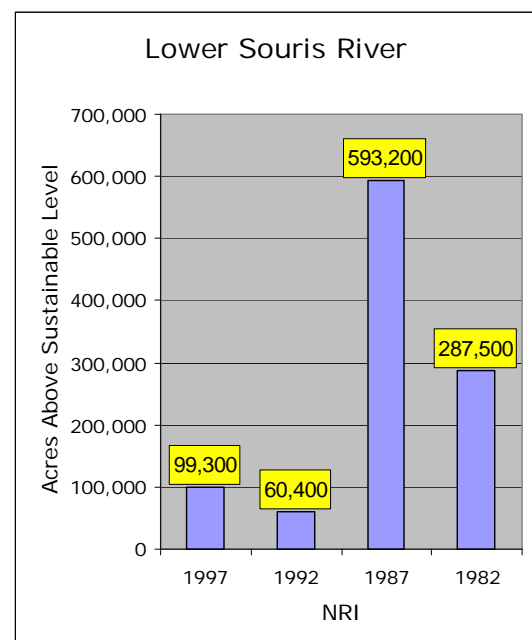
Resource Concerns – Continued

The following table shows the different projects, plans, studies, and assessments conducted within the sub-basin.

Watershed Projects, Plans, Studies and Assessments			
NRCS Watershed Projects		NRCS Watershed Plans, Studies & Assessments	
Name	Status	Name	Status
Boundary Creek Watershed	Completed	Oak Creek Stream Visual Assessment Protocol	Field work completed
		Wintering River Stream Visual Assessment Protocol	Report being prepared
		DesLacs-Souris River Basin Study	Complete
NDDH TMDLs		Soil Conservation District Assessments and Studies	
Number Listed		Name	Status
Lakes/Reservoirs - 1	Streams – 3	NA	NA
EPA 319 Watershed Projects			
Name		Status	
None		NA	

Soil

- The Highly Erodible Land (HEL) cultivated cropland acreage experiencing erosion rates above sustainable levels decreased to 21,800 acres in 1997, as compared to 90,400 acres in 1987.
- Controlling erosion not only sustains the long-term productivity of the land but also affects the amount of soil, pesticides, fertilizer, and other organic material that move into the basin's waters.
- Through NRCS programs, many farmers and ranchers have applied conservation practices to reduce the effects of wind erosion. From 1987 to 1997, the average wind erosion rate reduced from 10.5 tons/acre/year to 2.1 tons/acre/year on all cultivated cropland. The average water erosion rate reduced from 1.2 tons/acre/year to 0.8 tons/acre/year on cultivated cropland.





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Resource Concerns - Continued

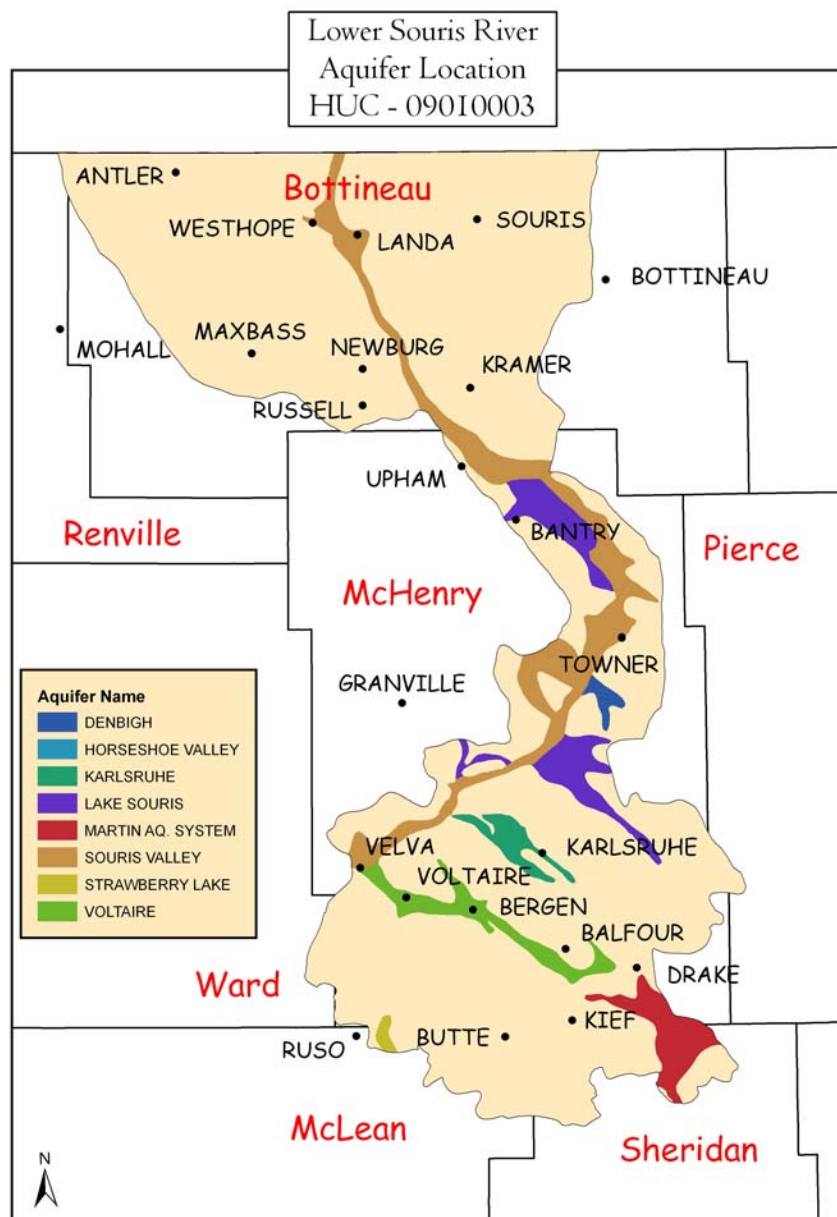
Soil - continued

- Sandy soils and irrigated soils still require conservation practices to control excessive soil erosion.
- Soil health, especially compaction on silty and clayey soils and organic matter on sandy soils.
- Soil erosion and low organic matter remain resource concerns.
- Windbreak plantings, reduced tillage systems, and improved cropping systems are still needed.

Resource Concerns - Continued

Water

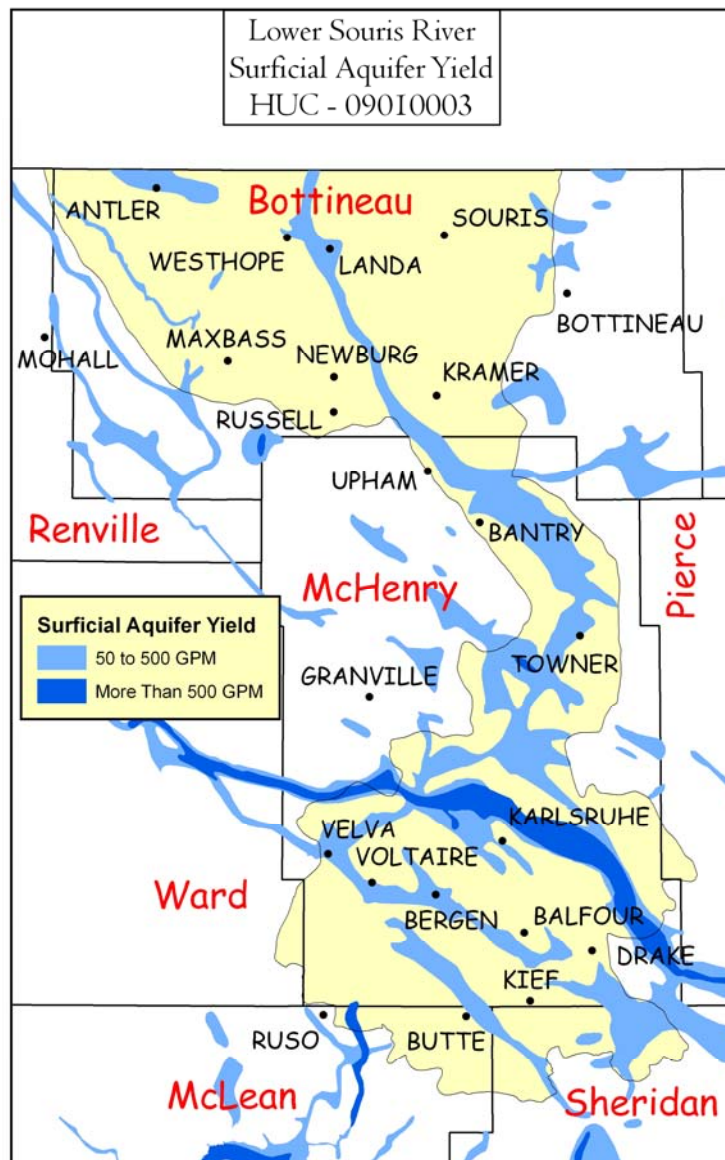
- **Aquifers**¹¹ - There are eight shallow glacial drift aquifers (Denbigh, Horseshoe Valley, Karlsruhe, Lake Souris, Martin Aquifer System, Souris Valley, Strawberry Lake, Butte, and Voltaire) underlying the Lower Souris sub-basin.
- Six of the eight shallow aquifers (Denbigh, Horseshoe Valley, Karlsruhe, Lake Souris, Martin Aquifer System, and Voltaire) are considered sensitive to nitrate and pesticide leaching.



Resource Concerns - Continued

Water - Continued

- Aquifers–Surficial** – The map below is a summary of the major glacial-drift aquifers and their potential Gallon per Minute (GPM) yield as described in the county ground water reports. These aquifers are considered to have the greatest potential for yielding significant quantities of water for municipal, industrial, and agricultural purposes. The New Rockford aquifer is a deep aquifer running east to west through McHenry County. This aquifer supplies the irrigation water needs for most of the irrigated lands in the HUC.



Resource Concerns - Continued

Water - Continued

- **Wellhead Protection Areas**¹² – There are eleven protection areas located in the sub-basin. They are designated to protect the municipal and rural water supply for the majority of citizens in the sub-basin.
- Three stream sections, two on the Souris River and one on the Wintering River, are listed in the Draft 2008 303(d) list for fecal coliform. In addition, two of the three are also listed for sedimentation/siltation with the remaining section listed for dissolved oxygen.
- Conservation practices to be used to address these water quality issues include grazing management, erosion control, nutrient and Ag waste management, and riparian buffers.
- The Souris River has water quality impacts from sedimentation and siltation.
- Lack of adequate riparian buffer width and health are impacting water quality and stream health.
- When significant spring flooding occurs, transportation infrastructure and crop seeding dates are affected.
- Summer flooding does occasionally occur and impacts crop production.
- Water conservation and water quality (potential for pesticide contamination) are issues on irrigated cropland.

Air

- Objectionable odors are noticeable from larger feeding operations.
- Visibility is reduced during winter months from blowing snow.
- Increased wind speeds due to tree/shelterbelt removal.

Plants

- Major concerns are with controlling invasive weeds and maintaining good pasture condition.
- Direct seeding of small grains and canola has been successful in some locations.
- Conventional tillage systems are still utilized, especially with sunflowers.
- Noxious weeds and poor range condition reduce productivity for livestock and wildlife.
- Season long grazing on or near water courses are a concern.
- The private, non-industrial forestland is associated with small woodlots, aspen groves, wooded riparian zones, and rural home sites which are not actively managed for timber production.



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Resource Concerns - Continued

Animals

- Animals that are threatened and endangered can be seen in the following table of threatened and endangered species.

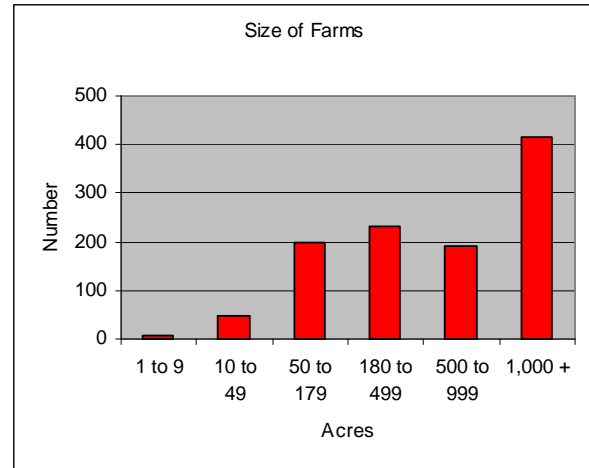
Federally Listed Threatened And Endangered Species			
Species Category	Threatened	Endangered	Candidate
Mammals	None	Gray Wolf	None
Birds	Piping Plover	Whooping Crane	None
Fish	None	None	None
Invertebrates	None	None	Dakota Skipper
Plants	None	None	None
Critical Habitat – Piping Plover			

Census and Social Data¹³

Number of Farms: 1,100

Number of Operators:

- Average Age: 55
- Full-Time Operators: 68%
- Part-Time Operators: 32%



Limited Resource and Beginning Farmer

Approximately 5.3 percent of the operators are minority producers. Limited Resource Farmers are estimated at 4.1 percent. Although rather low percentages, these facts point to the potential need for special technical assistance targeted to reach people who (1) may lack experience with government farm programs, (2) have good stewardship intentions but lack management skills, and (3) lack the time to visit an NRCS field office and seek assistance.

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References

- ¹ USDA-NRCS, NRI data.
- ² USDA-Farm Services Agency, Common Land Unit GIS data layer, 2005.
- ³ USDI-US Geologic Services, ND GAP analysis data, 2005.
- ⁴ USDA-NRCS, Natural Resources Planning Staff, 30 meter Relief Data GIS data layer, 2002.
- ⁵ ND Department of Health, Environmental Health Section, Water Quality Division, National Hydrography GIS layers, June 2006.
- ⁶ ND Department of Health, Environmental Health Section, Water Quality Division, Draft List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota, 2008.
- ⁷ ND Department of Health, Environmental Health Section, Water Quality Division, Animal Feeding Operations Program data, 2006.
- ⁸ 2002 Census of Agriculture, North Dakota, State and County Data Volume 1, Geographic Area Series Part 34, U.S. Department of Agriculture, National Agricultural Statistics Service, June 2004. (County data was prorated to HUC by the percent of a HUC in a county.)
- ⁹ USDA-NRCS, Natural Resources Planning Staff, Common Resource Area GIS data layer, 2004.
- ¹⁰ USDA-NRCS, Natural Resources Planning Staff, Soils Productivity GIS data layer, 2007.
- ¹¹ ND Department of Health, Environmental Health Section, Water Quality Division, Ambient Ground Water Monitoring Program data, 1997.
- ¹² ND Department of Health, Environmental Health Section, Water Quality Division, Source Water Protection Program data, 2003.
- ¹³ 2002 Census of Agriculture, North Dakota, State and County Data Volume 1, Geographic Area Series Part 34, U.S. Department of Agriculture, National Agricultural Statistics Service, June 2004. (County data was prorated to HUC by the percent of a HUC in a county.)