

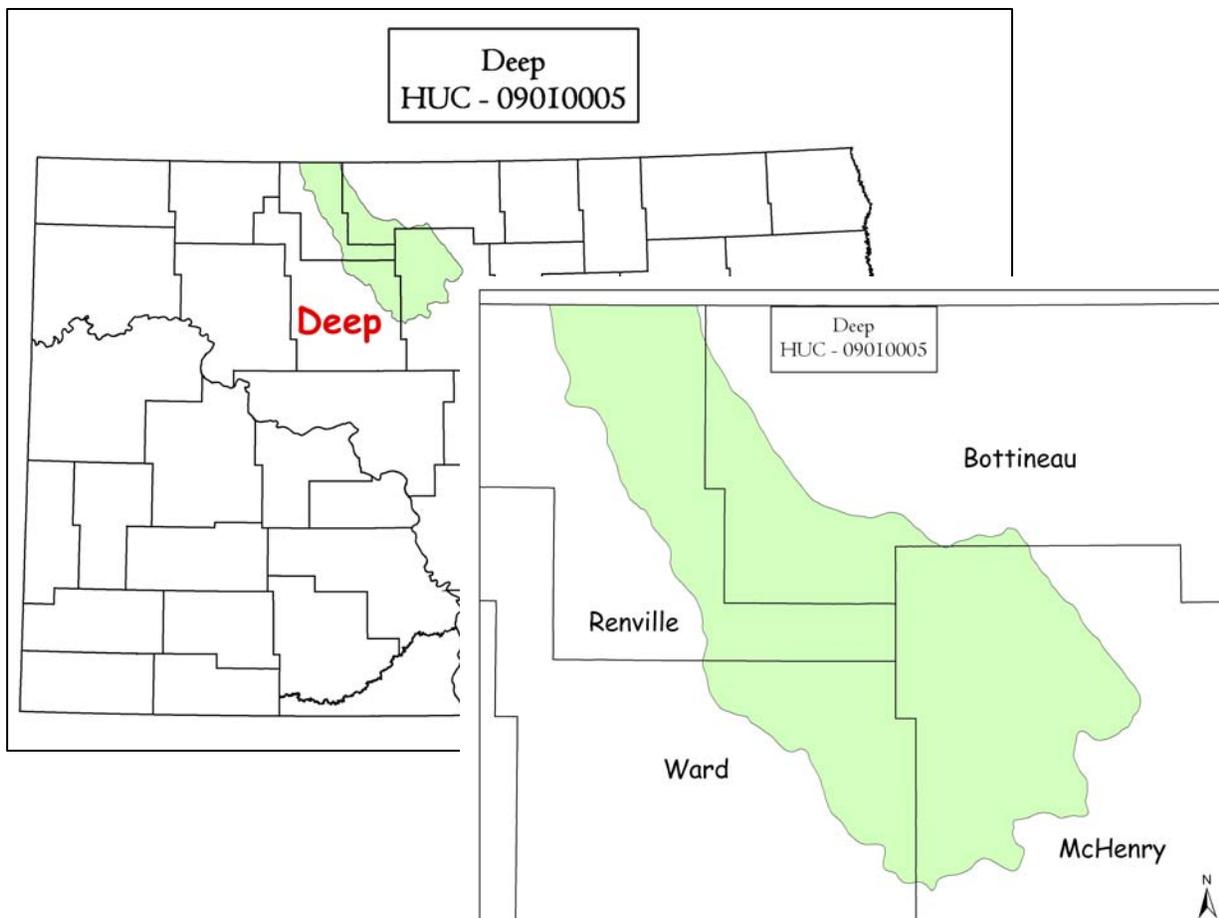
### **Introduction**

The Deep 8-Digit Hydrologic Unit Code (HUC) (9010005) sub-basin includes land in two countries, United States and Canada. There are approximately 1,047,500 acres in the sub-basin portion located in the United States. This sub-basin is located in Souris-Red-Rainy Region, Souris Sub-Region.

This report addresses only the portion located within North Dakota. The Deep sub-basin covers parts of four counties (McHenry, Renville, Ward, and Bottineau) in North Dakota. Of the 1,047,500 acres, McHenry contains 40%, Renville 26%, Ward 17%, and Bottineau 17%. There are approximately 744 farms in the sub-basin. The following two maps identifies the portion of the sub-basin located within North Dakota.

This sub-basin encompasses commodities ranging from soybeans, wheat, corn, sunflowers, canola, and dry edible beans to beef cattle, elk, swine, poultry, and bees.

Conservation assistance is provided by four Natural Resources Conservation Service (NRCS) Service Centers and one Resource Conservation & Development (RC&D) Office.



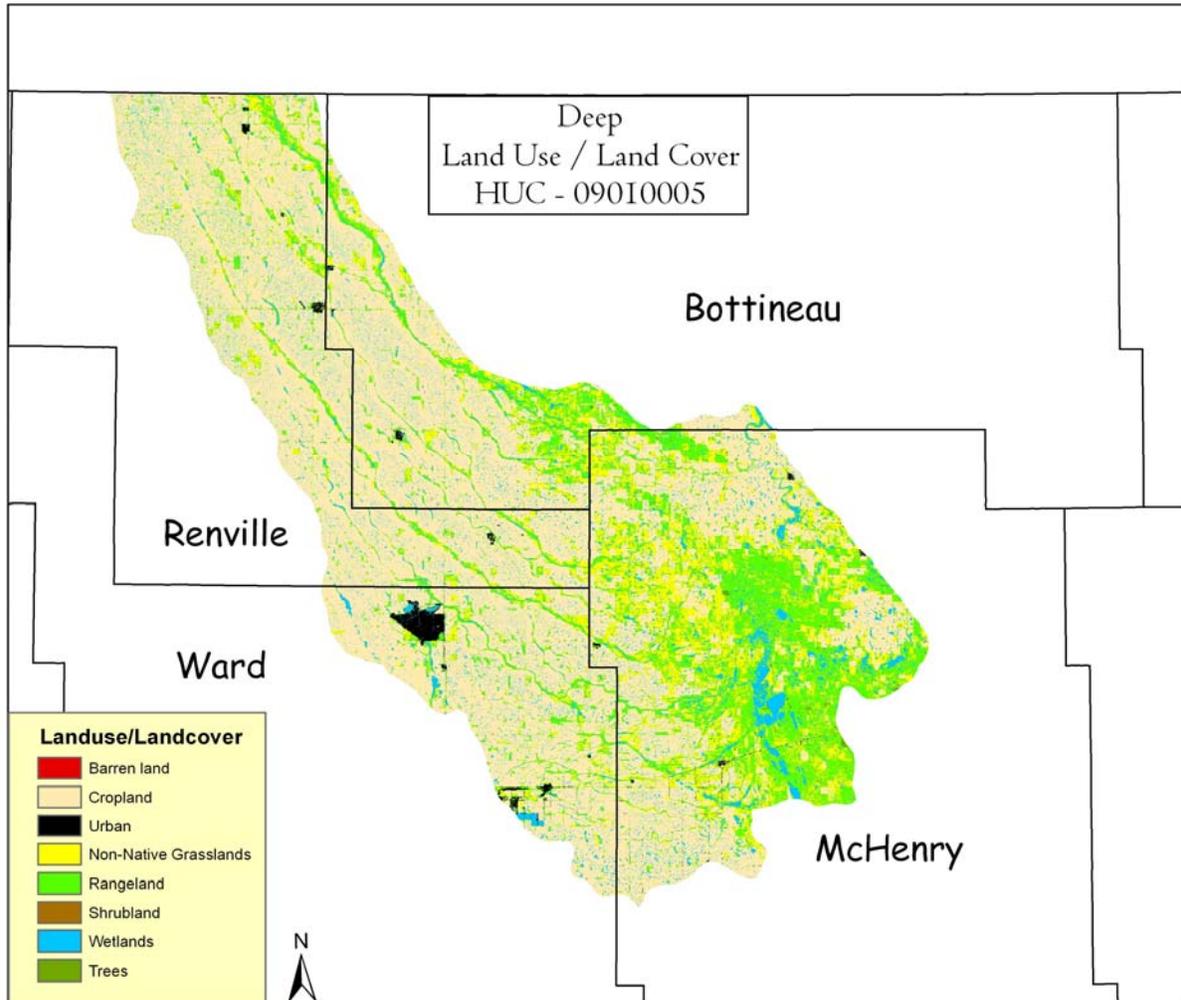
### Physical Description

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

Land Use/ Land Cover ( <i>National Resources Inventory [NRI]</i> ) <sup>1</sup>	Acres	Percent of HUC
Forestland	0	0%
Cropland	668,200	64%
Conservation Reserve Program (CRP) Land <sup>2 a</sup>	105,700	10%
Tame Grass/Hayland	45,600	4%
Pastureland	28,800	3%
Rangeland	124,600	12%
Urban/Farmstead/ Transportation Land	48,000	4%
Water/Wetlands	5,500	1%
Federal Lands	21,100	2%
<b>North Dakota HUC Totals <sup>b</sup></b>	<b>1,047,500</b>	<b>100%</b>
<i>a: Estimate from Farm Service Agency records and include CRP/CREP. b: Totals may not add due to rounding and small unknown acreages.</i>		
<b>Irrigated Land</b> ( <i>Farm Services Agency</i> ) <sup>3</sup>	2,320	<1%

### Physical Description – Continued

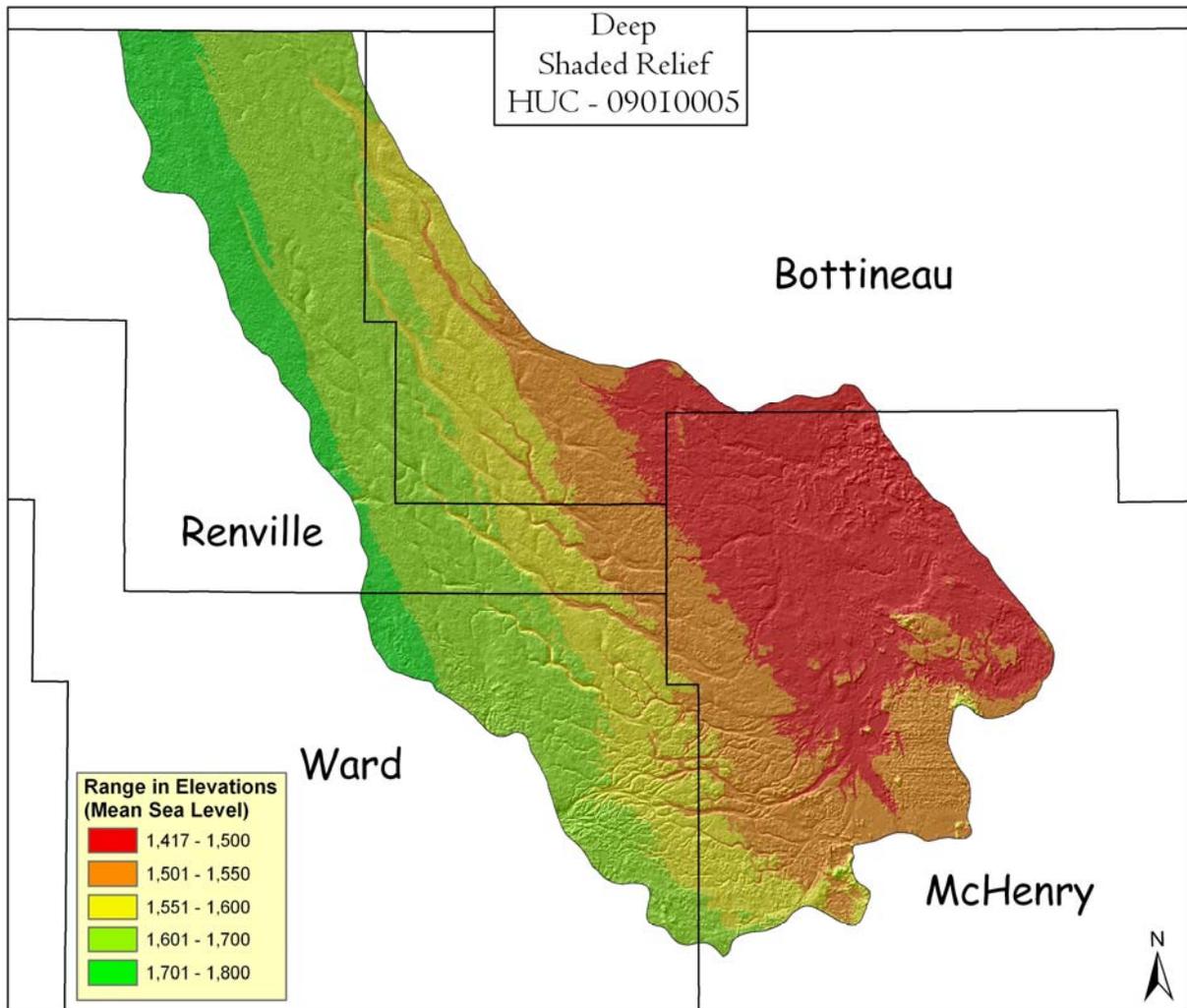
#### Land Use/Land Cover Map



The above map was developed from U.S. Geologic Survey's (USGS) ND Gap Analysis Program data.<sup>4</sup>

### Physical Description – Continued

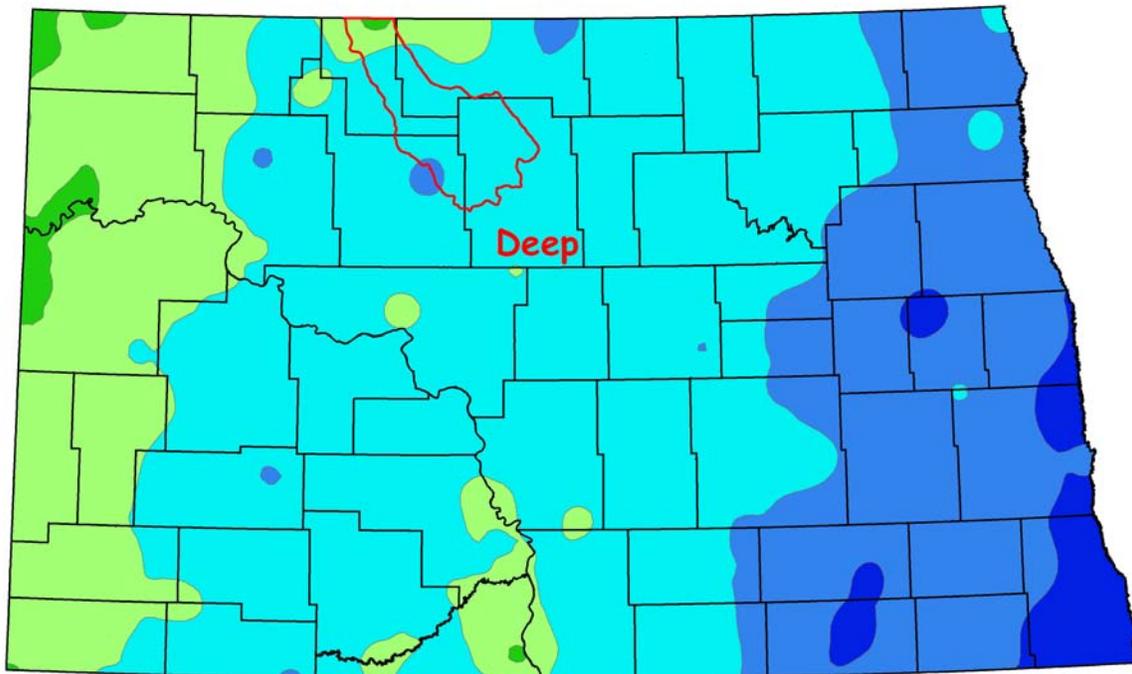
The sub-basin is part of the Souris-Red-Rainy River Region - Souris Sub-Region. All drainage patterns flow south/southeast off the higher elevations. At the valley floor, the drainage pattern changes and all drainage flows northeast into the Deep River, which flows north into the Souris River. The Souris River flows north into Canada where it connects to the Red River. The following map shows the relief for the sub-basin.<sup>5</sup>



**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)

Average Annual Precipitation  
HUC - 09010005



### **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. Currently, no water quality limitations have been identified within the sub-basin.

		Units	Deep Sub-basin <sup>6</sup>	Deep Impaired Water Quality (303d) <sup>7</sup>	Percent Impaired* Deep
<b>Water Quality Data</b> <i>*Percent of Total Miles and acres in HUC</i>	Total – Major Water Bodies	No.	2	0	0
	Rivers/Streams	Miles	672.1	0	0
	Lakes/Reservoirs	Acres	1,388.3	0	0

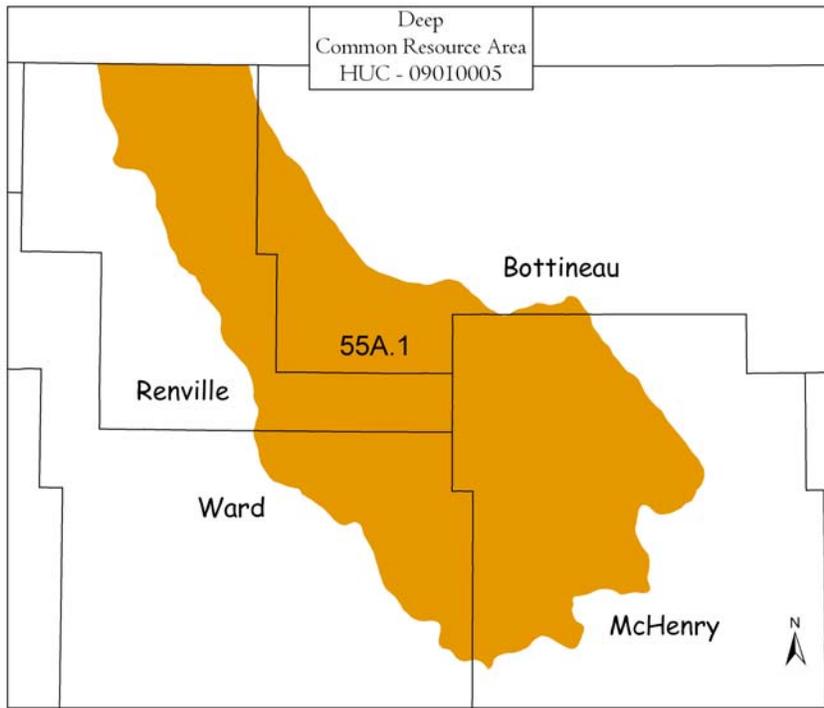
The following two tables show feeding operations, permitted operations, and livestock numbers. The first table lists the number of animal feeding operations and animals as tracked by NDDH. The second table shows livestock numbers for all cattle, beef cows, dairy cows, hogs and pigs, and sheep and lambs.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

<b>Animal Feeding Facilities – North Dakota Department of Health Permit<sup>8</sup></b>					
Animal Type	Dairy	Beef	Swine	Other	Total
<b>Number of Animal Feeding Operations</b>	3	2	0	0	5
<b>Number of Animals</b>	4,180	1,499	0	0	5,679
<b>Number of State Permitted Operations</b>					5

<b>Livestock Numbers (rounded to nearest 100)<sup>9</sup></b>					
	Cattle and Calves	Beef Cows	Dairy Cows	Hogs and Pigs	Sheep and Lambs
<b>North Dakota</b>	1,873,200	982,300	34,500	138,800	114,000
<b>Deep</b>	41,900	23,500	800	400	3,100
<b>Deep as a percent of North Dakota</b>	2.2%	2.4%	2.3%	0.3%	2.7%

### 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. The following map<sup>10</sup> shows the CRAs for Deep sub-basin with the descriptions below.



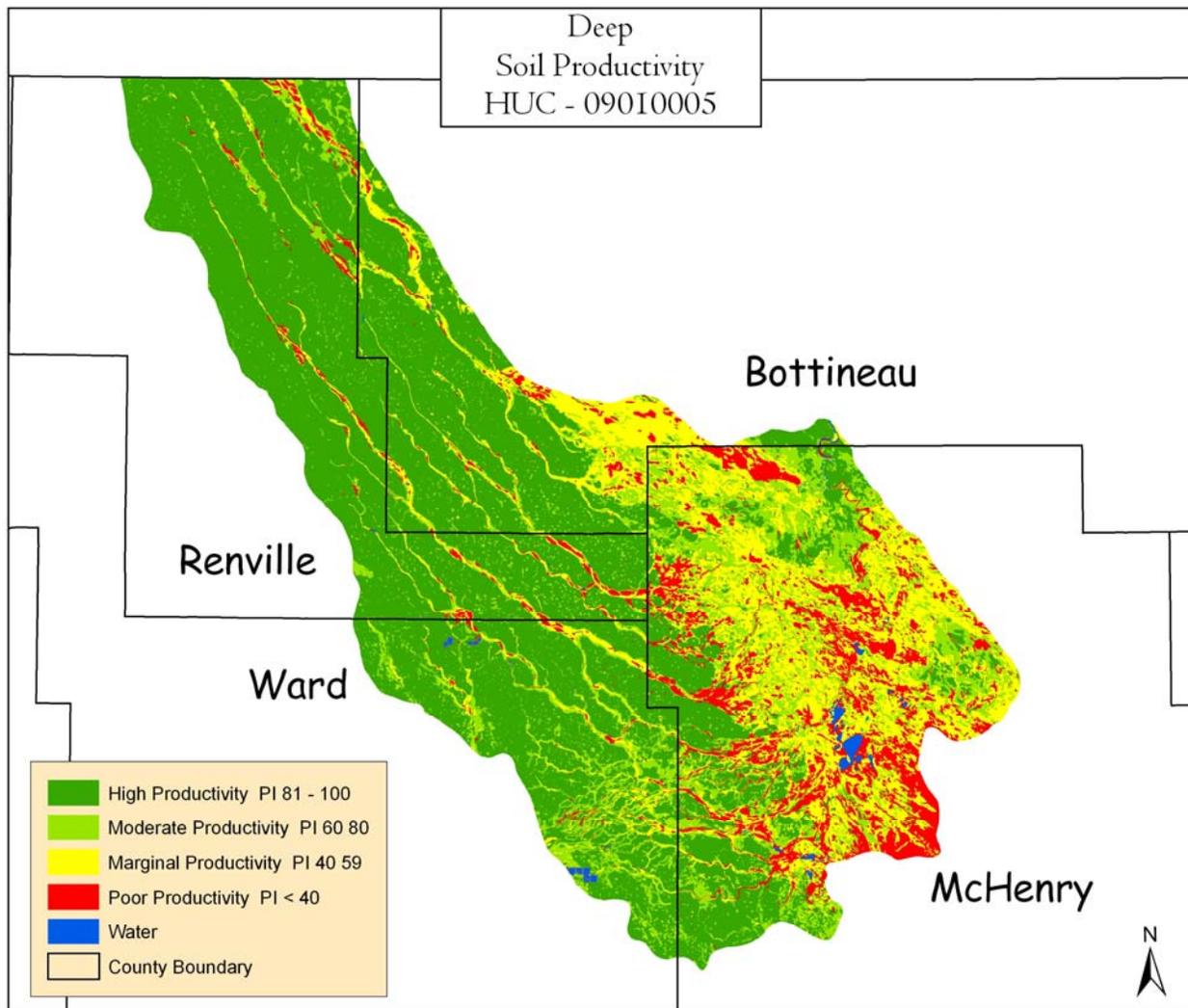
#### **55A.1 - Northern Black Glaciated Drift Plain:**

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 some of the coldest January temperatures in the Northern Plains.

### Soil Productivity <sup>11</sup>

The glacial till soils of Bottineau, McHenry, Renville, and Ward Counties are medium textured and on a level to undulating landscape. These soils have few limitations for commonly grown agriculture crops. They have a high productivity index (PI). The sandy soils of northern McHenry and south-central Bottineau County are associated with the eolian (wind blown) sand plain of Glacial Lake Souris. These soils are droughty and very susceptible to wind erosion. They have a marginal to poor PI for the production of spring wheat.

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

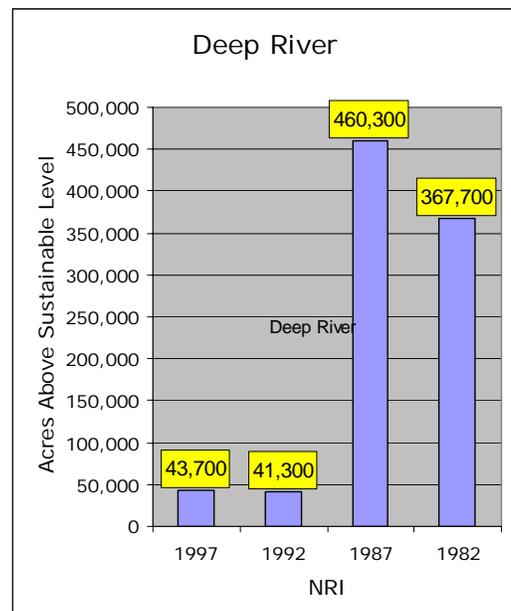
One of the goals of NRCS is to help quantify the types and amounts of resources that may be of concern in an area. This helps identify priority areas for the types and amounts of assistance given to a particular watershed.

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
NA	NA	NA	NA
NDDH TMDLs		Soil Conservation District Assessments and Studies	
Number Listed		Name	Status
Lakes/Reservoirs - 2	Streams - 10	NA	NA
EPA 319 Watershed Projects			
Name		Status	
NA		NA	

### Soil

- NRI estimates indicate there was a 43 percent reduction from 1987 to 1997 in the amount of Highly Erodible Land (HEL) being farmed (123,400 to 70,700).
- 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.
- The cultivated cropland acreage experiencing wind erosion rates above sustainable levels decreased to 43,700 acres in 1997, as compared to 367,000 acres in 1982.
- With assistance from NRCS programs, many farmers and ranchers have applied conservation practices to reduce the effects of both wind and water erosion. From 1987 to 1997, the average wind erosion rate reduced from 7.9 tons/acre/year to 1.2 t/ac/y on all cultivated cropland. The average water erosion rate reduced from 0.9 t/ac/y to 0.6 t/ac/y on cultivated cropland.



## **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.

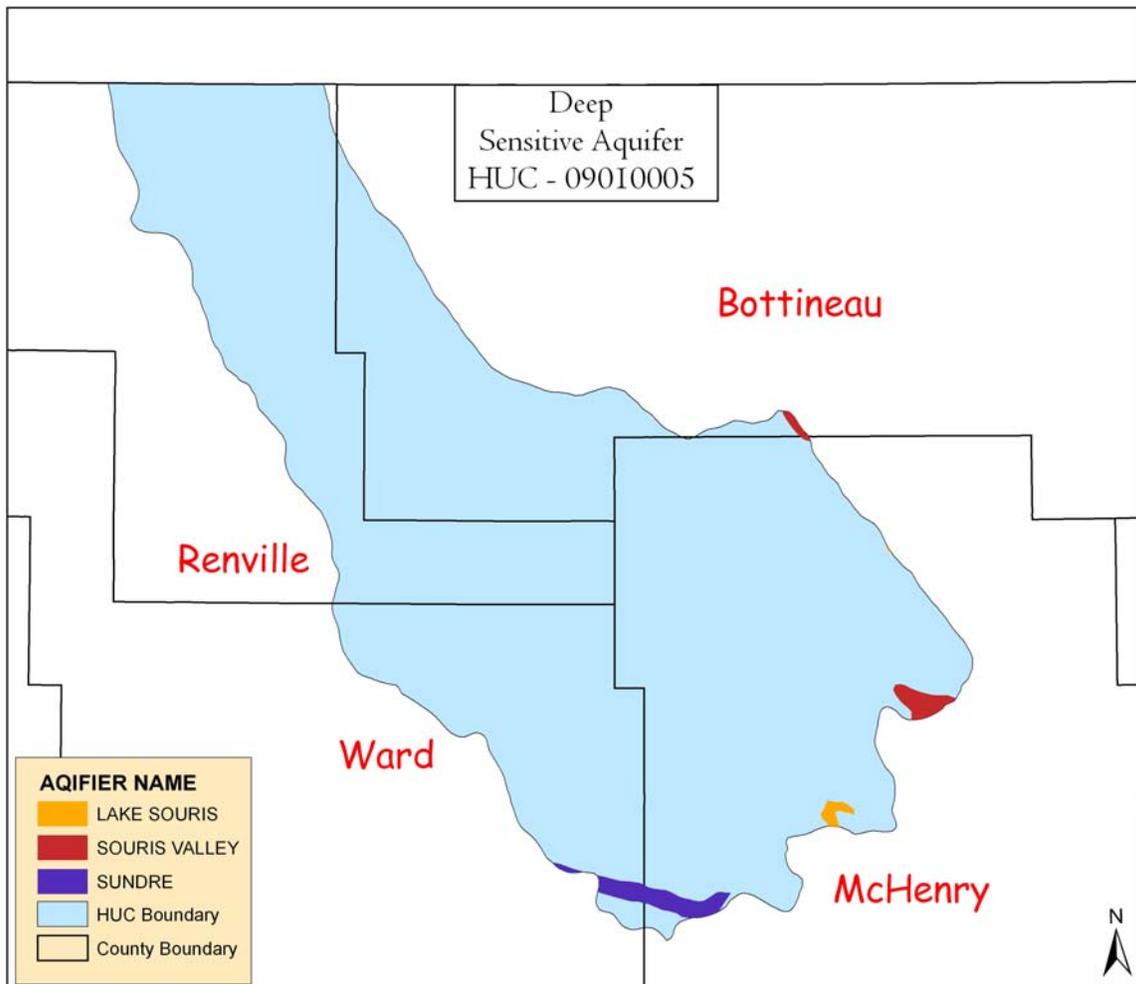
### **Water**

- Conservation practices that can be used to address these water quality issues include grazing management, erosion control, nutrient and ag waste management, and riparian buffers.
- Lack of adequate riparian buffer width and health are impacting water quality and stream health.
- Spring flooding occurs nearly every year affecting transportation infrastructure and crop seeding dates.
- Summer flooding does occasionally occur and impacts crop production.
- Water conservation and water quality (potential for pesticide contamination) are issues on irrigated cropland.
- Leaching of nitrogen into the groundwater is a concern on high water table sands.
- Sheet and rill erosion, due to improper residue management, poor crop rotations, overgrazing, and excess tillage is a concern.
- Urban and ag runoff are a concern for excessive nutrients and organics of surface water.
- Excessive runoff due to tiling is becoming a major concern.
- Water erosion is a severe hazard on gently sloping and steeper soils. The hazard is greatest when the soil is bare.

### Resource Concerns - Continued

#### Water - Continued

- **Aquifers<sup>12</sup>** - Three glacial drift aquifers (Lake Souris, Souris Valley, and Sundre) underlie the Deep sub-basin. The Lake Souris aquifer is the primary source of water for the Upper Souris Water Users Association (WUA) – System II, and the cities of Sherwood, Lansford, Glenburn, Granville, Deering, and Mohall.

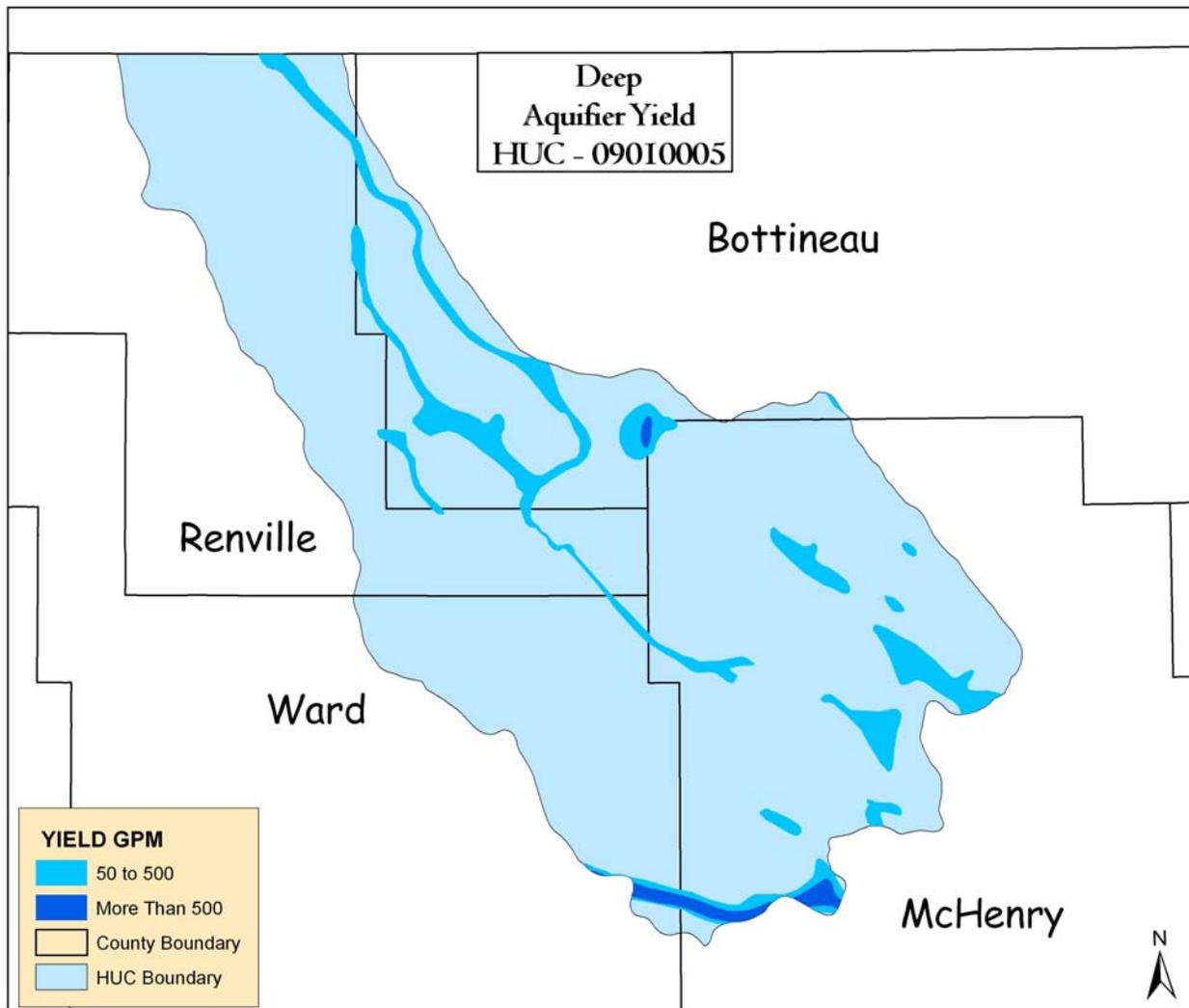


- **Wellhead Protection Areas<sup>13</sup>** – Six protection areas located in the sub-basin are designated to protect the municipal water supply for the cities of Upham, Lansford, Granville, Glenburn, Sherwood, Deering, Mohall as well as the residents served by the Upper Souris WUA System II.

### 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.



### Resource Concerns - Continued

#### Air

- Visibility is reduced during winter months from blowing snow.
- Increased wind speeds due to tree/shelterbelt removal are becoming more noticeable.

#### Plants

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

#### Animals

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

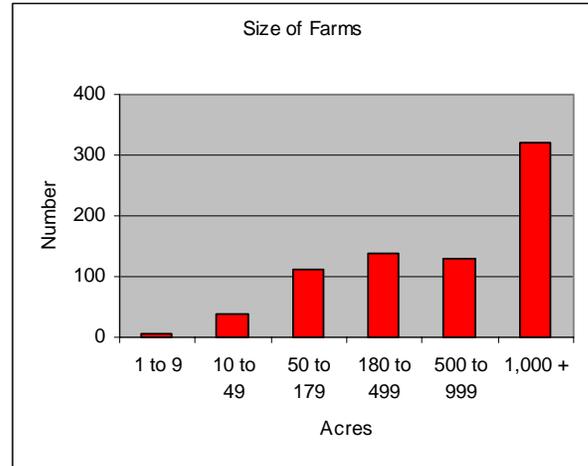
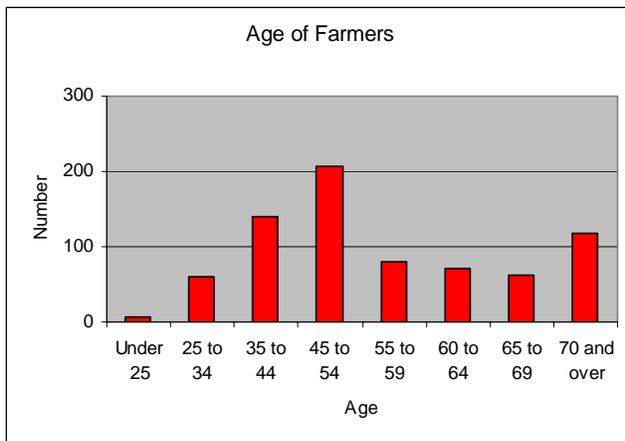
Federally Listed Threatened And Endangered Species			
Species Category	Threatened	Endangered	Candidate
Mammals	None	Gray Wolf	None
Birds	Piping Plover	Whooping Crane	None
Fish	None	None	None
Invertebrates	None	None	Dakota Skipper
Plants	None	None	None
Critical Habitat – Piping Plover			

### Census and Social Data<sup>14</sup>

**Number of Farms: 744**

**Number of Operators:**

- Average Age: 54
- Full-Time Operators: 72%
- Part-Time Operators: 28%



### **Limited Resource and Beginning Farmer**

Approximately 5.5% of the operators are minority producers. Limited Resource Farmers are also estimated at 5.8%. 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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# Deep 9010005

## *8-Digit Hydrologic Unit Profile*

September 2008

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### **References**

- <sup>1</sup> USDA-NRCS, NRI data.
- <sup>2</sup> USDA-Farm Services Agency, Common Land Unit GIS data layer, 2005.
- <sup>3</sup> USDA-Farm Services Agency, Common Land Unit GIS data layer, 2005.
- <sup>4</sup> USDI-US Geologic Services, ND GAP analysis data, 2005.
- <sup>5</sup> USDA-NRCS, Natural Resources Planning Staff, 30 meter Relief Data GIS data layer, 2002.
- <sup>6</sup> ND Department of Health, Environmental Health Section, Water Quality Division, National Hydrography GIS layers, June 2006.
- <sup>7</sup> ND Department of Health, Environmental Health Section, Water Quality Division, List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota, 2006.
- <sup>8</sup> ND Department of Health, Environmental Health Section, Water Quality Division, Animal Feeding Operations Program data, 2006.
- <sup>9</sup> 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.)
- <sup>10</sup> USDA-NRCS, Natural Resources Planning Staff, Common Resource Area GIS data layer, 2004.
- <sup>11</sup> USDA-NRCS, Natural Resources Planning Staff, Soils Productivity GIS data layer, 2006.
- <sup>12</sup> ND Department of Health, Environmental Health Section, Water Quality Division, Ambient Ground Water Monitoring Program data, 1997.
- <sup>13</sup> ND Department of Health, Environmental Health Section, Water Quality Division, Source Water Protection Program data, 2003.
- <sup>14</sup> 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.)