

# Painted Woods Square Butte Creek 10130101

## *8-Digit Hydrologic Unit Profile*

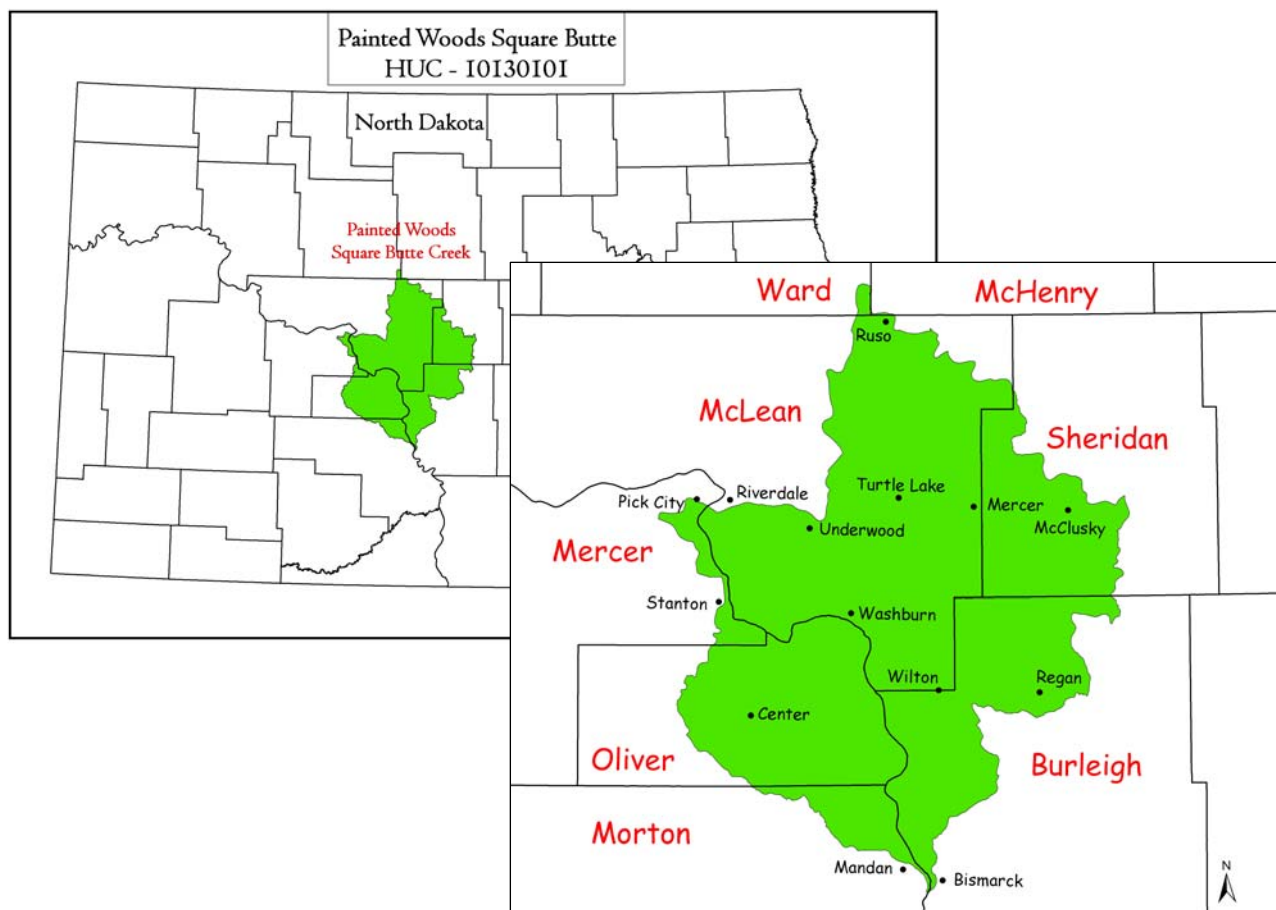
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### **Introduction**

The Painted Woods Square Butte Creek 8-Digit Hydrologic Unit Code (HUC) (10130101) sub-basin is approximately 1,517,600 acres covering parts of eight counties (Burleigh, McHenry, McLean, Mercer, Morton, Oliver, Sheridan, and Ward) in the Missouri Region – Missouri Oahe Sub region – Lake Oahe Basin. Of the 1,517,600 acres, McLean County contains 42%, Oliver 19%, Burleigh 18%, Sheridan 13%, Morton 5%, Ward 1%, Mercer 2%, and McHenry <1%. There are approximately 1,020 farms in the sub-basin.

This sub-basin encompasses commodities ranging from wheat, corn, sunflowers, barley, canola, and oats to beef cattle, swine, poultry, and bees. Other crops include soybeans, flax, potatoes, and edible beans.

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



*Produced by  
the Natural  
Resources  
Planning Staff  
Bismarck, ND*

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### Physical Description

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

<b>Land Use/ Land Cover (<i>National Resources Inventory [NRI]</i>)<sup>1</sup></b>	<b>Acres</b>	<b>Percent of HUC</b>
Forestland	31,600	2%
Cropland	566,900	37%
Conservation Reserve Program (CRP) Land <sup>2 a</sup>	107,300	7%
Tame Grass/Hayland	82,300	5%
Pastureland	56,600	4%
Rangeland	529,700	35%
Urban/Farmstead/ Transportation Land	102,500	7%
Water/Wetlands	30,700	2%
Federal Lands	10,000	1%
<b>North Dakota HUC Totals <sup>b</sup></b>	<b>1,517,600</b>	<b>100% *</b>
<p><i>* Less than one percent of total acres. See below for special considerations. 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>		
<b>Irrigated Land</b> <i>(Farm Services Agency)<sup>3</sup></i>	6,600	<1%

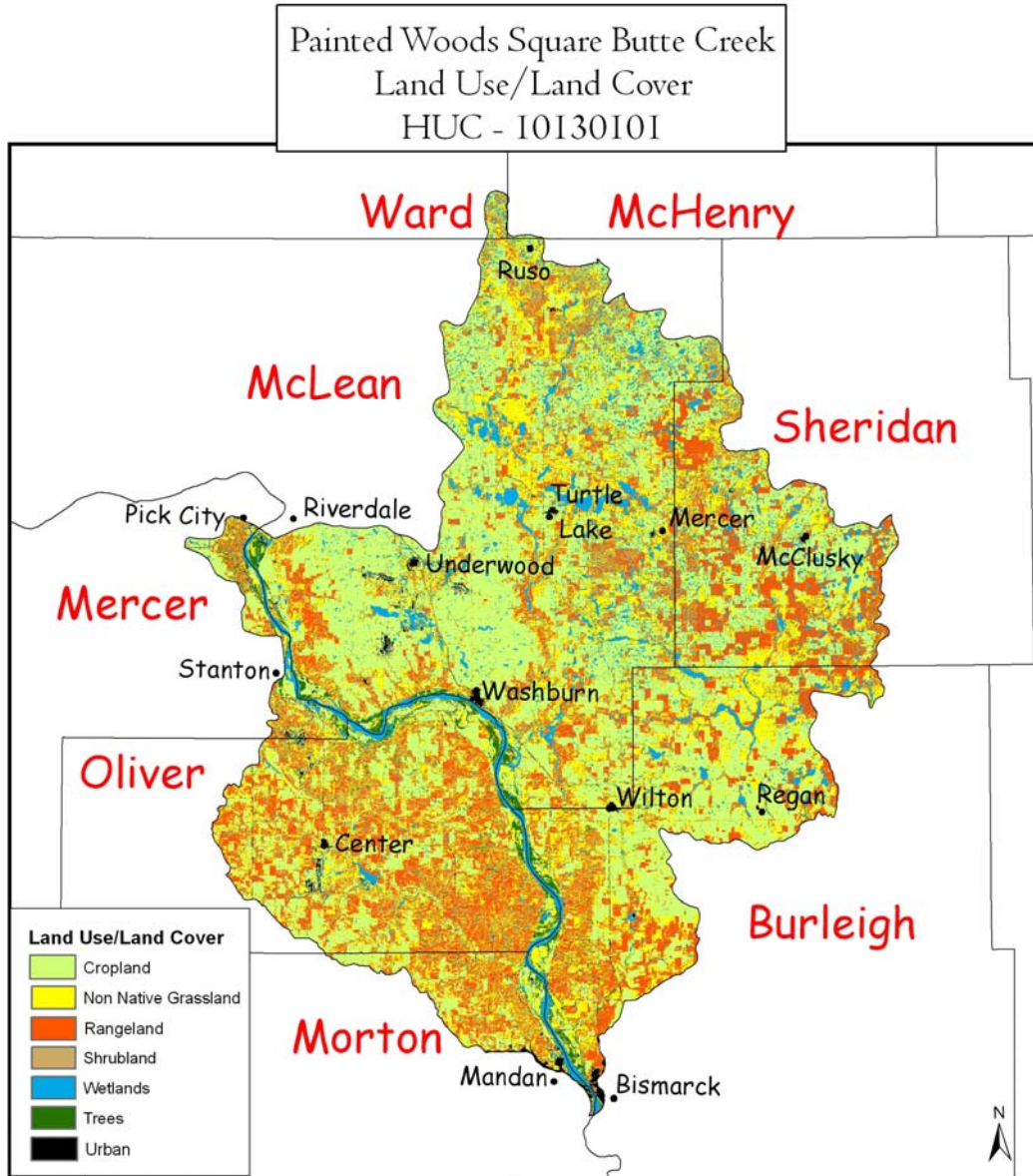
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### Physical Description – Continued

#### 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>

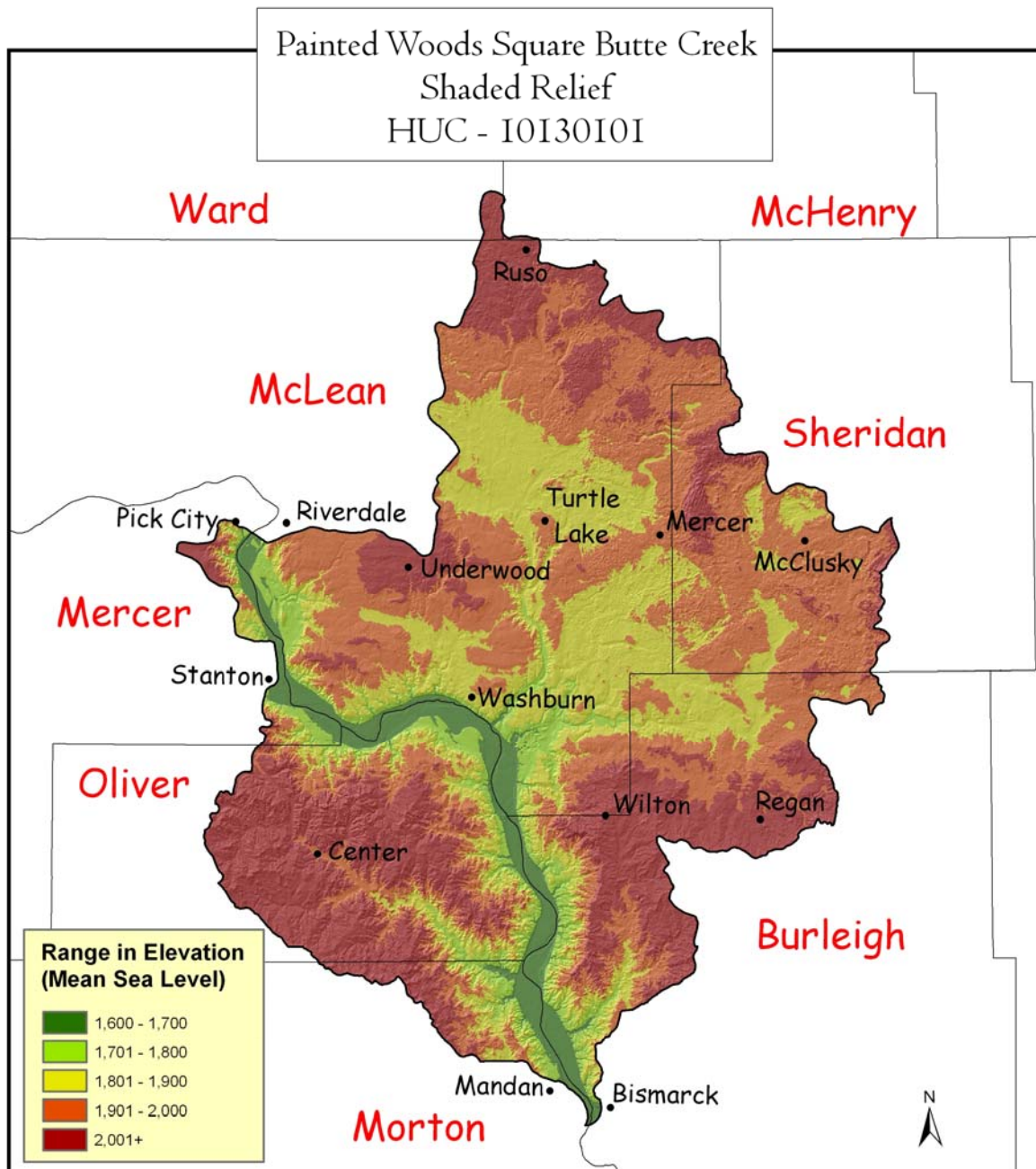
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### Physical Description – Continued

The sub-basin is part of the Missouri River Basin – Lake Oahe Sub-basin. Painted Woods-Square Butte Creek drains into the Missouri River, which eventually flows into the Mississippi River before it outlets into the Gulf of Mexico. The following map shows the relief for the sub-basin.<sup>5</sup>



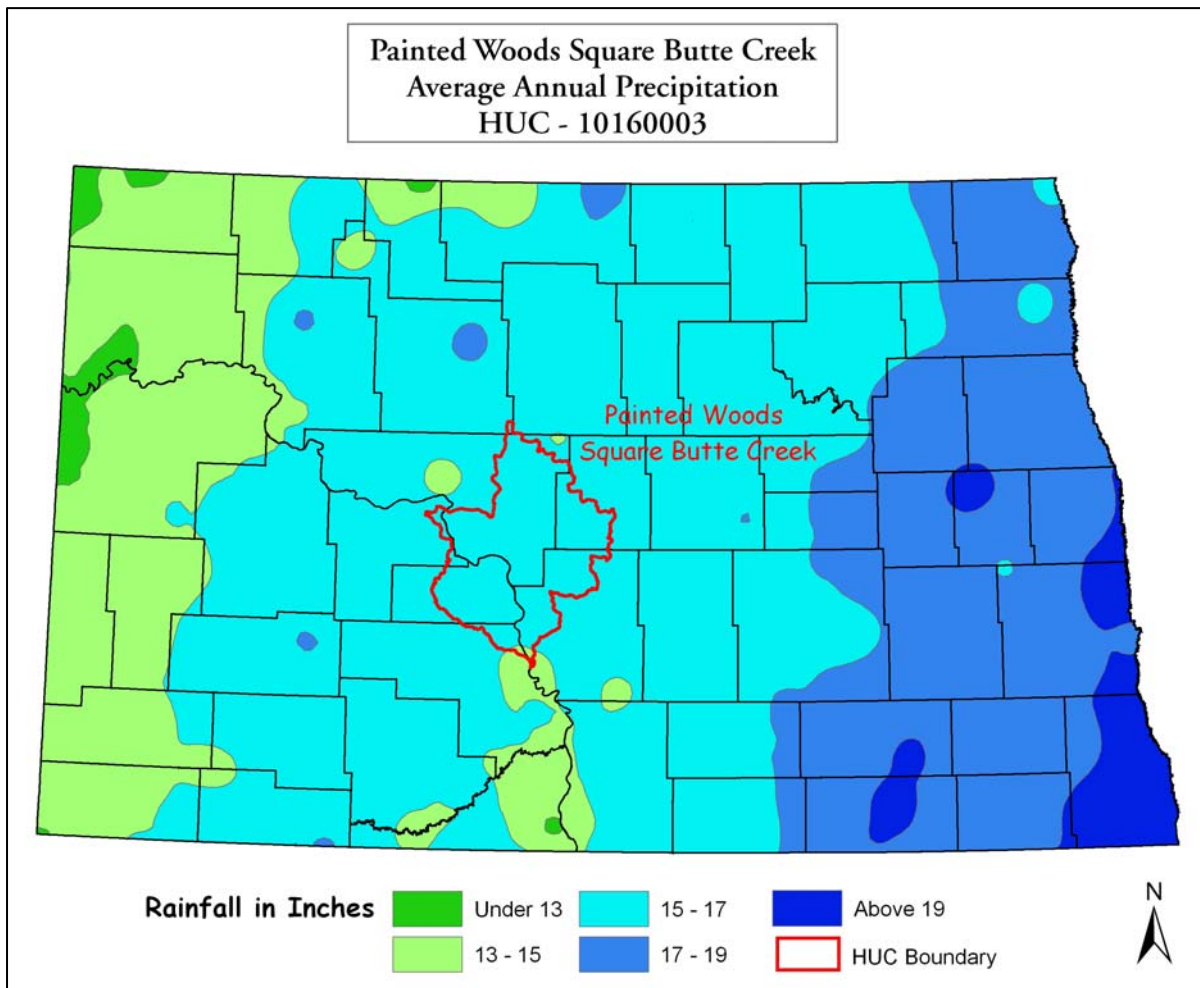
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### Physical Description – Continued

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)



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### 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 waterbody can "handle" without violating State water quality standards.

		Units	Painted Woods-Square Butte Creek Sub-basin <sup>6</sup>	Painted Woods-Square Butte Creek Impaired Water Quality (303d) <sup>7</sup>	Percent Impaired* Painted Woods-Square Butte Creek
<b>Water Quality Data</b> <i>*Percent of Total Miles and acres in HUC</i>	Total – Major Water Bodies	No.	51	3	
	Rivers/Streams	Miles	1,650	39.9	2.4%
	Lakes/Reservoirs	Acres	3,385	715	21.1%





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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, 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>	4	6	2	1	13
<b>Number of Animals</b>	2,810	8,809	2,084	6	13,709
<b>Number of State Permitted Operations</b>					8

<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>Painted Woods-Square Butte Creek</b>	73,600	40,100	1,700	2,100	2,600
<b>Painted Woods-Square Butte Creek as a percent of North Dakota</b>	3.9%	4.1%	4.9%	1.5%	2.3%

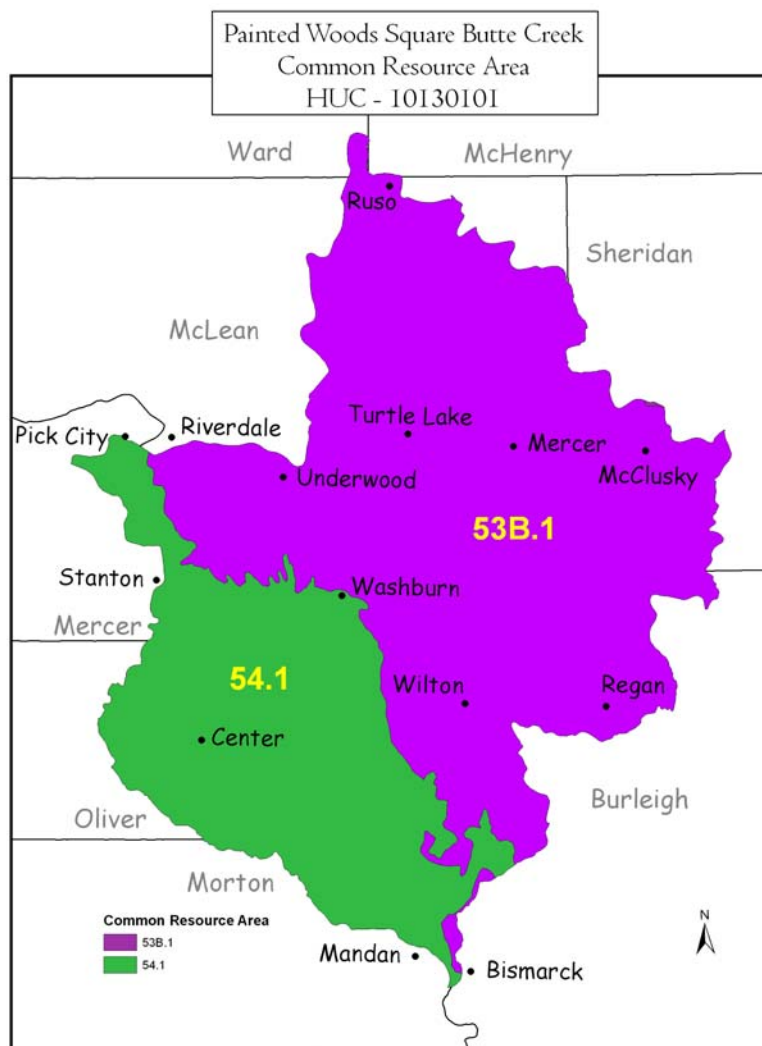
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### Physical Description – Continued

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 (MLRAs). The following map<sup>10</sup> shows the CRAs and descriptions for Painted Woods – Square Butte Creek sub-basin.



#### **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.

#### **54.1 - Rolling Soft Shale**

**Plain:** The Rolling Soft Shale Plain is a semiarid rolling plain with soils formed from shale, siltstone, and sandstone. Native grasses cover areas of steep or broken topography, while cultivated and forage crops dominate other parts of the landscape. Most soils are moderately deep and deep, well drained and moderately well drained, loamy and clayey, and have a frigid temperature regime. The area was largely unaffected by glaciation and retains a moderately dissected stream drainage pattern.

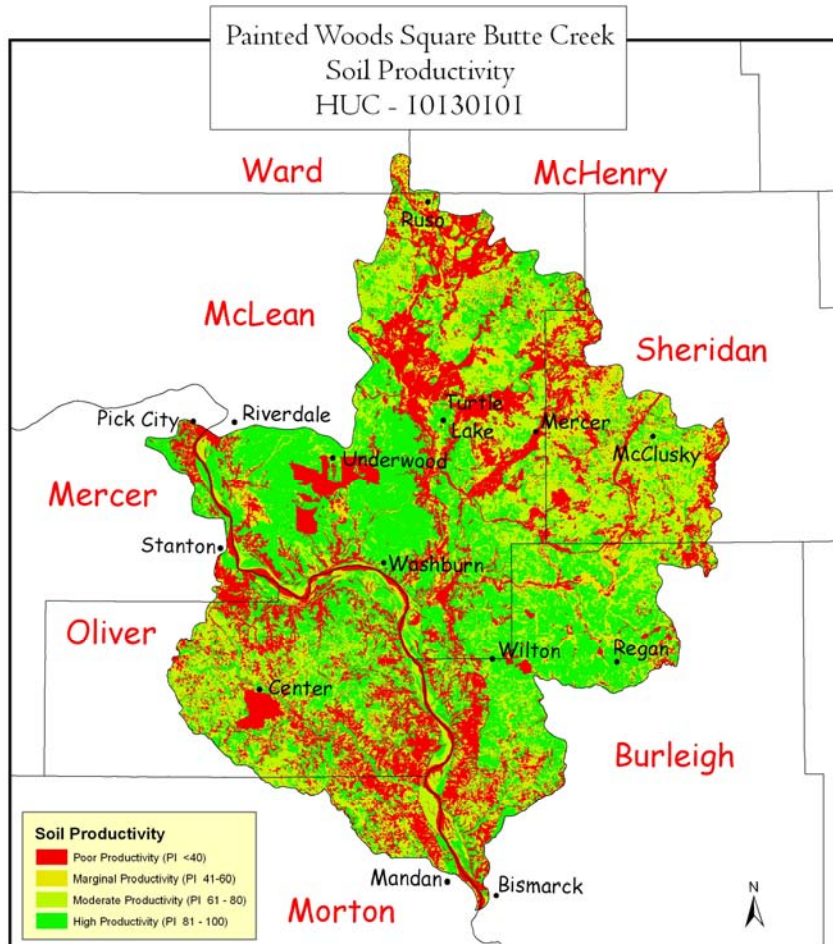


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### Soil Productivity <sup>11</sup>



The two watersheds that make up this sub-basin are separated by the Missouri River. North and east of the Missouri River is the Painted Woods Creek watershed and south and west of the river is the Square Butte Creek watershed. Painted Woods Creek watershed has two distinct physiographic areas which correspond well to soil productivity for spring wheat. These areas generally run parallel to the Missouri River. One of these physiographic areas is the Missouri Slope which borders the Missouri River on the south and the west and is bounded on the north with a line that stretches from Turtle Lake to several miles north of the City of Regan. This is known as the Missouri Coteau. There is a combination of moderate to poorly productive soils for

spring wheat, depending on the steepness of the landscape. The steeper the landscape, the less productive these soils are.

Square Butte Creek watershed is an area in the sub-basin that has soils which developed from relatively old (in relationship to eastern North Dakota) glacial till and residue bedrock. The north central portion of this watershed has landscapes that are level to gently sloping glacial till. These soils have high to moderate soil productivity for spring wheat. The remainder of the area has soils that developed from residual bedrock. Level to gently sloping areas of the entire watershed has poor soil productivity for spring wheat.



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### Common Land Unit

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

### Resource Concerns

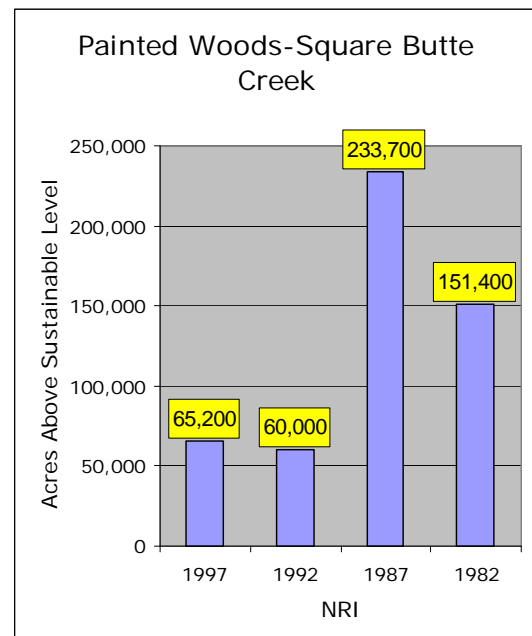
One of the goals of NRCS is to help quantify the types and amounts of resources that may be of concern in an area. This helps identify priority areas for the types and amounts of assistance given to a particular watershed.

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
Burnt Creek	Application Withdrawn	Burnt Creek Diversion	Completed
Sherk Creek	Application Withdrawn	Square Butte Creek Stream Assessment	Completed 1999
Square Butte Creek	Ongoing Construction		
NDDH TMDLs		Soil Conservation District Assessments and Studies	
Number Listed		Name	Status
Lakes/Reservoirs - 3	Streams - 2	None	None
EPA 319 Watershed Projects			
Name		Status	
NONE		--	

### Soil

- NRI estimates indicate there was a 44 percent reduction from 1987 to 1997 in the amount of Highly Erodible Land (HEL) being farmed.
- The cultivated cropland acreage experiencing erosion rates above sustainable levels decreased to 65,200 acres in 1997, as compared to 151,400 acres in 1982.
- Through 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 3.2 tons/acre/year to 1.6 tons/acre/year on all cultivated cropland. The average water erosion rate reduced from 3.0 tons/acre/year to 1.8 tons/acre/year on cultivated cropland.





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### **Resource Concerns - Continued**

#### **Soil continued**

- The cultivated cropland acreage experiencing wind erosion rates above sustainable levels decreased to 39,600 acres in 1997, as compared to 135,800 acres in 1987.
- 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.
- 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**

- **Wellhead Protection Areas**<sup>12</sup> – Three protection areas are located in the sub-basin. They are designated to protect the municipal water supply for the cities of Center, Wilton, Mercer, Dakota Adventist Academy, and McLean-Sheridan Rural Water.
- The stream sections on the 303(d) listed in hydrologic unit code 10130101 is listed for fecal coliform and sedimentation/siltation.
- Brush, Crooked, and Strawberry Lake have water quality impacts from dissolved oxygen and eutrophication.
- 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 health and buffer width are impacting water quality and stream health.
- Water conservation for water quality and quantity are issues on grazing lands.

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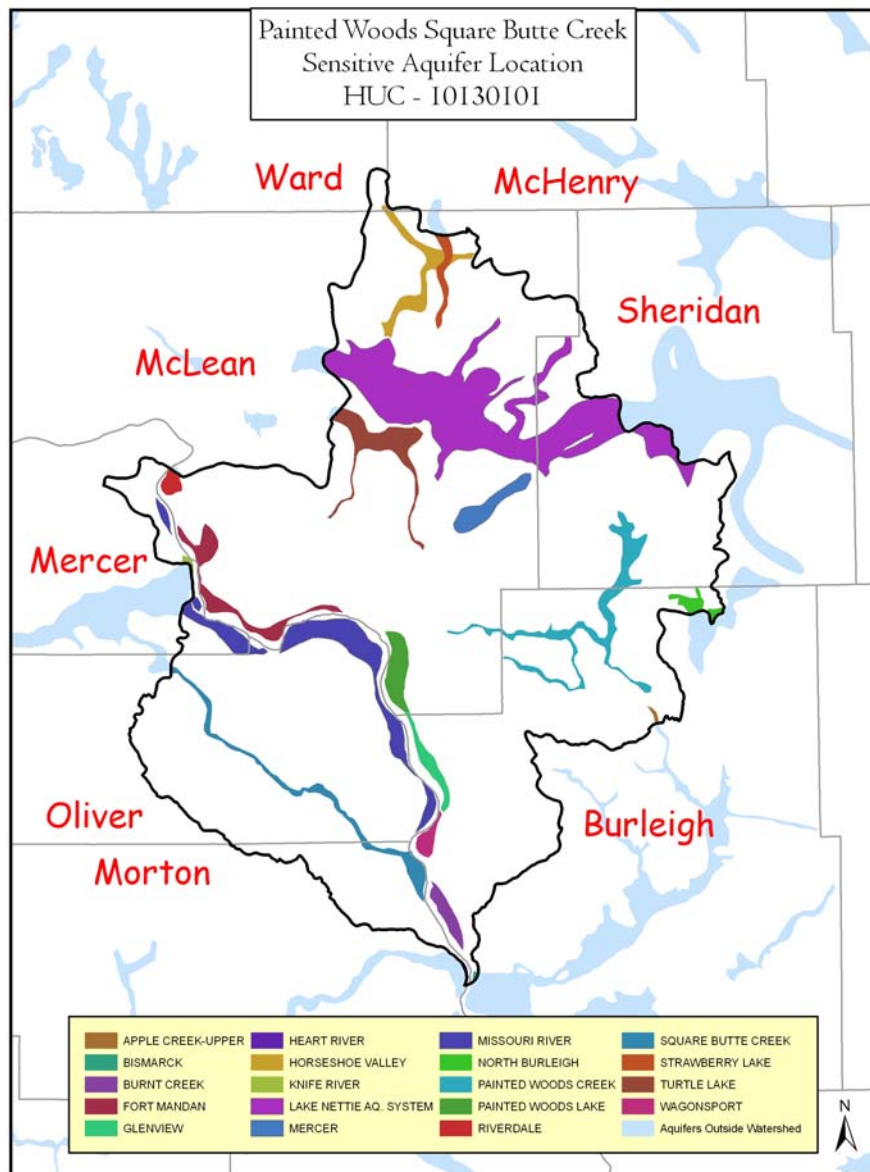
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### Resource Concerns - Continued

#### Water - Continued

- Aquifers-Sensitive<sup>13</sup>** - There are nineteen glacial drift aquifers underlying the Painted Woods Square Butte Creek sub-basin. The McLean-Sheridan Rural Water Users, Dakota Adventist Academy, and the City of Mercer are identified as ND Ground Water-Dependent Community Public Water Systems and overlay aquifers within the basin.



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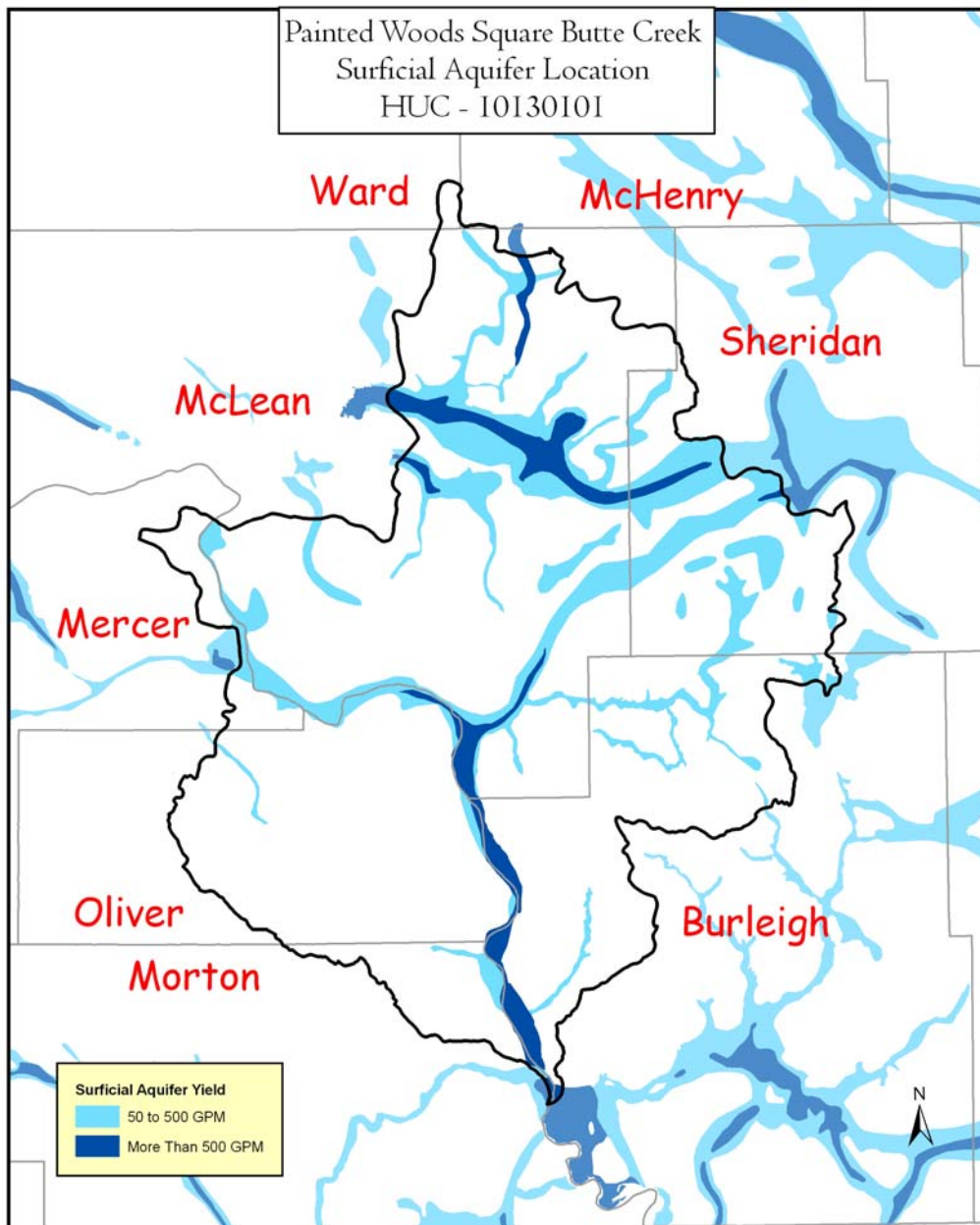
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### Resource Concerns - Continued

#### Water - Continued

- Aquifers—Surficial** – The map below is a summary of the major glacial-drift aquifers and their potential GPM (Gallon per Minute) 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.





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### **Resource Concerns - Continued**

#### **Water - Continued**

- **Surface Water - Dependent Public Water Systems** – Four coal fired energy stations (Coyote Station, Great River Energy-Stanton, Leland Olds Station, and Great River Energy-Coal Creek Station) and three cities (Washburn, Mandan, and Bismarck) utilize surface water intake structures as their primary water source.

#### **Air**

- Air pollution is very noticeable from the coal fired electric plants in and around the watershed.
- Visibility is reduced during winter months from blowing snow.
- Increased wind speeds due to tree/shelterbelt removal.
- Wild fires can decrease visibility and make it hard to breathe.

#### **Plants**

- Major concerns are with 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 dry beans.
- 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, riparian trees, or rural home sites that are not 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		Black-footed Ferret Gray Wolf	None
Birds	Piping Plover,	Whooping Crane, Interior Least Tern	None
Fish	None	Pallid Sturgeon	None
Invertebrates	None	None	Dakota Skipper
Plants	None	None	None
Critical Habitat – Piping Plover			

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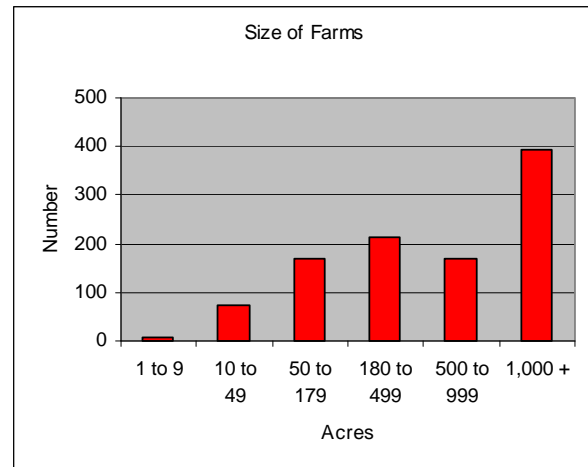
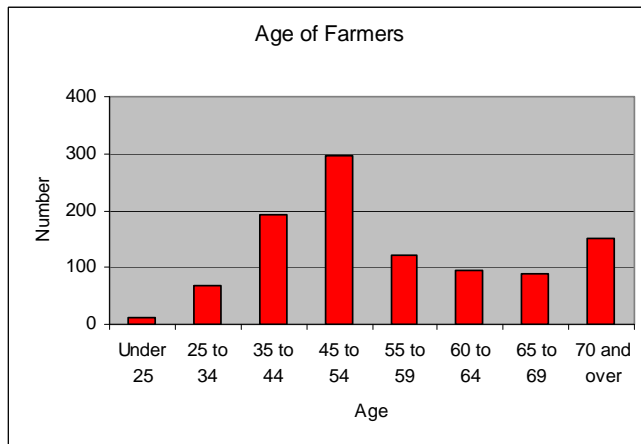
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### Census and Social Data<sup>14</sup>

**Number of Farms: 1,020**

**Number of Operators: 650**

- Average Age: 53
- Full-Time Operators: 65%
- Part-Time Operators: 35%



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

Approximately nine percent of the operators are minority producers. Limited Resource Farmers are also estimated at ten 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**

- <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, and 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, Source Water Protection Program data, 2003.
- <sup>13</sup> ND Department of Health, Environmental Health Section, Water Quality Division, Ambient Ground Water Monitoring Program data, 1997.
- <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.)