

# Middle Little Missouri 10110203

## 8-Digit Hydrologic Unit Profile

September 2007

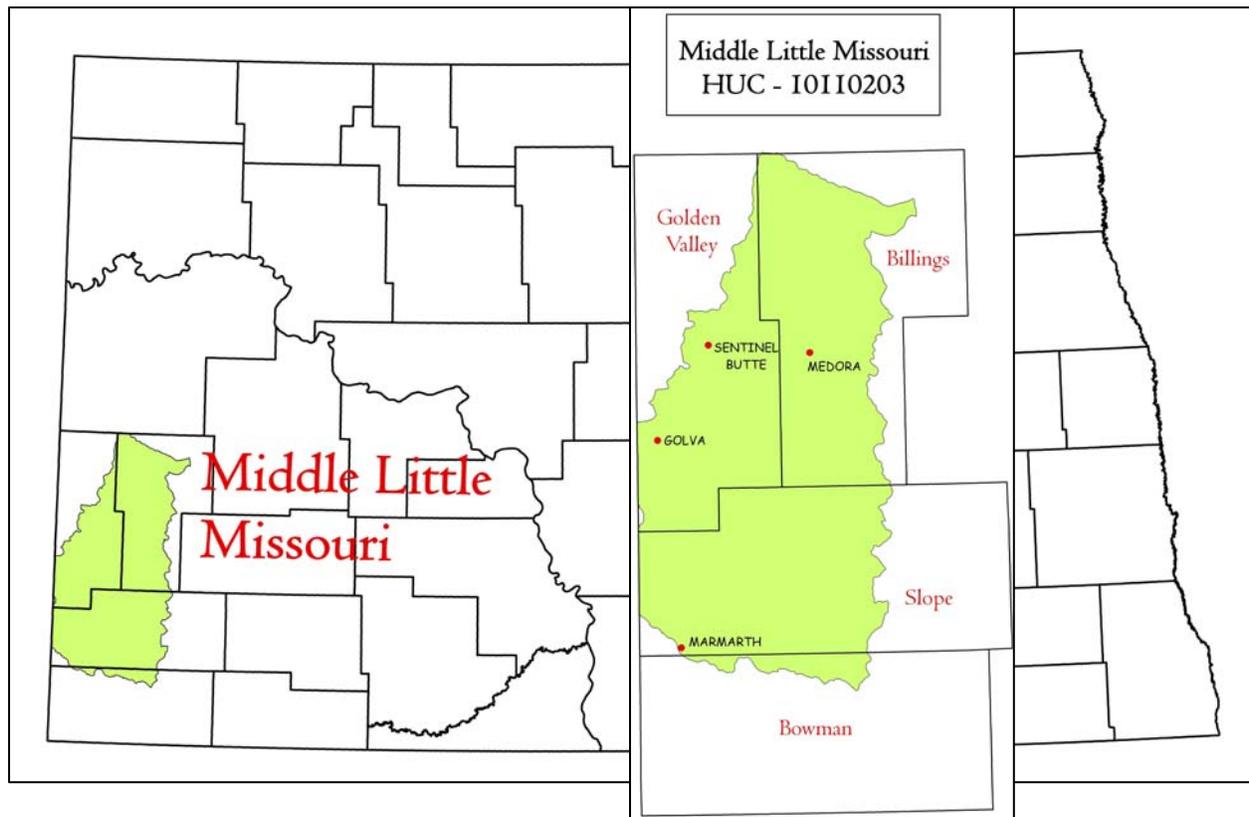
### Introduction

The Middle Little Missouri 8-Digit Hydrologic Unit Code (HUC) (10110203) sub-basin includes land in Montana and North Dakota. There are approximately 1,395,300 acres in the entire sub-basin. This sub-basin is located in Missouri Region, Missouri-Little Missouri Sub-Region.

This report addresses only the portion located within North Dakota. The Middle Little Missouri is approximately 1,345,900 acres covering parts of five counties (Billings, Bowman, Golden Valley, McKenzie, and Slope) in North Dakota. Of the 1,345,900 acres, Billings contains 34%, Slope 35%, Golden Valley 28%, McKenzie less 1%, and Bowman 3%. There are approximately 500 farms in the sub-basin. The following two maps show the entire sub-basin and also the portion of the sub-basin located within North Dakota (McKenzie County has less than 200 acres within the watershed, which is beyond the detail of the maps).

This sub-basin encompasses commodities ranging from wheat, barley, oats, sunflowers, alfalfa, pulse crops, and tame hay to beef cattle, bison, swine, and sheep.

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



Produced by  
the Natural  
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Bismarck, ND

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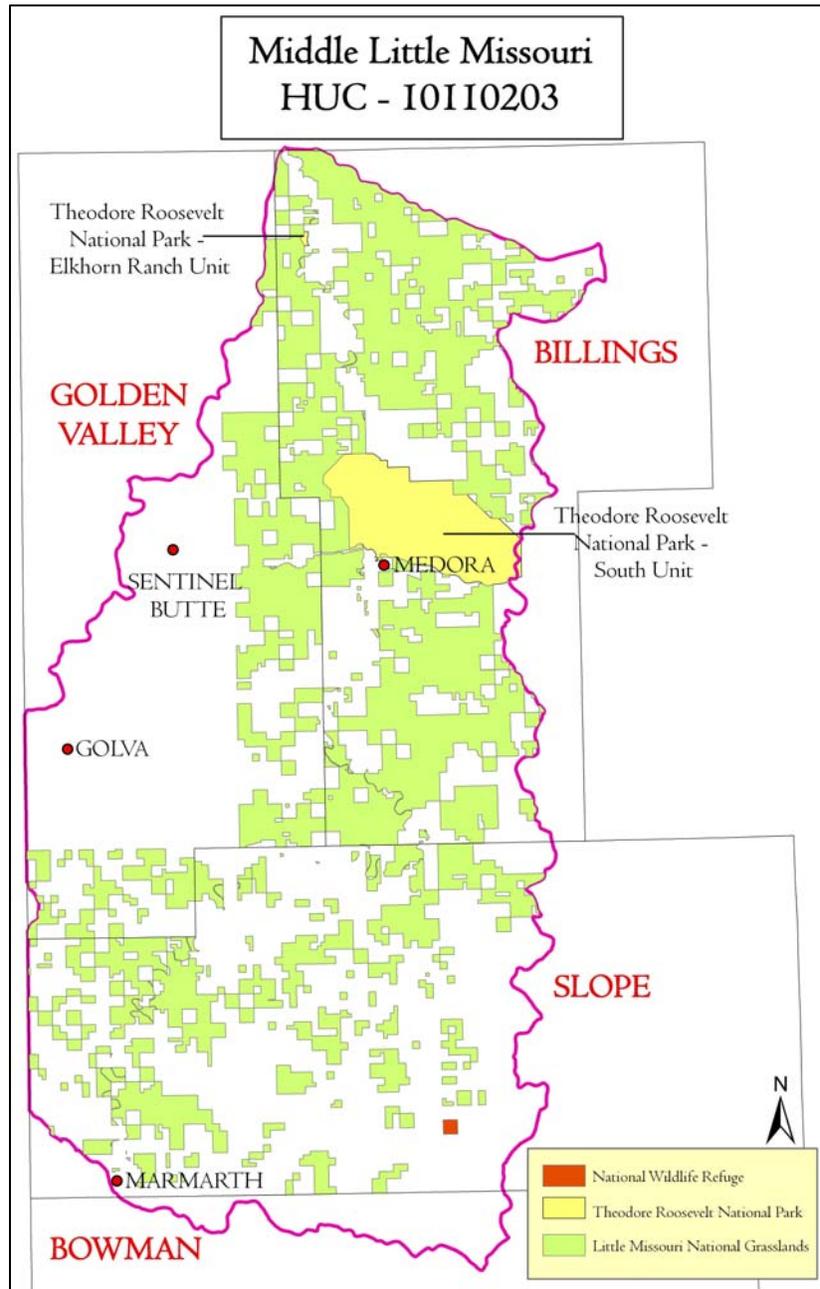
### **Physical Description**

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

<b>Land Use/ Land Cover (National Resources Inventory [NRI])<sup>1</sup></b>	<b>Acres</b>	<b>Percent of HUC</b>
Forestland	8,900	1%
Cropland	185,700	14 %
Conservation Reserve Program (CRP) Land <sup>2</sup> <a href="#">a</a>	31,100	2 %
Tame Grass/Hayland	43,300	3 %
Pastureland	20,700	2 %
Rangeland	459,700	34 %
Urban/Farmstead/ Transportation Land	79,400	6 %
Water/Wetlands	6,100	*
Federal Lands	511,000	38 %
<b>North Dakota HUC Totals <sup>b</sup></b>	<b>1,345,900</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>	1,100	<1%

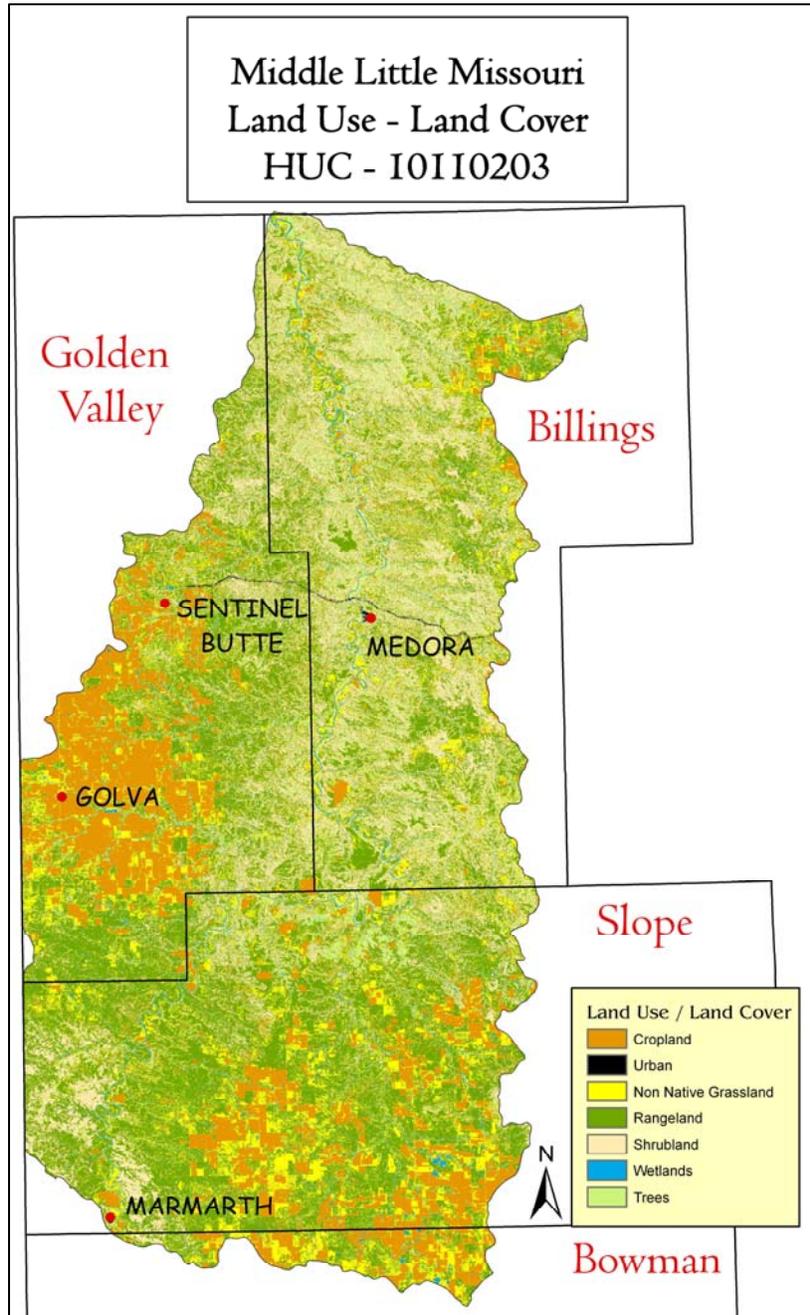
## Physical Description – Continued

The adjacent map shows the location of the Federally owned land. The National Park Service owns 46,500 acres which make up the South Unit and Elkhorn Ranch Unit of the Theodore Roosevelt National Park. The US Forest Service manages the Little Missouri Grasslands (441,600 acres) within the watershed. Also located with the watershed is one National Wildlife Refuge (600 acres) owned by the US Fish and Wildlife Service.



### Physical Description – Continued

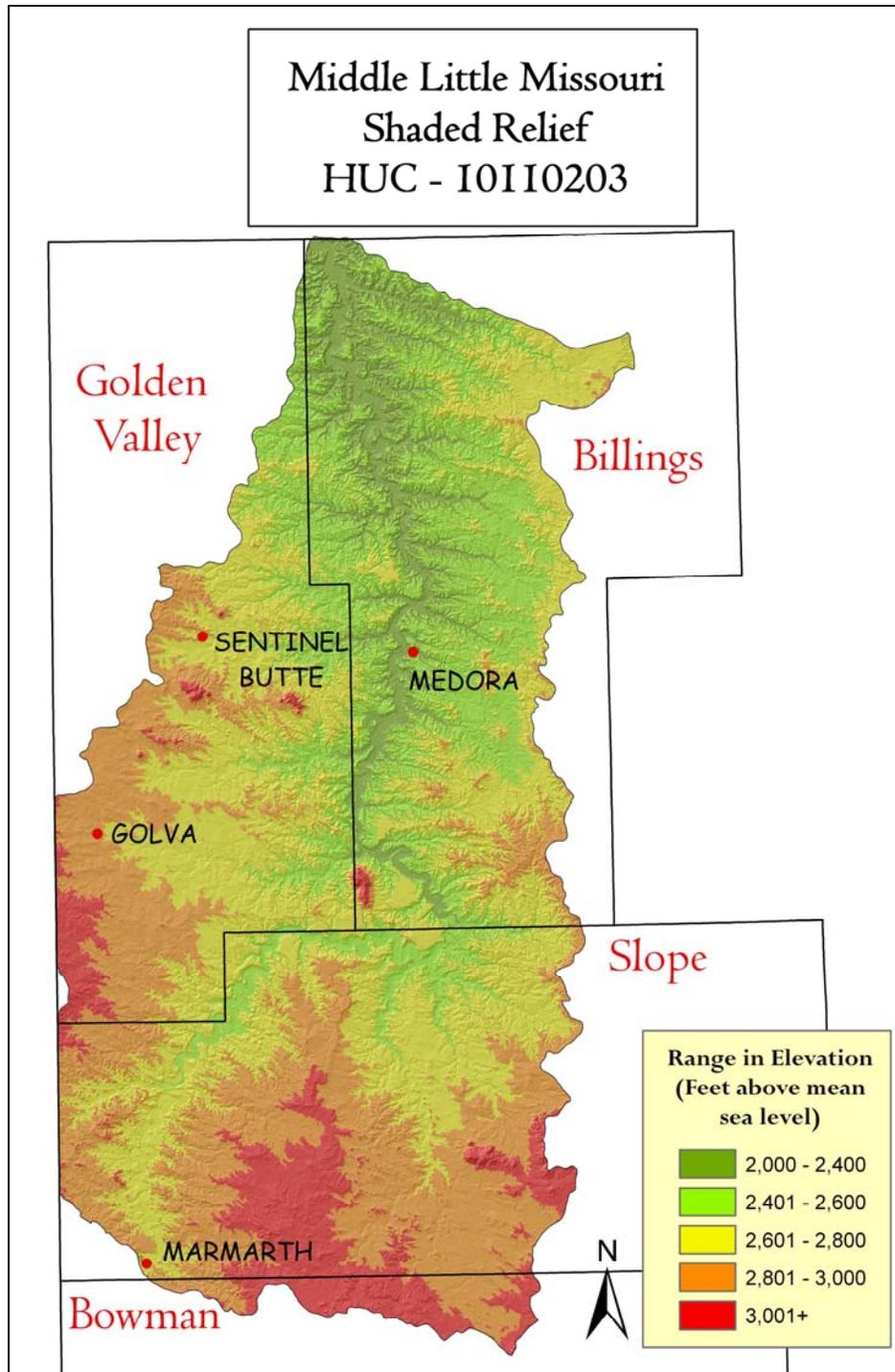
#### Land Use/Land Cover Map



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

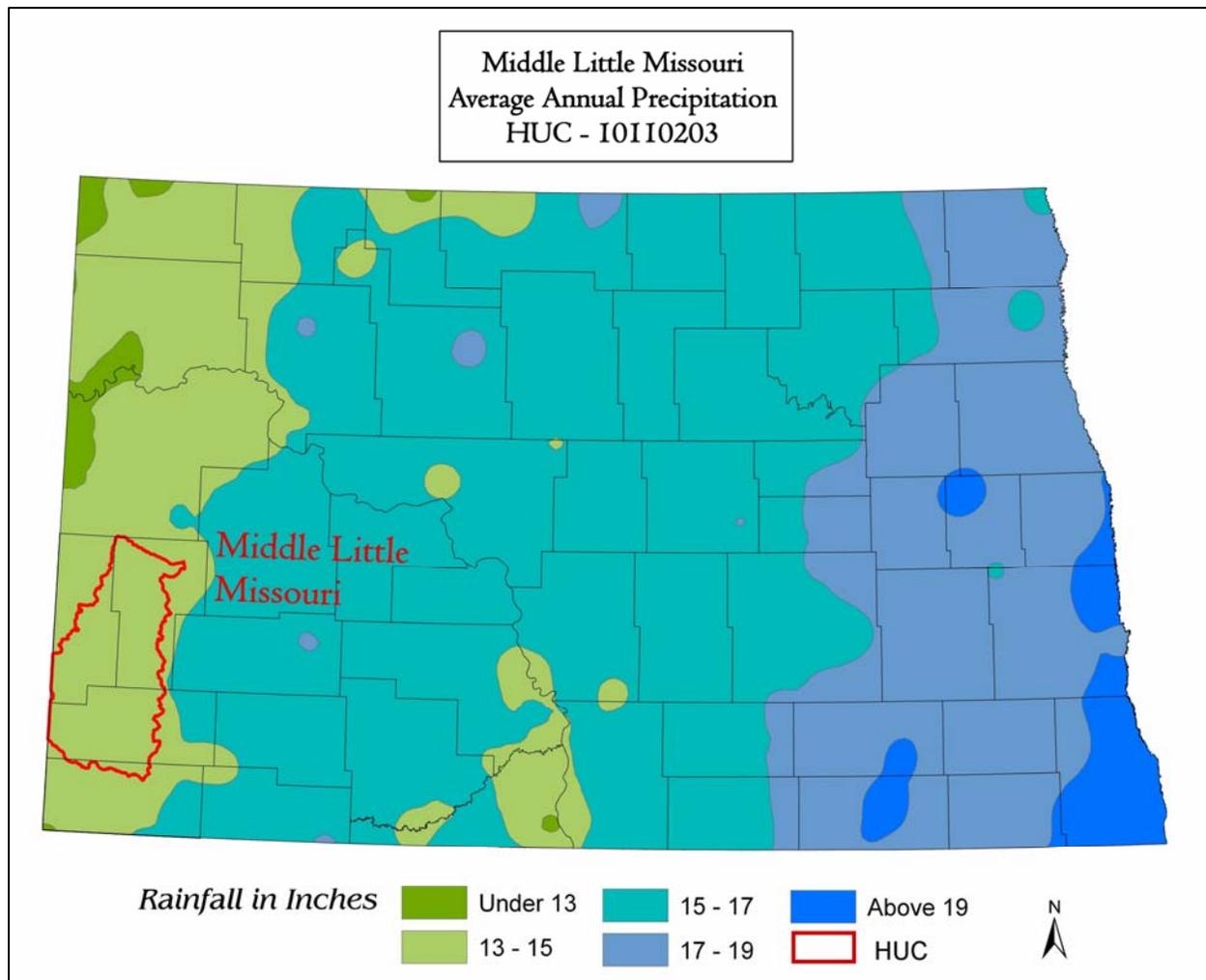
### Physical Description – Continued

The sub-basin is part of the Missouri River Region – Missouri-Little Missouri Sub-Region. The drainage pattern flows to the north into Lake Sakakawea, which then flows south and east into the Missouri River. The following map shows the relief for the sub-basin.<sup>5</sup>



### **Physical Description – Continued**

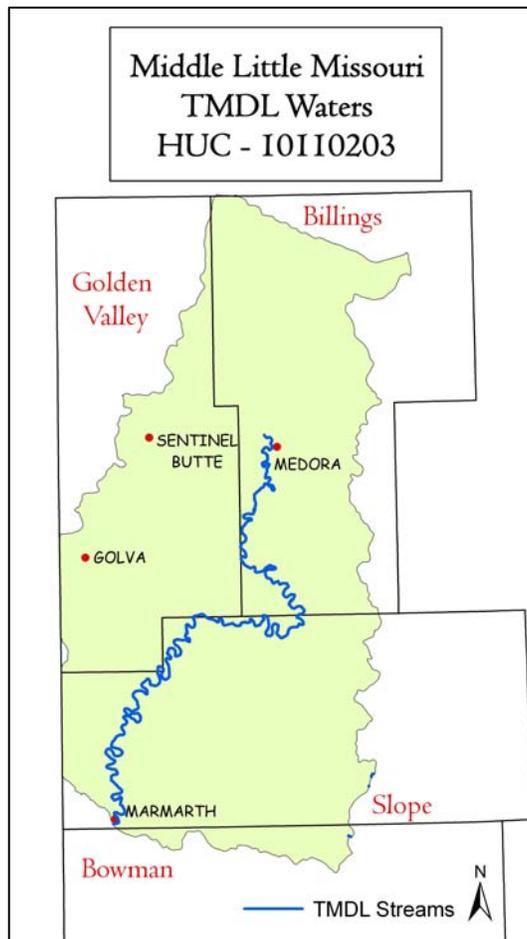
The following map is a plot of 1961-1990 annual average precipitation contours from National Oceanic and Atmospheric Administration (NOAA) Cooperative Stations and (where appropriate) USDA-NRCS Snowpack Telemetry (SNOTEL) Stations. Christopher Daly used the PRISM (**P**arameter-elevation **R**egressions on **I**ndependent **S**lopes **M**odel) 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 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 particular stream, lake, estuary, or other waterbody can "handle" without violating State water quality standards.

		Units	Middle Little Missouri Sub-basin <sup>6</sup>	Middle Little Missouri Impaired Water Quality (303d) <sup>7</sup>	Percent Impaired* Middle Little Missouri
<b>Water Quality Data</b> <i>*Percent of Total Miles and acres in HUC</i>	Total – Major Water Bodies				
	Rivers/Streams	Miles	3,443.1	124.04	3.6
	Lakes/Reservoirs	Acres	62	0	0.0





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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 North Dakota Department of Health. 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>					
<b>Animal Type</b>	<b>Dairy</b>	<b>Beef</b>	<b>Swine</b>	<b>Other</b>	<b>Total</b>
<b>Number of Animal Feeding Operations</b>	1	1	2	0	4
<b>Number of Animals</b>	136	3000	480	0	3616
<b>Number of State Permitted Operations</b>					3

<b>Livestock Numbers (rounded to nearest 100)<sup>9</sup></b>					
	<b>Cattle and Calves</b>	<b>Beef Cows</b>	<b>Dairy Cows</b>	<b>Hogs and Pigs</b>	<b>Sheep and Lambs</b>
<b>North Dakota</b>	1,873,200	982,300	34,500	138,800	114,000
<b>Middle Little Missouri</b>	59,100	29,000	300	1,100	4,500
<b>Middle Little Missouri as a percent of North Dakota</b>	3.2%	3.0%	0.9%	0.8%	3.9%

### 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 for Middle Little Missouri sub-basin with the descriptions below.

#### **54.1 - Rolling Soft Shale Plain:**

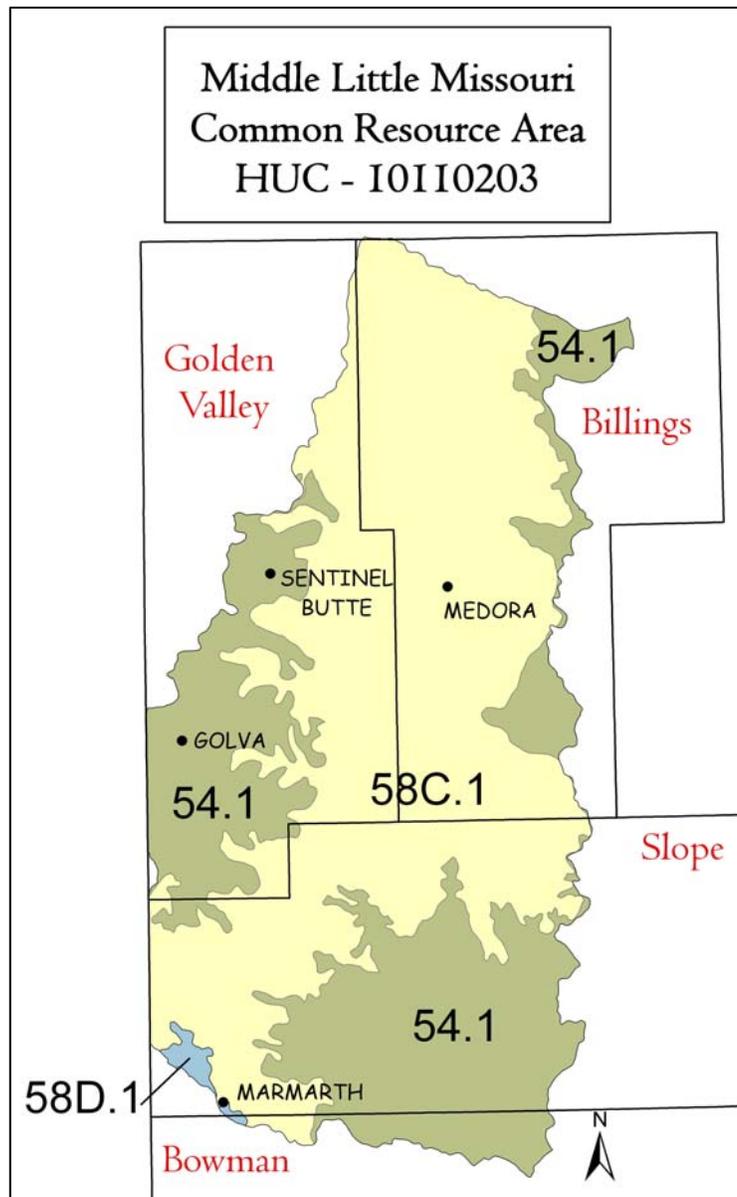
The Rolling Soft Shale Plain is a semiarid rolling plain with soils formed from shale, siltstone, and sandstone. Native grasses cover areas of steep or broken topography, while cultivated and forage crops dominate other parts of the landscape. Most soils are moderately deep and deep, well drained and 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.

#### **58C.1 - Northern Rolling High**

**Plains, Northeastern Part:** These strongly dissected plains consist mainly of badlands and steep to very steep soils. Soils formed in shale, siltstone, sandstone, or locally thick alluvium. Most vegetated areas are grazed by livestock. Rocky Mountain Juniper, Aspen, and Ponderosa Pine trees occur on north slopes. Mean annual precipitation is 350 to 400 mm. Mean annual air temperature is 4 to 6°C. Average frost-free period is 110 to 120 days.

#### **58D.1 - Northern Rolling High**

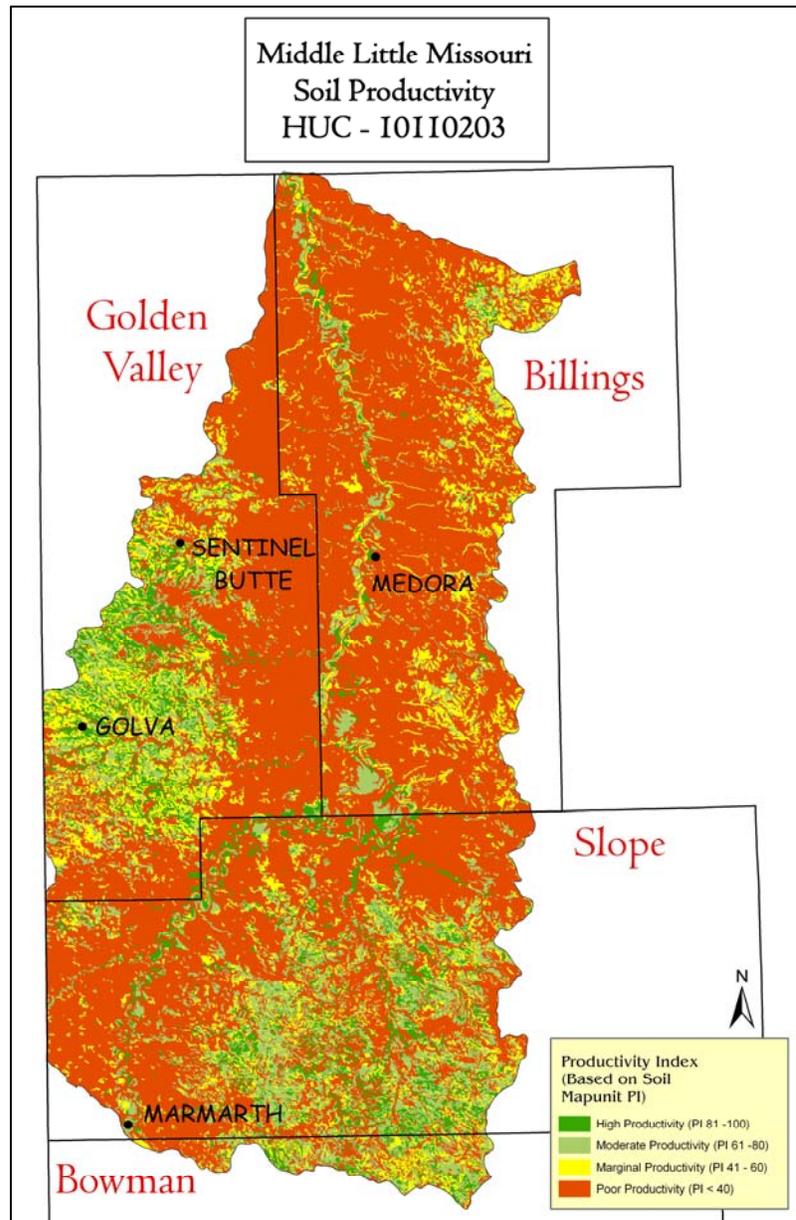
**Plains, Eastern Part:** These dissected plains are underlain by shale and sandstone. Slopes are mostly gently rolling to steep. Most soils are medium to fine textured, well drained with a frigid temperature regime. About four-fifths of this area is privately owned with the remainder being State and Federal. Most of the area is in native grasses and shrubs with grazing cattle and sheep. Cropped areas are used for small grain and hay.



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

The extreme southeastern corner and west central areas of the Middle Little Missouri sub-basin have soils with a marginal to high productivity index (PI). The remainder of the sub-basin is dominated by soils with a poor PI and are generally not suited to small grain production. The majority of the soils in the sub-basin are associated with badlands or soils that are shallow to weathered bedrock and are better suited to rangeland.

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

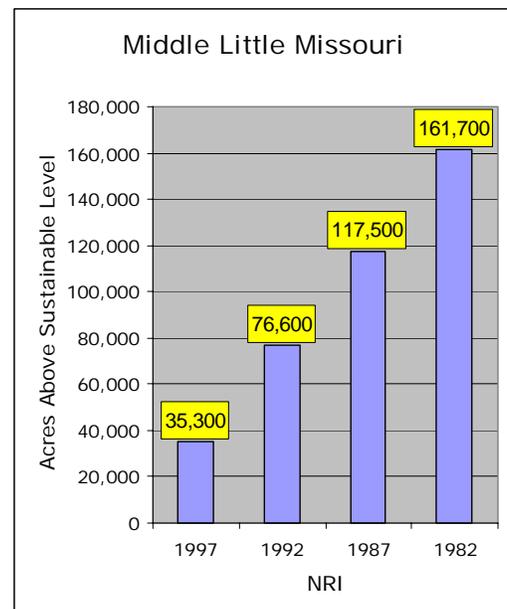
One of the goals of NRCS is to help quantify the types and amounts of resources that may be of concern in an area. This helps identify priority areas for the types and amounts of assistance to be given to a particular watershed.

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
None	NA	None	NA
NDDH TMDLs		Soil Conservation District Assessments and Studies	
Number Listed		Name	Status
Lakes/Reservoirs – 0	Streams – 2	None	NA
EPA 319 Watershed Projects			
Name		Status	
None		NA	

### Soil

- NRI estimates indicate there was a 16 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 from 161,700 acres in 1982 to 35,300 acres in 1997.
- Through NRCS programs many farmers and ranchers have applied conservation practices to reduce the effects of both wind and water erosion. From 1982 to 1997, the average wind erosion rate reduced from 8.4 tons/acre/year to 0.8 tons/acre/year on all cultivated cropland. The average water erosion rate reduced from 3.1 tons/acre/year to 2.4 tons/acre/year on cultivated cropland.
- Organic matter depletion remains a resource concern due to conventional tillage systems.
- Natural and man-induced gully erosion continues to result in downstream sedimentation and loss of crop and range productivity.



## **Resource Concerns - Continued**

### **Soil Continued**

- Streambank erosion along the Little Missouri and its tributaries.
- Sandy soils and fine textured soils still require conservation practices to control excessive wind erosion.
- Soil health, especially saline seeps and soils inhibit agricultural production.
- Poor soil health due to excessive animal waste application or deposition on or near livestock feeding areas.
- Soil health on rangeland sites as it relates to the stability of redistributing and losing nutrients and organic matter.

### **Water**

- **Aquifers**<sup>12</sup> - There are no surficial aquifers underlying the Middle Little Missouri sub-basin. There are minor unnamed springs and aquifers that provide water for livestock and human consumption.
- **Wellhead Protection Areas**<sup>13</sup> – there are three protection areas located in the sub-basin. They are designated to protect the municipal water supply for the cities of Sentinel Butte and Medora, as well as the Home on the Range facility located northwest of Sentinel Butte.
- The two stream sections on the 303(d) listed in hydrologic unit code 10110203 are listed for total fecal coliform.
- Conservation practices used to address these water quality issues include grazing management, erosion control, nutrient and ag waste management.
- The Little Missouri and its tributaries in this sub-basin have water quality impacts from sedimentation and siltation and associated excessive nutrient loading.
- Salinity is excessive in part of the sub-basin and impacting water quality.
- Rapid and excessive runoff has lead to localized flooding while leaving some streams with insufficient flows.
- There is an apparent lack of capacity of sub-watersheds to capture, store, and safely release rain runoff and snowmelt.
- Seep areas have caused excessive subsurface water which in turn has aggravated salinity levels in both soil and water.
- Conventional tillage systems continue to hinder efficient water use on dry land cropland.

### **Air**

- Objectionable odors are minimal with some feedlot or wintering areas having noticeable odor during certain times of the year.
- Visibility is reduced during winter months from blowing snow.



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### Resource Concerns - Continued

#### Plants

- Major concerns are with controlling invasive weeds (downy brome, knapweed, and leafy spurge) and maintaining good pasture and rangeland condition.
- Productivity, health and vigor of native plant communities is a major concern with producers and natural resource managers.
- Noxious weeds and associated poor range condition are resulting in reduced forage productivity for livestock and wildlife.
- Season long grazing on or near water courses are of a concern.
- Declining native species and biotic integrity to support ecological processes is a concern in parts of the sub-basin.
- Species of concern such as sage brush and sage grouse habitat may be a local resource concern.
- Direct seeding of small grain and row crops has been successful in some locations.

#### Animals

- Sage grouse and their habitat is a major resource concern.
- Lack of plant community diversity and habitat fragmentation are impacting wildlife.
- Inadequate livestock water sources remains an annual concern.
- Animals that are threatened and endangered can be seen in the following table of threatened and endangered species.

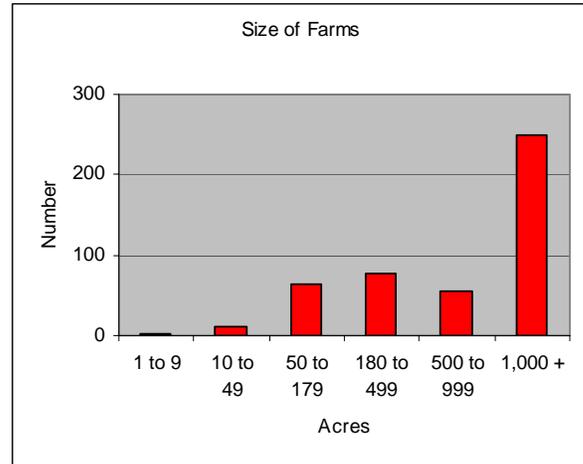
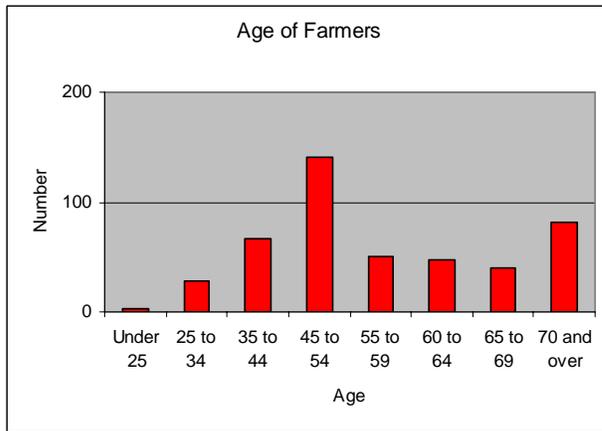
Federally Listed Threatened And Endangered Species			
Species Category	Threatened	Endangered	Candidate
Mammals	None	Black-footed Ferret Gray Wolf	None
Birds	None	Whooping Crane	None
Fish	None	None	None
Invertebrates	None	None	None
Plants	None	None	None
Critical Habitat – None			

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

**Number of Farms: 500**

**Number of Operators:**

- Average Age: 55
- Full-Time Operators: 75%
- Part-Time Operators: 25%



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

Approximately 8 percent of the operators are minority producers. Limited Resource Farmers are estimated at 5 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, 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.)