Upper Little Missouri 10110201

8-Digit Hydrologic Unit Profile

September 2007

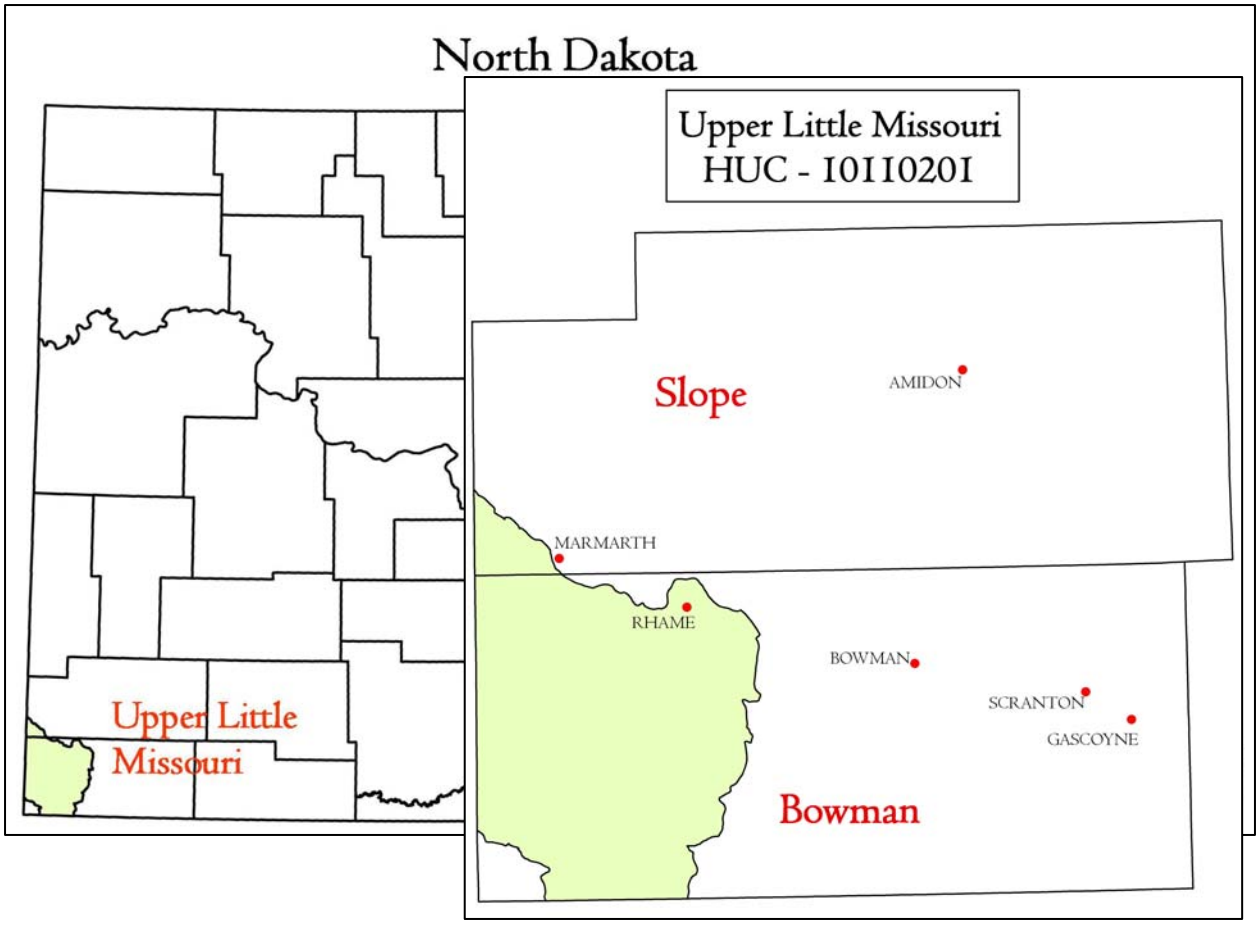
Introduction

The Upper Little Missouri 8-Digit Hydrologic Unit Code (HUC) (10110201) sub-basin includes land in four states (ND, SD, MT, and WY). There are approximately 2,206,000 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 Upper Little Missouri is approximately 275,300 acres covering parts of Bowman and Slope Counties in North Dakota. Of the 275,300 acres, Bowman County contains 94% and Slope County 6%. There are approximately 100 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.

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

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



Produced by the Natural Resources Planning Staff Bismarck, ND

Physical Description

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

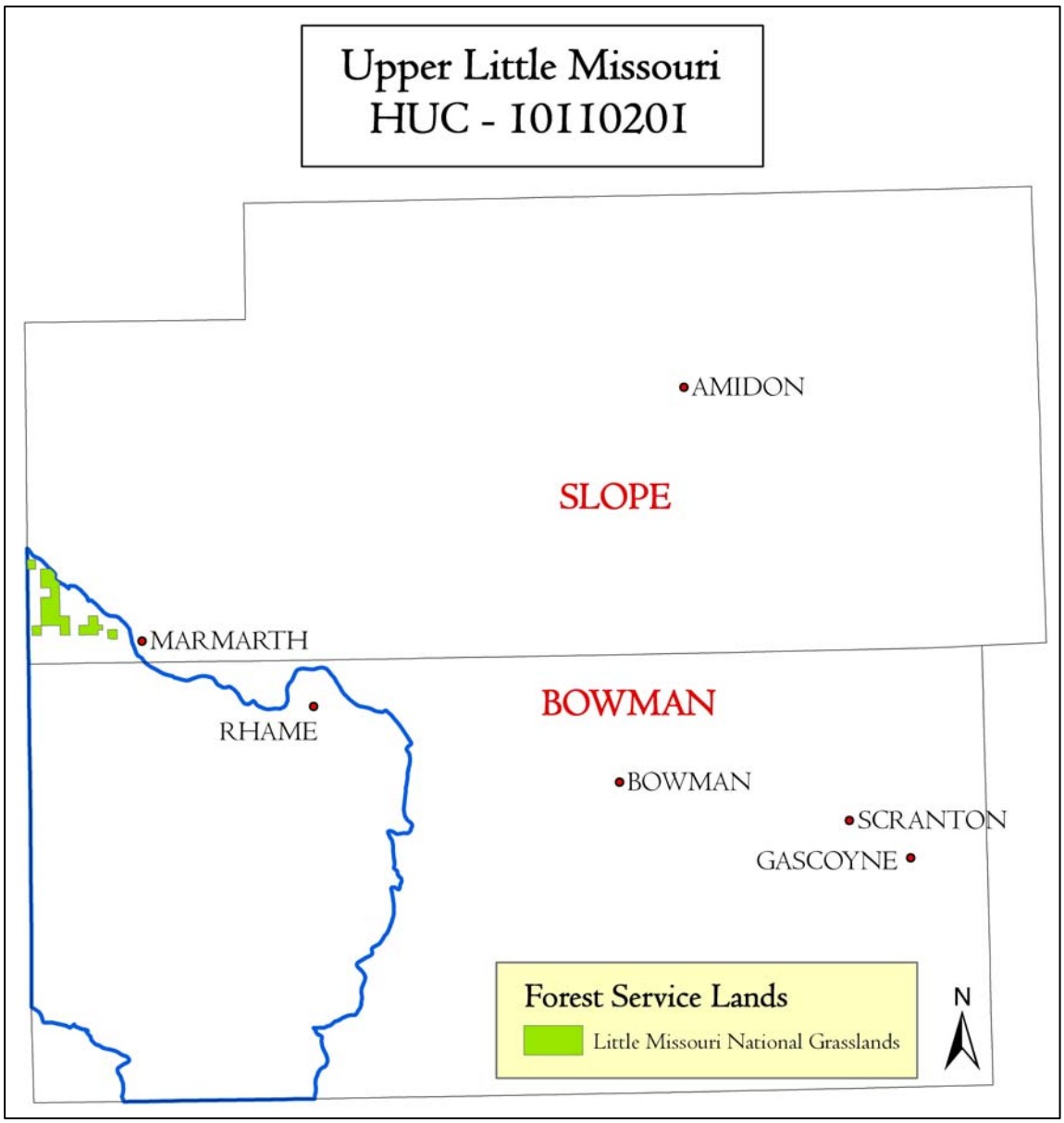
Land Use / Land Cover *(National Resources Inventory [NRI])*[1]	Acres	Percent of HUC
Forestland	0	0%
Cropland	18,100	7%
Conservation Reserve Program (CRP) Land [2] [a]	33,200	12%
Tame Grass/Hayland	19,500	7%
Pastureland	5,300	2%
Rangeland	143,800	52%
Urban/Farmstead/ Transportation Land	24,000	9%
Water/Wetlands	4,100	1%
Federal Lands	27,300	10%
North Dakota HUC Totals [b]	275,300	100%*

** 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.

Irrigated Land *(Farm Services Agency)*[3]	400	<1%

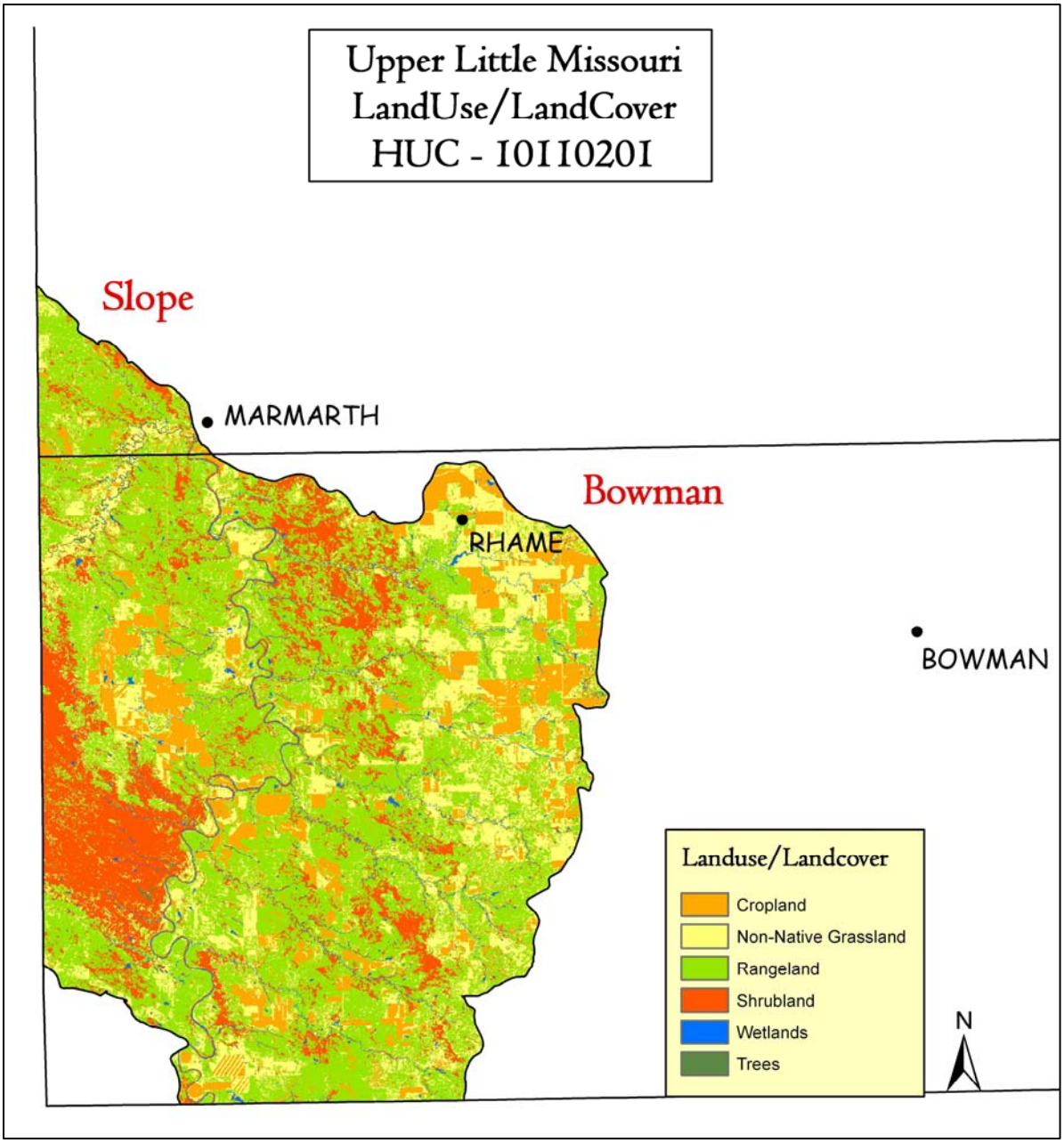
Physical Description – Continued

The following map shows the location of the Federally owned land. The Federal land is own by the US Forest Service and is part of the Little Missouri National Grasslands (3,000 acres).



Physical Description – Continued

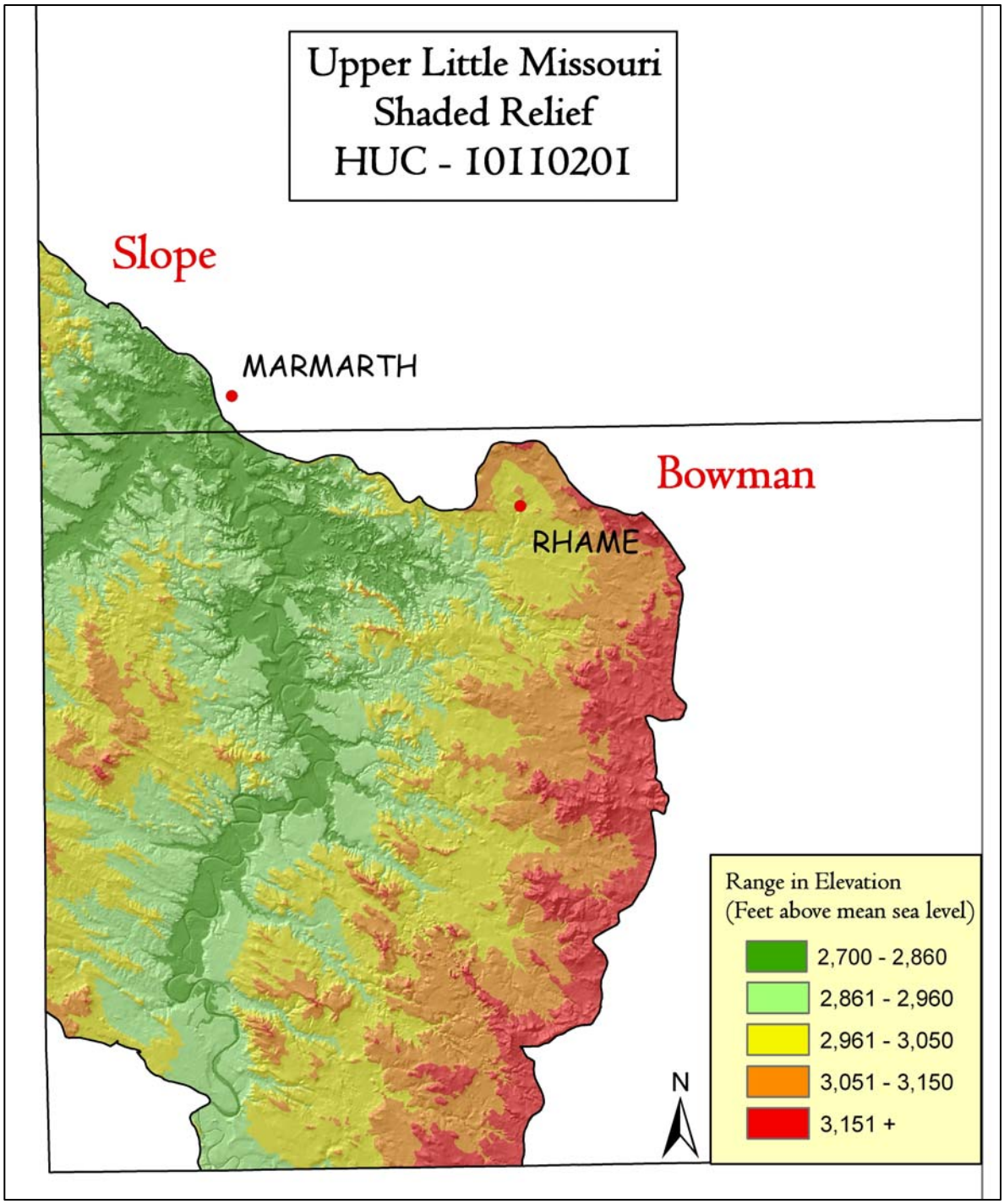
Land Use/Land Cover Map



The above map was developed from U.S. Geologic Survey's (USGS) ND Gap Analysis Program data.[4]

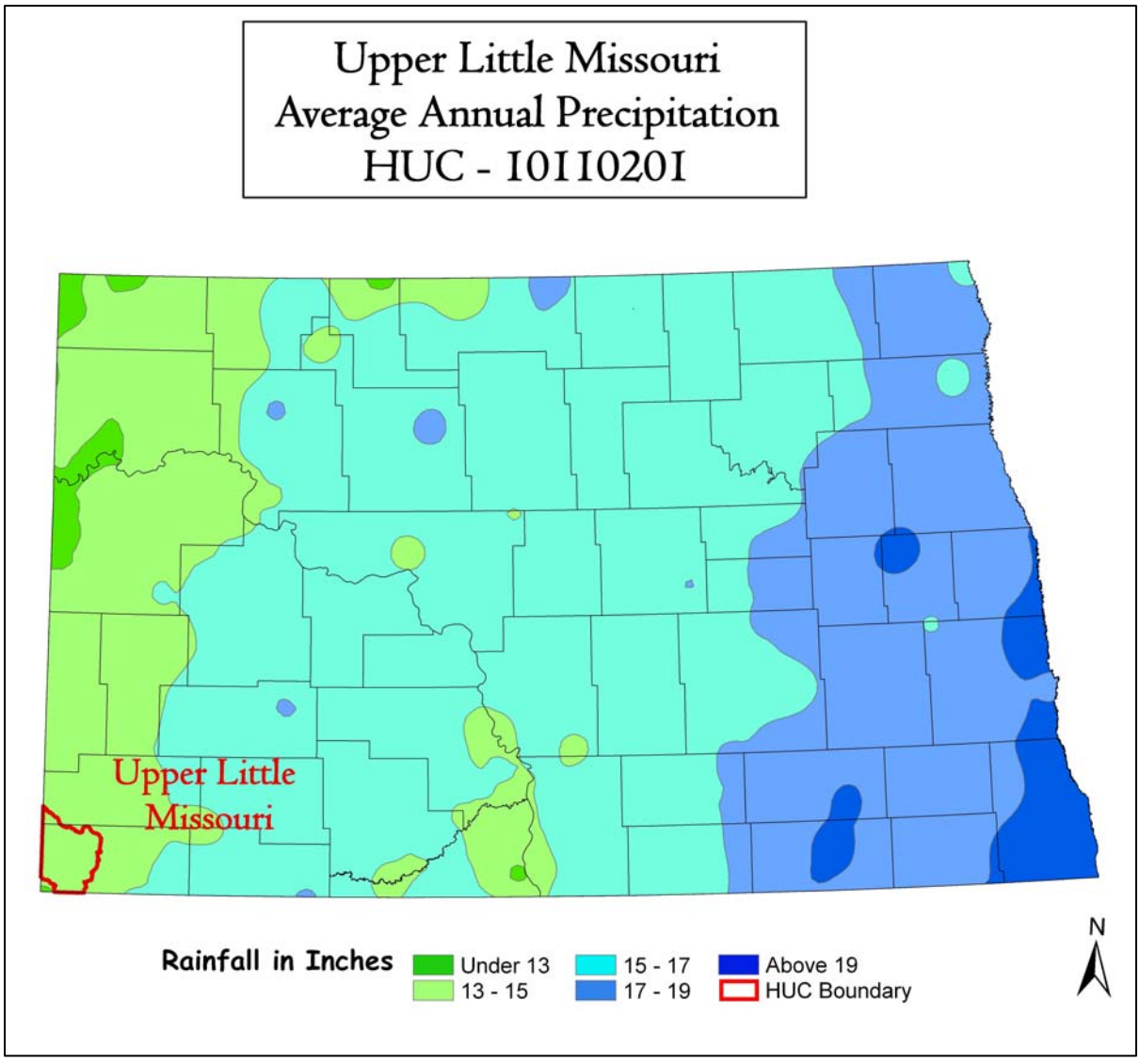
Physical Description – Continued

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.[5]



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. Total Maximum Daily Load (TMDL) is the amount of a particular pollutant a stream, lake, estuary, or other waterbody can "handle" without violating State water quality standards. Currently, there are no waters within this watershed exceeding these standards.

		Units	Upper Little Missouri Sub-basin[6]	Upper Little Missouri Impaired Water Quality (303d)[7]	Percent Impaired* Upper Little Missouri
Water Quality Data **Percent of Total Miles and acres in HUC*	Total – Major Water bodies				
	Rivers/Streams	Miles	668.2	0	0
	Lakes/Reservoirs	Acres	40	0	0

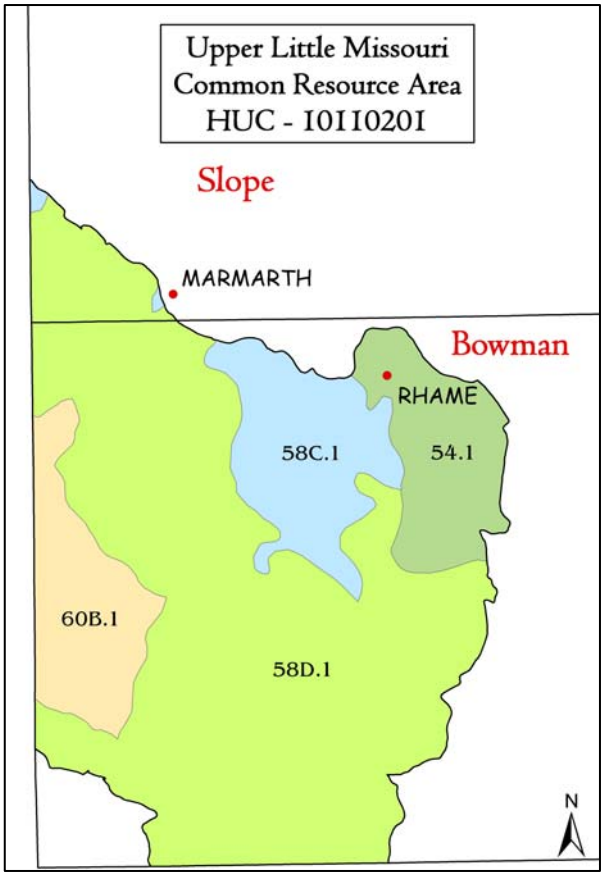
The following two tables show feeding operations, permitted operations, and livestock numbers. The first table lists the number of animal feeding operations and animals as tracked by the North Dakota Department of Health. The second table shows livestock numbers for all cattle, beef cows, dairy cows,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

Animal Feeding Facilities – North Dakota Department of Health Permit[8]					
Animal Type	**Dairy**	**Beef**	**Swine**	**Other**	**Total**
Number of Animal Feeding Operations	0	0	0	0	0
Number of Animals	0	0	0	0	0
Number of State Permitted Operations					0

Livestock Numbers (rounded to nearest 100)[9]					
	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
Upper Little Missouri	12,900	7,400	0	3,800	2,300
Upper Little Missouri as a percent of North Dakota	0.7%	0.8%	0.0%	2.7%	2.0%

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 (MLRAs). The following map[10] shows the CRAs for Upper 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.

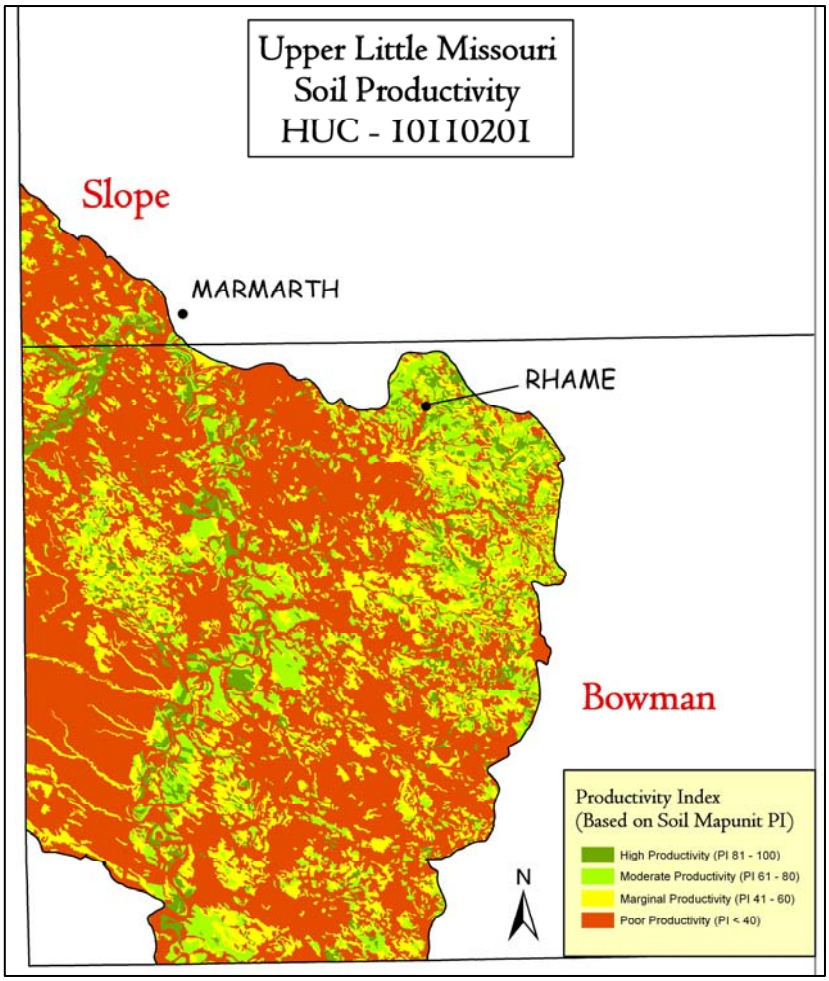
58D.1 - Northern Rolling High Plains, Eastern Part: These dissected plains are underlain by shale and sandstone. Slopes are mostly gently rolling to steep. Most soils are medium to fine textured, well drained with a frigid temperature regime. About four-fifths of this area is privately owned with the 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.

60B.1 - Pierre Shale Plains, Northern Part: These shale plains have long, smooth, gentle to strong slopes. Slopes along drainageways and streams are moderately steep to steep. Soils are mostly moderately deep and deep, fine textured, and have a frigid temperature regime and montmorillonitic mineralogy. Most of the area is used for grazing livestock. A few small nearly level to moderately sloping tracts grow winter wheat. Mean annual precipitation is 300 to 350 mm. Mean annual air temperature is 6 to 7°C. Average frost-free period is 110 to 120 days. This area supports natural mixed prairie vegetation.

Soil Productivity [11]

The extreme northeastern part and scattered areas along the Little Missouri River of the Upper Little Missouri sub-basin have soils with marginal to high productivity indexes (PI). The remainder of the sub-basin is dominated by soils with poor PIs and are generally not suited to small grain production. The majority of the soils in the sub-basin are either sodium affected, shallow to weathered bedrock ,or hilly to very steep. They 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

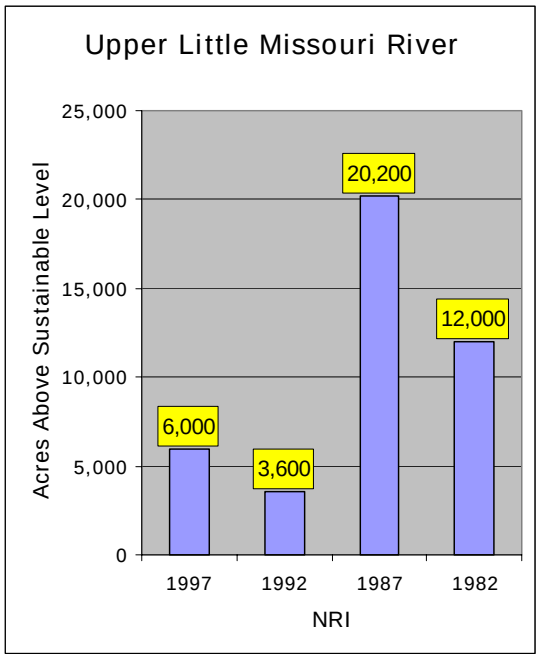
One of the goals of NRCS is to look at an area to help quantify the types and amounts of resources that may be of concern. This helps identify priority areas for the types and amounts of assistance given to a particular watershed.

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

Soil

- The HEL cropland acreage experiencing erosion rates above sustainable levels decreased to 6,000 acres in 1997, as compared to 20,200 acres in 1987.
- NRI estimates indicate there was a 71 percent reduction from 1987 to 1997 in the amount of Highly Erodible Land (HEL) being farmed.
- NRI estimates indicated a 1997 wind erosion rate of 8.0 tons/acre/year on all cultivated cropland.
- Organic matter depletion remains a resource concern due to conventional tillage systems.
- Natural and man-induce gully erosion continues to result in downstream sedimentation and loss of crop and range productivity.



Resource Concerns - Continued

Soil - Continued

- Streambank erosion occurs 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**[12] - There are no major named surficial underlying the Upper Little Missouri sub-basin. There are minor unnamed springs and aquifers that provide water for livestock and human consumption.
- **Wellhead Protection Areas**[13] – there are two protection areas located in the sub-basin. They are designated to protect the municipal water supply for the cities of Marmarth and Rhame.
- 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.
- The Little Missouri and its tributaries in this sub-basin have water quality impacts from sedimentation and siltation and their associated excessive nutrient loading.
- Lack of adequate riparian buffer width and health are impacting water quality and stream health.
- Salinity is excessive in part of the sub-basin, and is 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.

Resource Concerns - Continued

Plants

- Major concerns are controlling invasive weeds (downy brome, knapweed, 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.

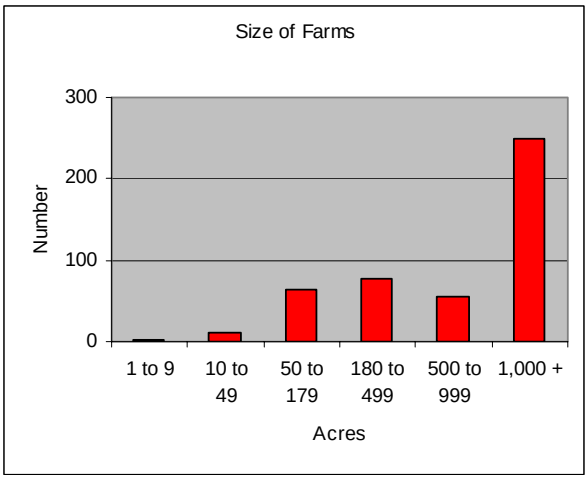
Federally Listed Threatened And Endangered Species			
Species Category	Threatened	Endangered	Candidate
Mammals	None	Black-footed Ferret Gray Wolf	None
Birds	None	Whooping Crane	None
Fish	None	None	None
Invertebrates	None	None	None
Plants	None	None	None
Critical Habitat – None			

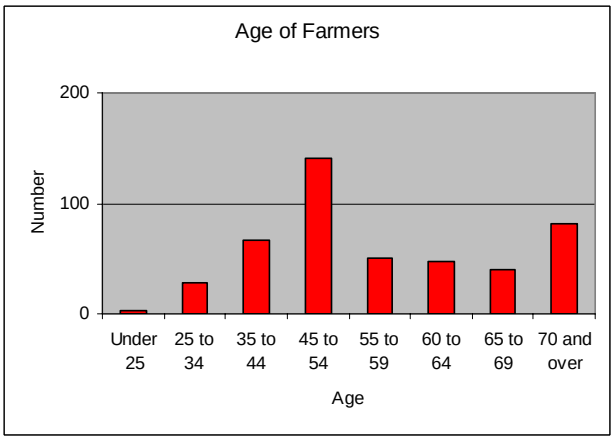
Census and Social Data[14]

Number of Farms: 100

Number of Operators:

- Average Age: 57
- Full-Time Operators: 69%
- Part-Time Operators: 31%





Limited Resource and Beginning Farmer

Approximately eight percent of the operators are minority producers. Limited Resource Farmers are 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.

References

[1] USDA-NRCS, NRI data.
[2] USDA-Farm Services Agency, Common Land Unit GIS data layer, 2005.
[3] USDA-Farm Services Agency, Common Land Unit GIS data layer, 2005.
[4] USDI-US Geologic Services, ND GAP analysis data, 2005.
[5] USDA-NRCS, Natural Resources Planning Staff, 30 meter Relief Data GIS data layer, 2002.
[6] ND Department of Health, Environmental Health Section, Water Quality Division, National Hydrography GIS layers, June 2006.
[7] 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.
[8] ND Department of Health, Environmental Health Section, Water Quality Division, Animal Feeding Operations Program data, 2006.
[9] 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.)
[10] USDA-NRCS, Natural Resources Planning Staff, Common Resource Area GIS data layer, 2004.
[11] USDA-NRCS, Natural Resources Planning Staff, Soils Productivity GIS data layer, 2006.
[12] ND Department of Health, Environmental Health Section, Water Quality Division, Ambient Ground Water Monitoring Program data, 1997.
[13] ND Department of Health, Environmental Health Section, Water Quality Division, Source Water Protection Program data, 2003.
[14] 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.)