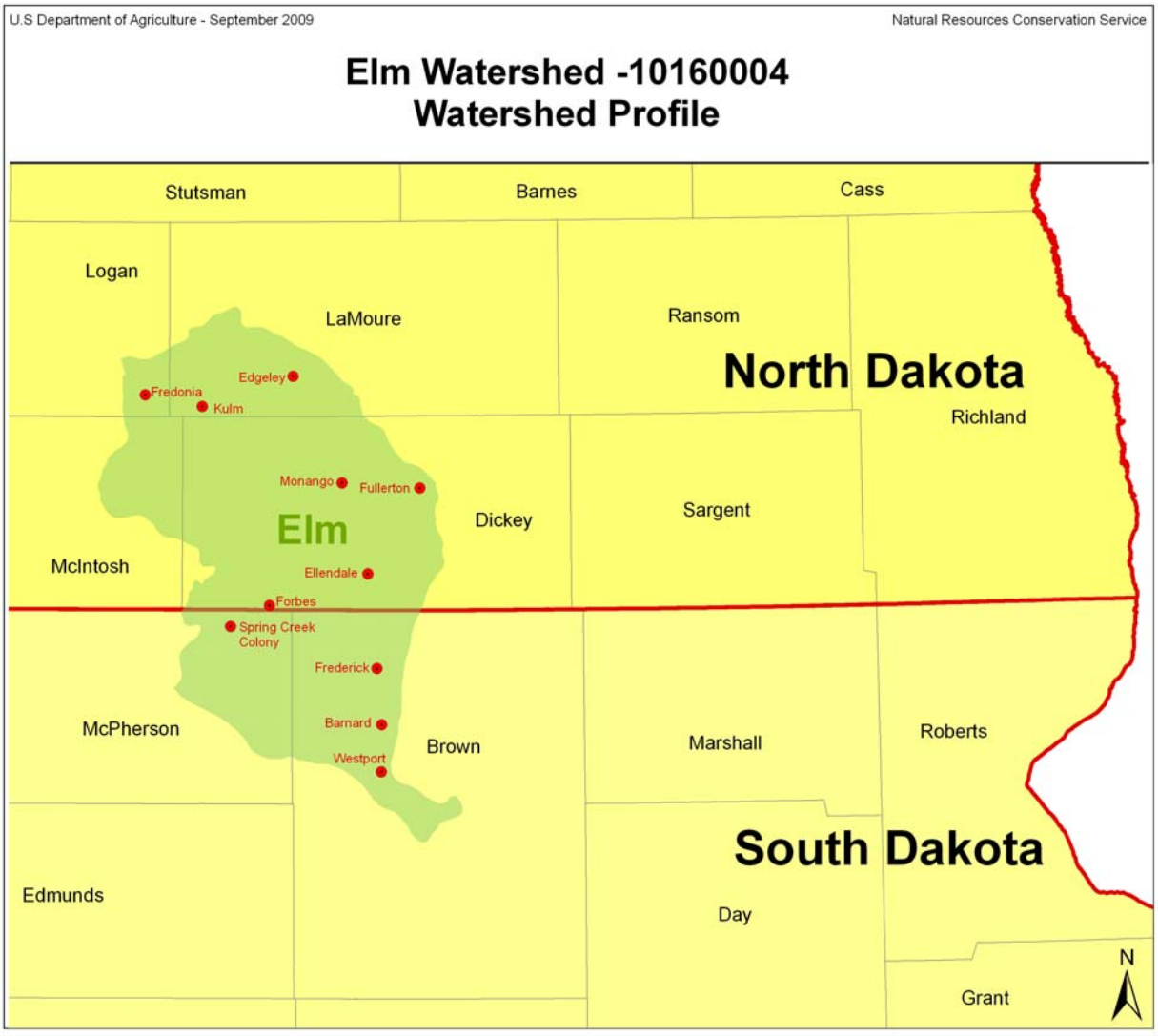
North Dakota
South Dakota

ELM - 10160004
8-DIGIT HYDROLOGIC UNIT PROFILE

USDA Natural Resources Conservation Service **September 2009**

NORTH DAKOTA AND SOUTH DAKOTA
Rapid Watershed Assessment



SEPTEMBER 2009

Produced by:
United States Department of Agriculture
Natural Resources Conservation Service

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USDA Natural Resources Conservation Service September 2009

Elm Watershed

North Dakota (ND) and South Dakota (SD)

Rapid Watershed Assessment Project

Sponsored by:

ND Association of Soil Conservation Districts

ND Department of Health

James River (Dickey County) Soil Conservation District

LaMoure County Soil Conservation District

Logan County Soil Conservation District

McIntosh County Soil Conservation District

SD Association of Conservation Districts

SD Department of Environment and Natural Resources

SD Department of Agriculture

SD Department of Game, Fish, and Parks

Brown/Marshall Conservation District

McPherson County Conservation District

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Executive Summary

A Rapid Watershed Assessment (RWA) document compiles existing resource information and data within a watershed and is used to assist conservation districts, landowners, and other community organizations and stakeholders to identify where conservation investments are best utilized and set resource conservation goals. The RWA contains summaries of resource concerns and opportunities that are useful for a number of resource conservation activities. Local landowners and organizations can use the RWA as a basis to prioritize resource concerns and estimate the technical and financial resources required to achieve their resource conservation goals within the watershed. The assessment provides information that can be used to develop conservation district annual and long-range plans, or establish a foundation for more detailed watershed, area wide, or site-specific natural resource planning and the development of implementation plans.

A RWA provides sufficient information to help facilitate making some key resource management decisions. The RWA:

- Provides a quick and inexpensive source of information on which to base decisions about conservation priorities, allocation of resources, funding for implementation, and how to report outcomes/results.
- Supplies enough detail to identify conservation activities that can be implemented without waiting on further watershed-level studies or analyses.
- Provides a preliminary source of information for standard environmental evaluations.
- Identifies if there is a need for further detailed analysis or watershed studies.
- Determines if there are infrastructure needs.
- Addresses multiple concerns and objectives of landowners and communities.
- Enhances established local, state, and federal partnerships.
- Enables landowners and communities to decide on the best mix of Natural Resources Conservation Service (NRCS) programs and other funding sources to meet their resource concerns/needs.
- Evaluates availability of conservation program tools (cost-share, easements, and technical assistance).

The RWAs consist of two parts: the watershed profile which provides the physical, biological, and sociological characterization of the watershed resources; and the watershed assessment which defines the identified resource concerns and evaluates the effectiveness, the extent, and the associated costs of the conservation practices that address the identified resource concerns.

The RWAs are developed based on the first six steps of the NRCS conservation resource planning process on a watershed scale. The information is general in nature and is not sufficiently detailed to be used in lieu of an area wide or watershed plan when the identified resource concerns require specific information, for example, flood prevention or control. However, the information does provide a solid starting point for local stakeholders to use should they decide to proceed with a more detailed area wide or watershed planning effort or the development of a watershed implementation plan using existing NRCS conservation programs.

North Dakota
South Dakota

ELM - 10160004
8-DIGIT HYDROLOGIC UNIT PROFILE

USDA Natural Resources Conservation Service (NRCS) September 2009

Rapid Watershed Assessment Contents
Part I Watershed Profile

I. WATERSHED PROFILE

1.0 PURPOSE

The watershed resource profile compiles the most recent, readily-available data which provides a physical, biological, and sociological characterization of watershed resources. The profile inventories the current resource health and condition of the soil, water, plants, animals, and social resources of a watershed and identifies the known resource concerns. The watershed profile also provides a brief overview of the social and economic composition of the watershed.

The profile summary of the resource conditions, concerns, and opportunities is useful for a number of conservation activities. Local landowners and organizations can use the information to prioritize resource concerns and estimate the technical and financial resources required to achieve resource conservation goals within the watershed. The information can be used to develop conservation district annual and long-range plans, establish a foundation for a more detailed watershed, area wide, or site-specific natural resource plan, or the development of an implementation plan.

2.0 INTRODUCTION

The Elm Watershed 8-Digit Hydrologic Unit Code (HUC) subbasin is approximately 1,053,400 acres located in four counties in south central ND and two counties of north central SD. The watershed counties include Dickey, LaMoure, Logan, and McIntosh in ND and Brown and McPherson counties in SD.

The dominant land use is cultivated cropland consisting of over 515,200 acres or 49 percent of the watershed. Cropland is primarily used to produce corn, winter wheat, spring wheat, soybeans, barley, and sunflowers. Alfalfa and grass hay are also produced and included in some crop rotations. Rangeland accounts for 239,900 acres or 23 percent of the watershed and pastureland, 73,400 acres, is seven percent of the watershed. Growing cash crops and hay, beef cattle production, and dairying are the main agricultural enterprises. Agricultural production is vital to the local economy.

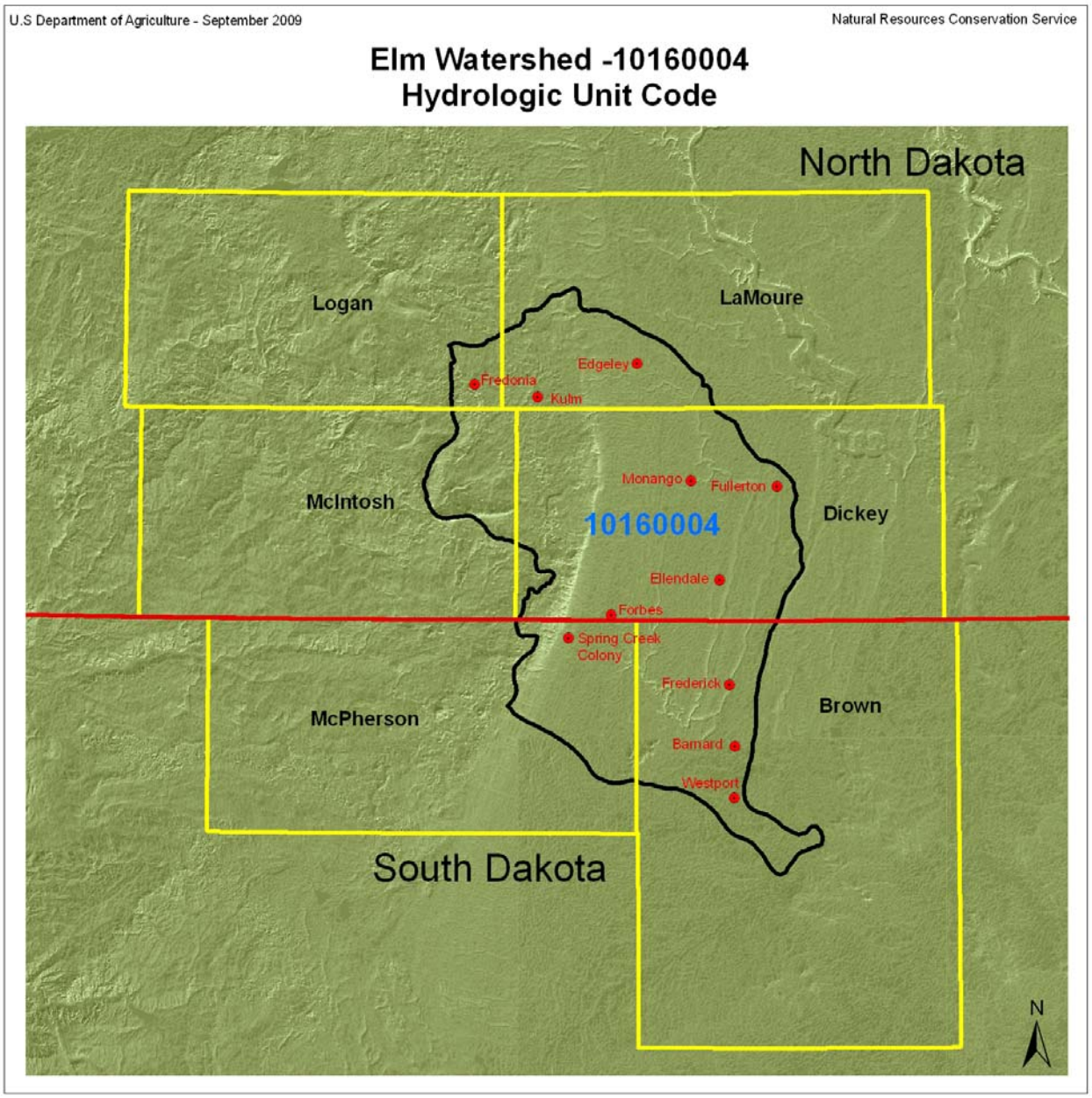
Conservation assistance is provided by six NRCS field office service centers, two field support/area offices, one Resource Conservation and Development (RC&D) Areas, one RC&D applicant area, and six soil conservation districts.

3.0 PHYSICAL DESCRIPTION

The physical description of the Elm subbasin provides a general description of the watershed location, geology, topography, precipitation, and climatic ranges.

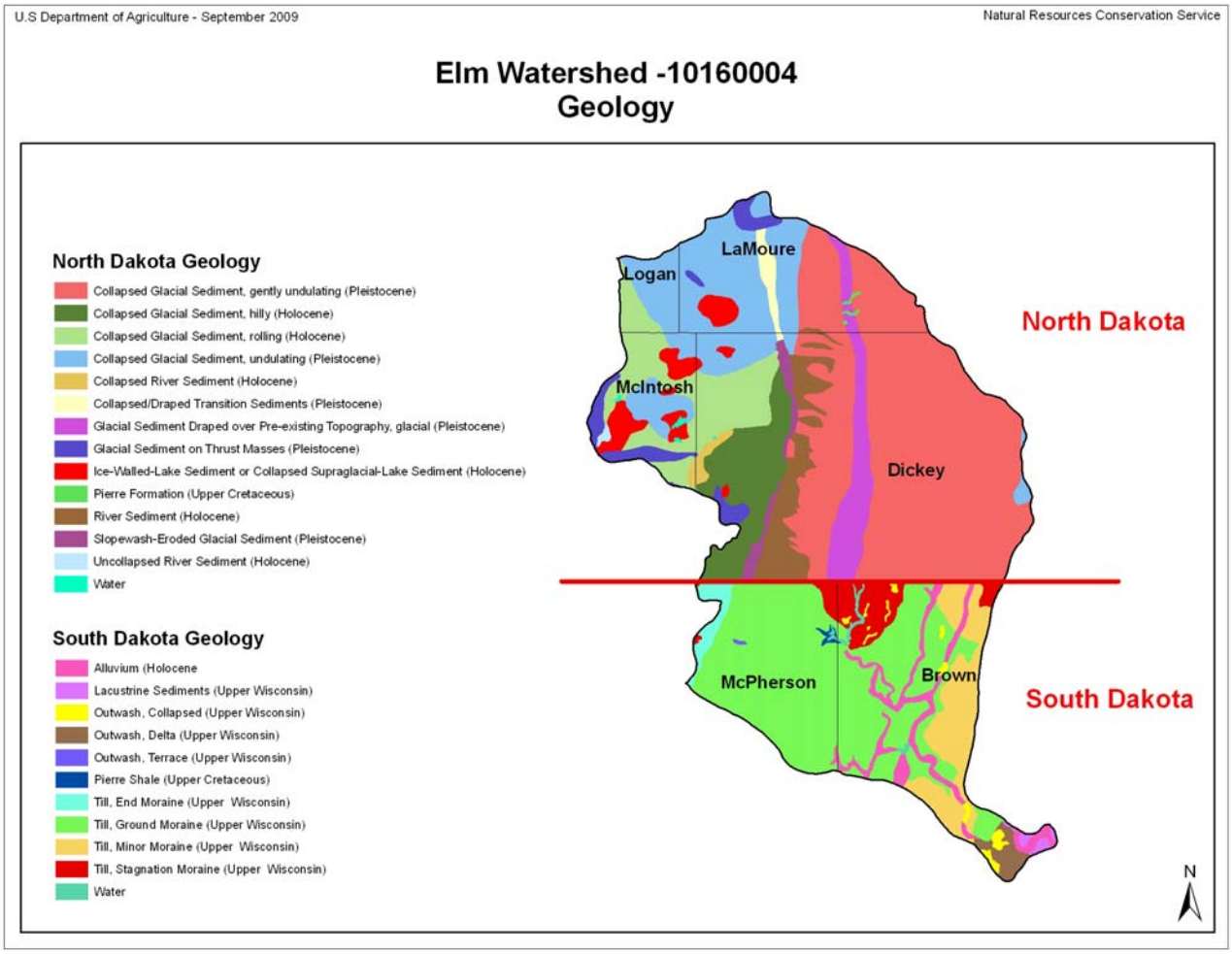
3.1 HYDROLOGIC UNIT CODE (HUC)[1]

A HU is part of a multi-level watershed mapping classification system. The HU boundaries are defined by hydrographic and topographic criteria used to delineate areas of land that contribute surface water runoff to a designated outlet point, such as a lake or stream segment. The United States Geological Survey (USGS) designates HU drainage areas as subwatersheds (including smaller drainages) numbered with 12-digit HUCs, nested within watersheds (10-digit HUCs). Watersheds are combined into larger drainage areas called subbasins (8 digits), basins (6 digits), and subregions (4 digits), which make up the large regional drainage basins (2 digits).



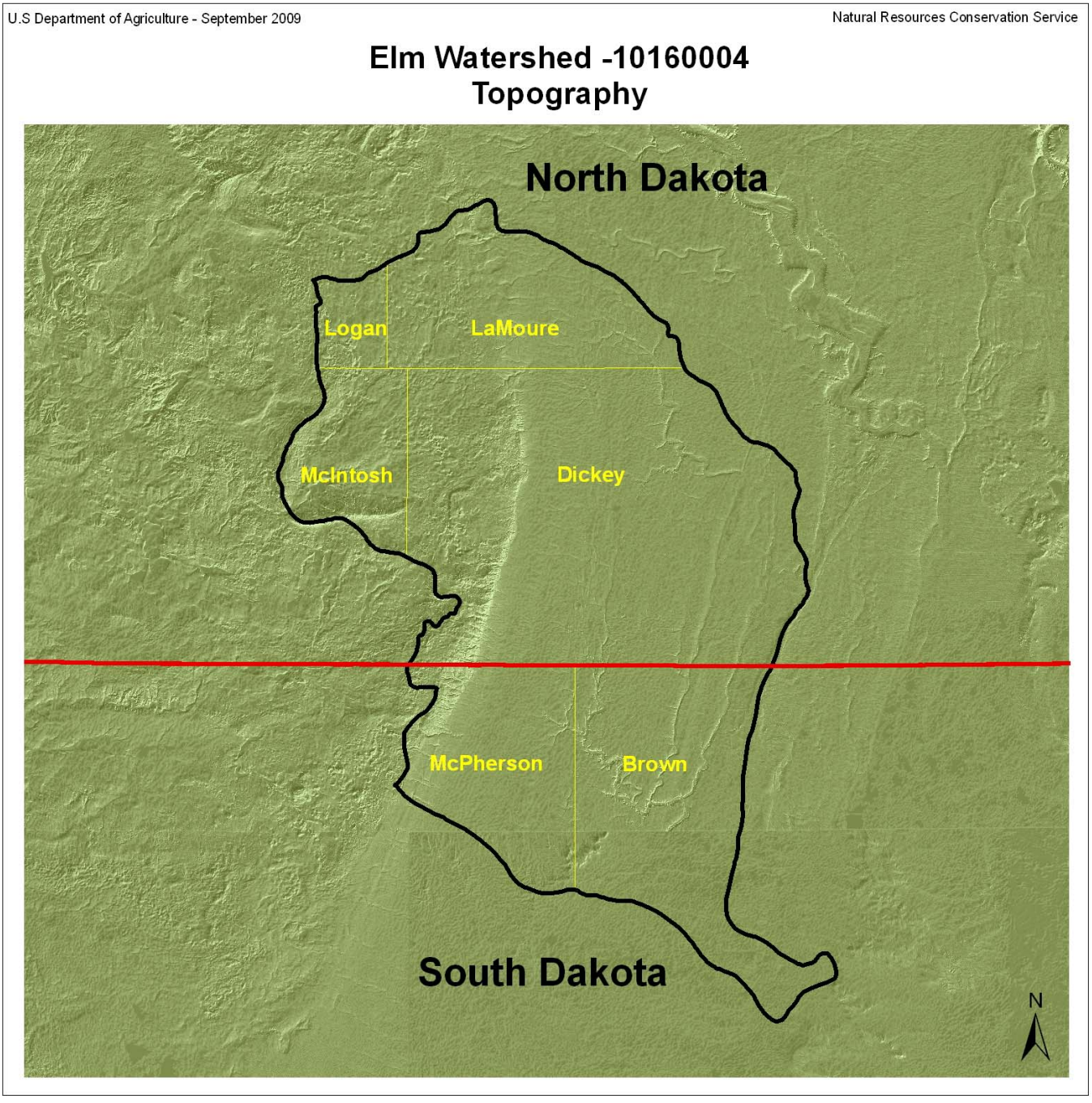
3.2 GEOLOGY[2] [3]

Precambrian metamorphic and igneous rock formations of granite, gneiss, limestone, sandstone, and shale underlie the entire watershed. Late Cretaceous sedimentary rocks of marine origin directly overlie the Precambrian bedrock. The surface geology of the watershed was formed by a series of Pleistocene glacial events. Glacial drift, the debris deposited by moving ice and glacial streams, determined the geologic features of the watershed. A sequence of glacial sediments (glacial till) was deposited directly from the ice as the glaciers advanced and retreated. The glacial till is generally an unconsolidated heterogeneous mixture of clay, silt, sand, gravel, and boulders ranging widely in size and shape. Thin sand and gravel layers occur erratically within and between the till layers. Glacial melt water streams formed localized, stratified deposits of well sorted clays, sands, and gravels (glacial outwash) as the glaciers receded. The glacial till commonly ranges between 100 and 300 feet thick, but may be in excess of 1,000 feet thick in some areas of the watershed. The upper 20 to 150 feet of the glacial till has been altered by weathering to gray smectitic clays.



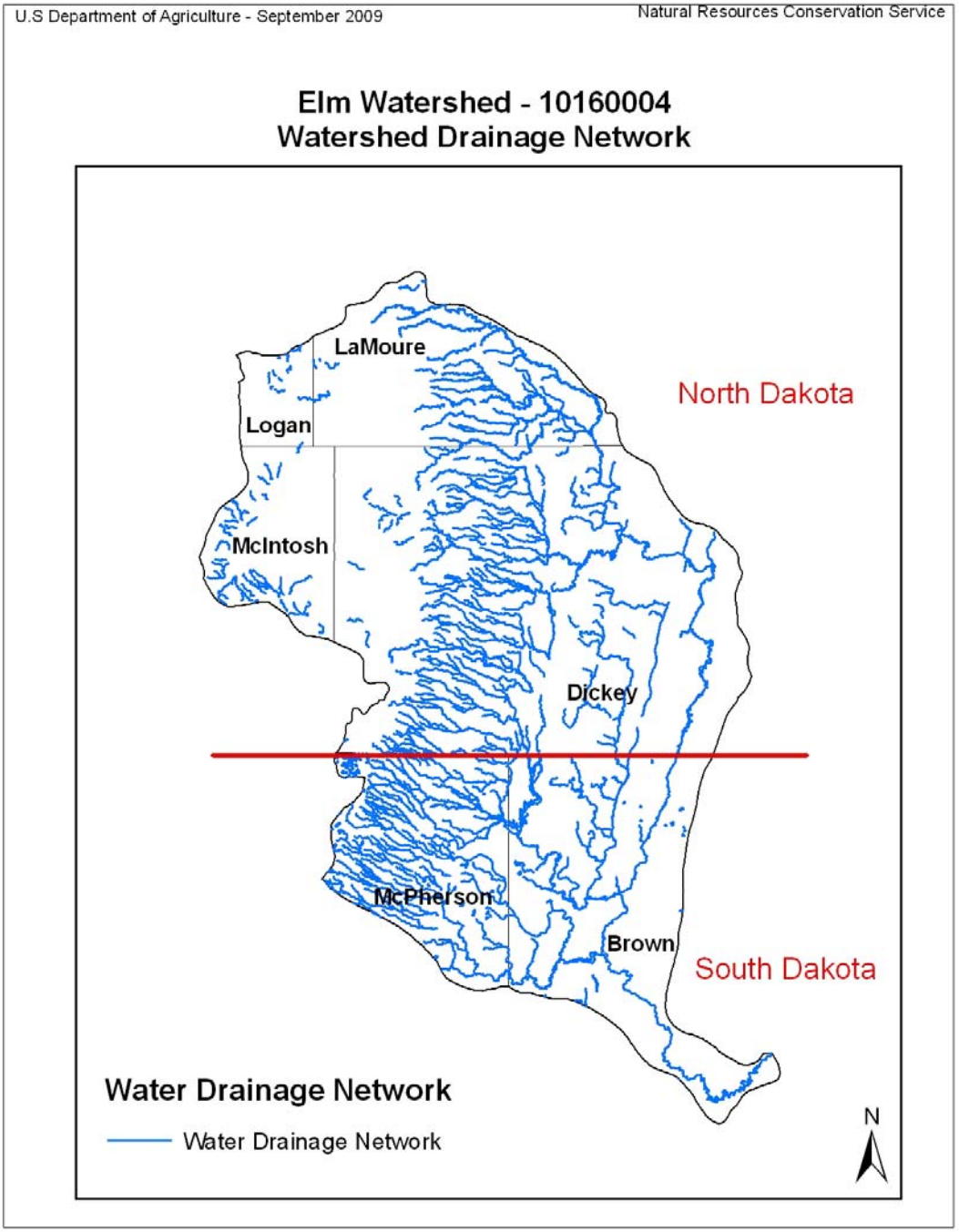
3.3 TOPOGRAPHY[1]

The Elm watershed is in the Central Lowlands Physiographic Province and lies within the James River Lowland division. The Elm River and Moccasin Creek are the main tributaries to the James River, the principal drainage system of the watershed. The major land forms in this area are the gently rolling hills in the glacial uplands and the nearly level alluvial flood plains along the rivers and streams.



3.4 DRAINAGE NETWORK

The drainage network is the pattern formed by the streams, rivers, and lakes in a watershed. The topography, geology, and slope of the watershed determine the characteristics of a particular drainage network.



3.5 CLIMATE

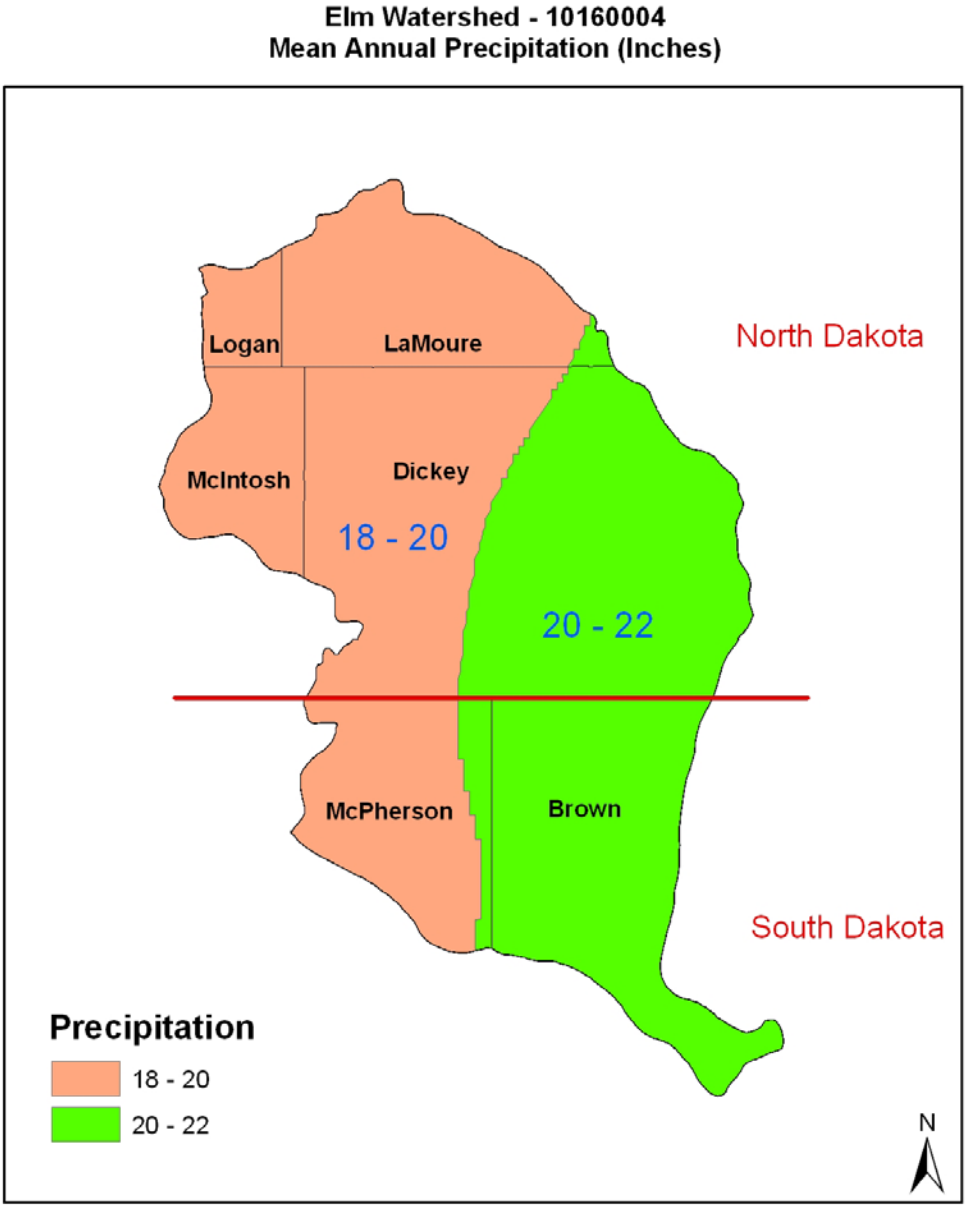
The climate of the Elm Watershed is semi-humid and continental, characterized by large seasonal fluctuations in temperature, long winters, warm summers with moderate to high relative humidity, and frequent high winds. Storms are generally of moderate intensity and short duration; localized convective, high intensity storms of short duration are common. Recurring periods of drought and near-drought conditions are common. Less frequently, periods of short duration yield higher than normal amounts of precipitation. Warm to hot summer months give way to cold winters. On the average, between 70 and 80 percent of the annual precipitation occurs from April through September, the growing season for most of the crops raised in the area, with the largest amount generally occurring in June. The average growing season ranges from 115 days to 130 days with the last killing frost in mid-May and the first killing frost in mid-September. Many freeze-thaw events occur in the fall and early spring.

It is estimated that more than 75 percent of the annual runoff occurs during the four-month period of March through June. The high runoff in March and April is usually from snowmelt while the runoff in May and June is from rainfall. Heavy runoff during the summer months is caused by brief, intense thunderstorms. Annual runoff can vary widely from year to year; the average annual runoff totals 1.25 inches. Most of the tributaries will show periods of low or no flow almost every year during the fall and winter months.

The historical data records for average temperature, wind speed, and relative humidity data used to represent the watershed are from the Aberdeen, SD, municipal airport, and the U.S. Weather Bureau Station at Ellendale, ND, which is centrally located in the watershed.

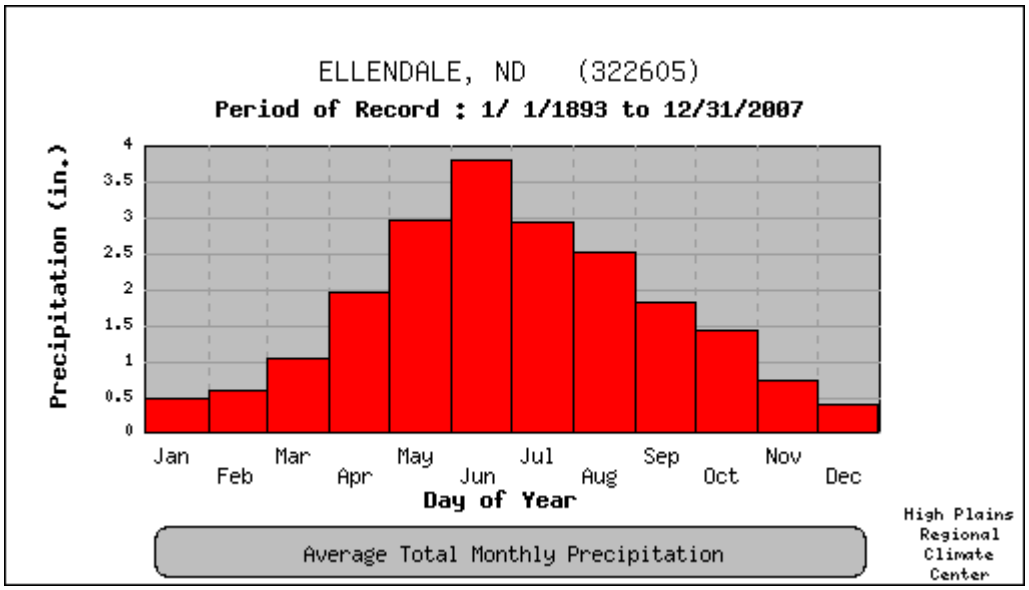
3.5.1 Precipitation[4]

The average annual precipitation for the watershed area is 20 inches per year measured at the U.S. Weather Bureau Station at Ellendale, ND.



3.5.1a Precipitation Distribution Graph

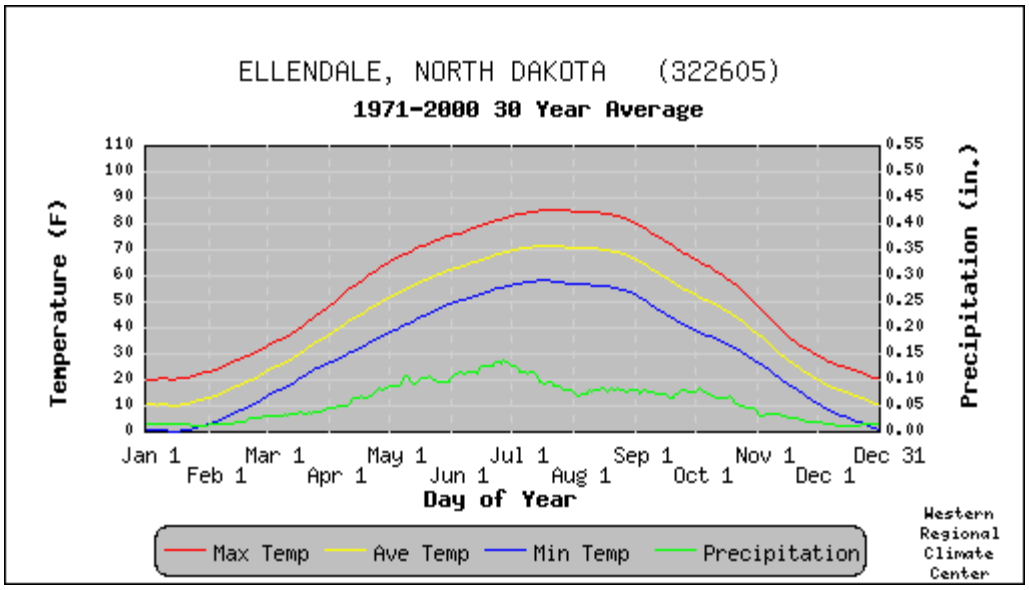
Period of Record - Monthly Average Total Precipitation



- Average precipitation recorded for the month.

3.5.2 Average Monthly Temperature[5]

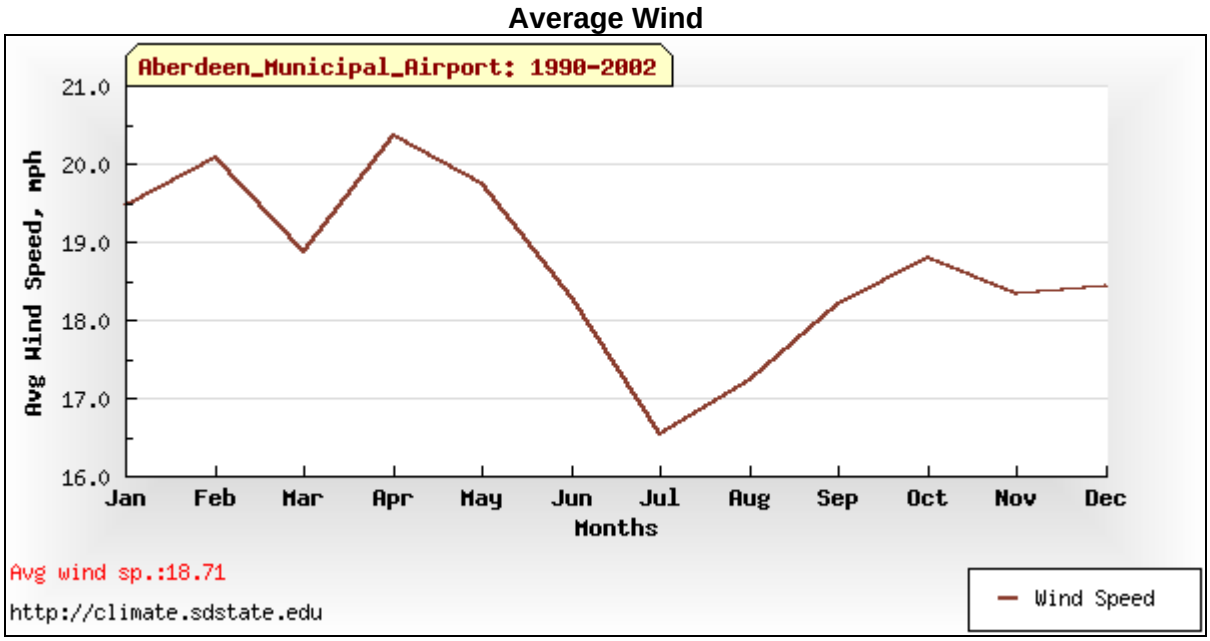
Temperatures vary considerably throughout the year. The average winter temperature is 19 degrees F and the average summer temperature is 72 degrees F. Extreme temperatures for the year often range from below zero in the winter to an occasional 100 plus degree summer day.



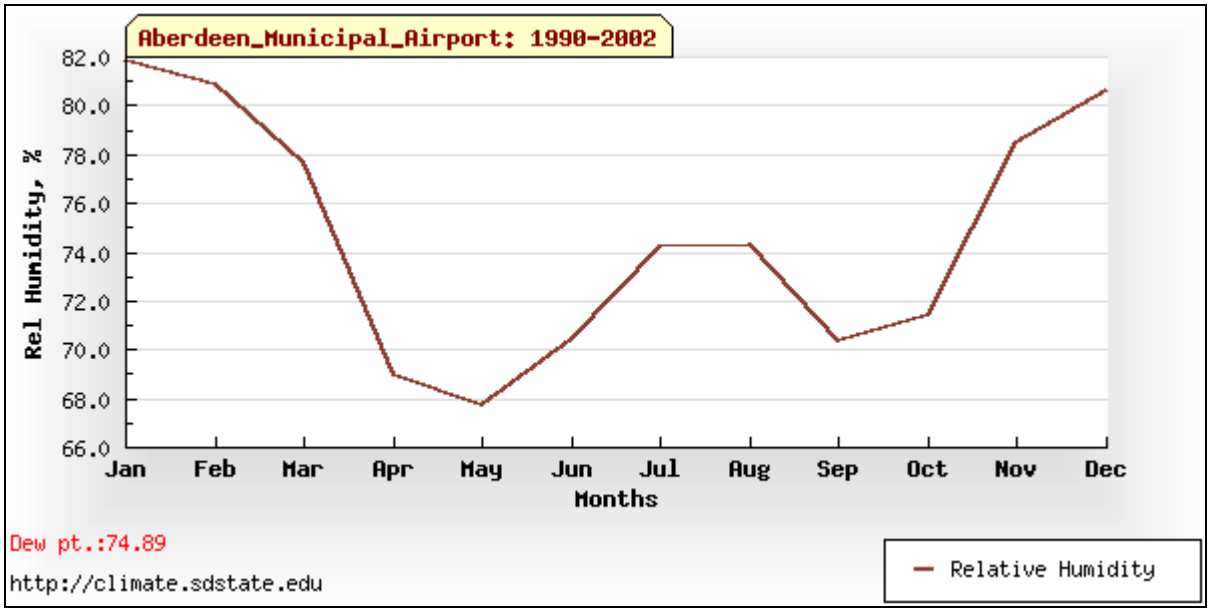
Data is smoothed using a 29 day running average.

- Maximum Temp. is the average of all daily maximum temperatures recorded for the day of the year between the years 1971 and 2000.
- Average Temp. is the average of all daily average temperatures recorded for the day of the year between the years 1971 and 2000.
- Minimum Temp. is the average of all daily minimum temperatures recorded for the day of the year between the years 1971 and 2000.
- Precipitation is the average of all daily total precipitation recorded for the day of the year between the years 1971 and 2000.

3.5.3 Average Monthly Wind Speed[5]

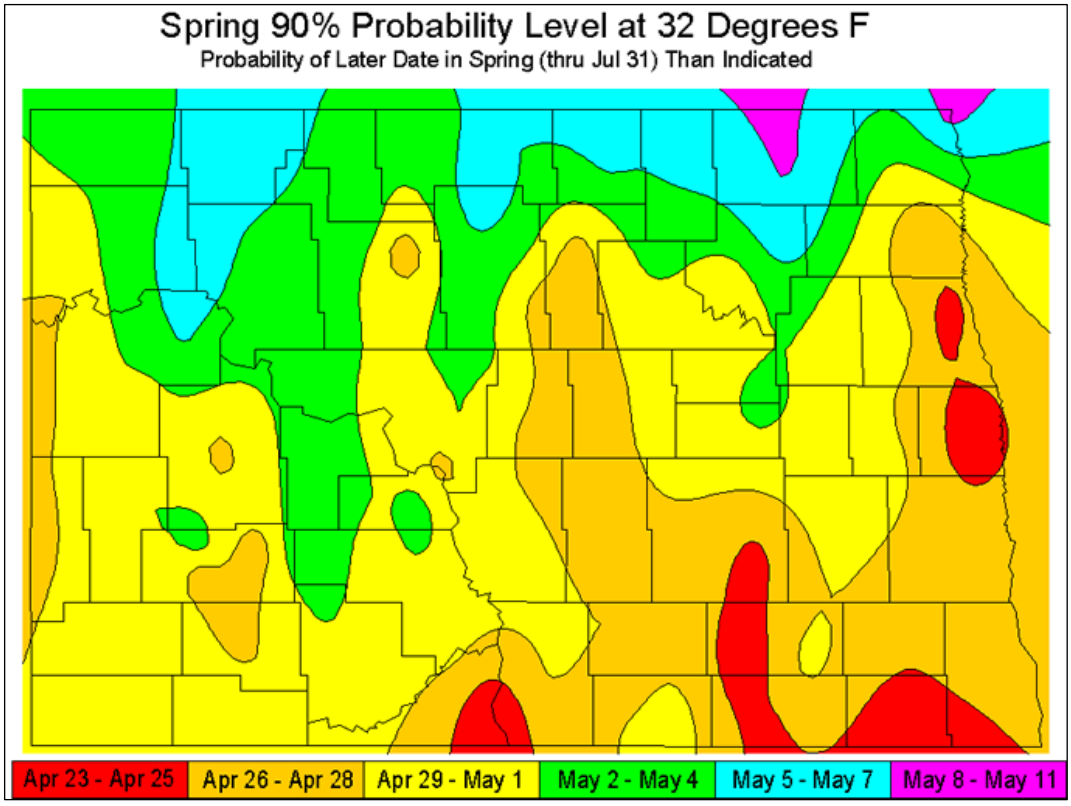


3.5.4 Average Monthly Relative Humidity[5]

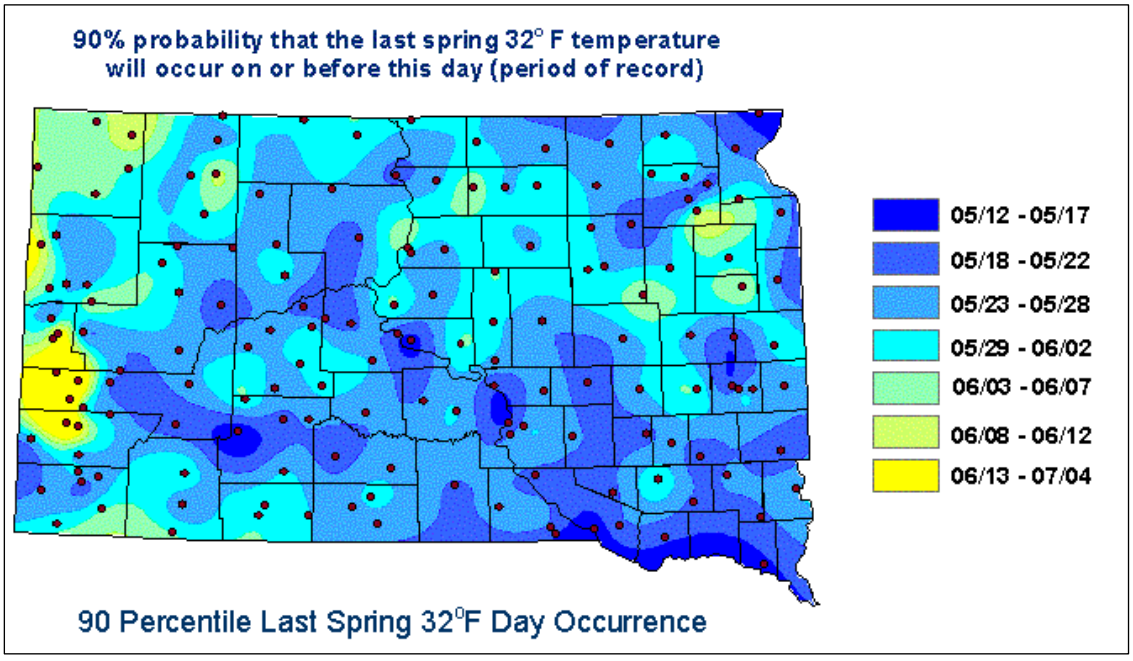


3.5.5 Last Spring Freeze[5,6]

North Dakota



South Dakota



3.5.6 First Fall Freeze[5 6]

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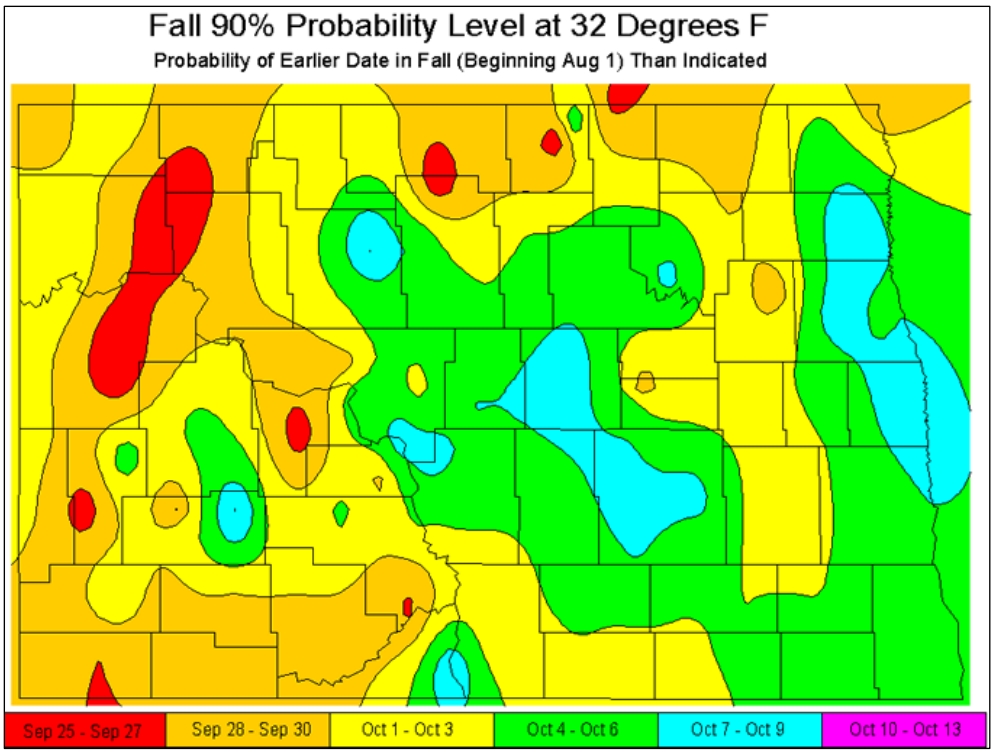

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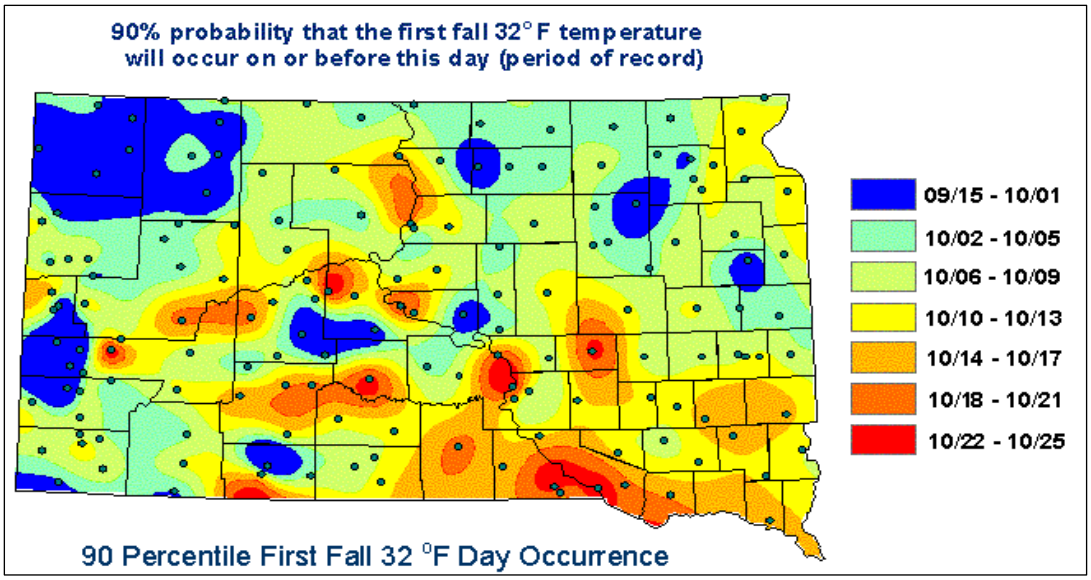


3.5.7 Climate Summary[7]

Overall monthly climatic summary of temperature and precipitation averages for the watershed.

ELLENDALE, ND (322605)
Period of Record Monthly Climate Summary

Period of Record: 1/ 1/1893 to 12/31/2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	20.7	25.6	38.4	56.6	69.7	78.3	84.9	83.7	73.4	60.2	39.4	26.0	54.8
Average Min. Temperature (F)	-0.1	4.6	17.7	31.7	43.1	53.0	58.0	56.0	45.5	34.1	19.3	6.4	30.8
Average Total Precipitation (in.)	0.47	0.54	1.01	1.93	2.87	3.70	2.81	2.41	1.81	1.39	0.71	0.39	20.03
Average Total SnowFall (in.)	6.5	6.0	7.3	4.0	0.2	0.0	0.0	0.0	0.1	0.9	5.8	4.9	35.6
Average Snow Depth (in.)	5	5	2	0	0	0	0	0	0	0	1	3	1

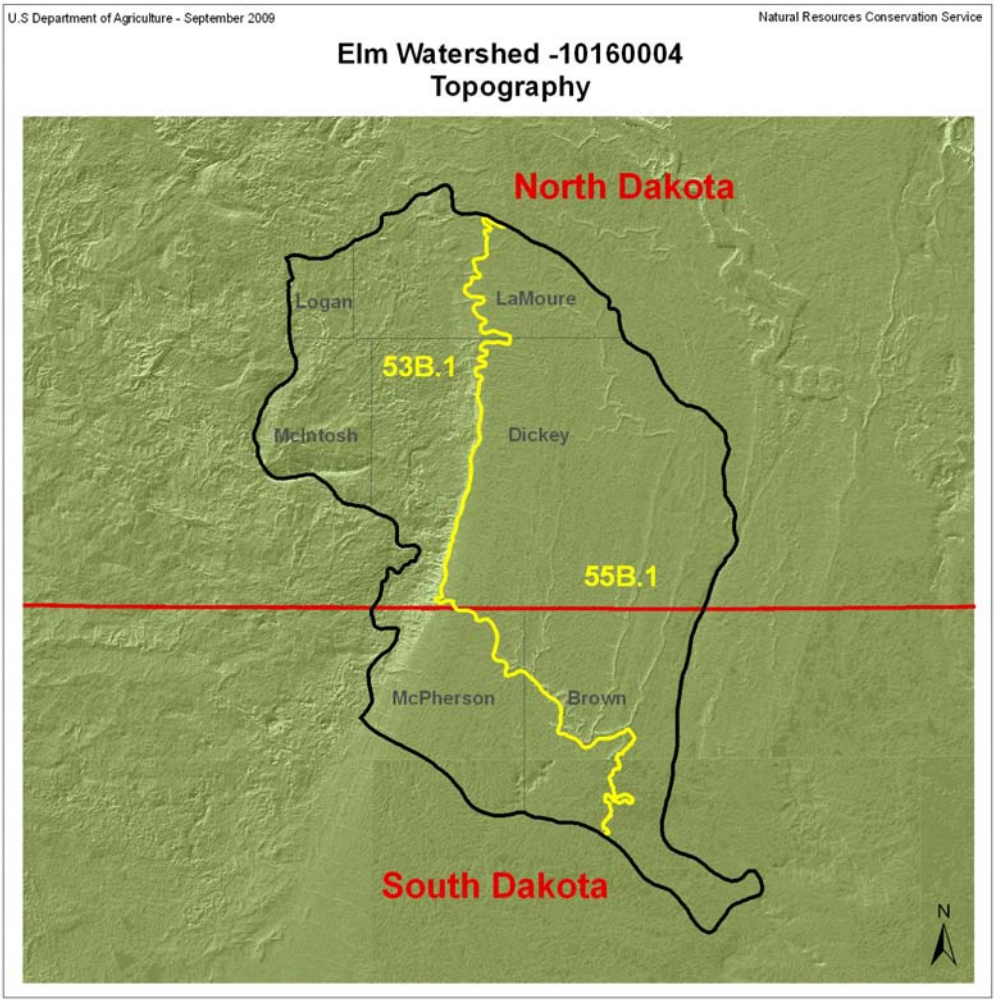
High Plains Regional Climate Center

4.0 RESOURCE INVENTORY

The resource inventory provides a general summary of the existing conditions of the natural resources in the watershed that are related to the soil, water, animals, plants, air, and humans (SWAPA+H). The resource descriptions provide general information on land use, land capability, soils and productivity, and prime farmland.

4.1 MAJOR LAND RESOURCE AREAS (MLRA) AND COMMON RESOURCE AREA (CRA)[1]

The MLRAs are a part of a USDA classification system that defines land as a resource for farming, ranching, forestry, engineering, recreation, and other uses. The MLRA is a broad-based geographic area characterized by a uniform pattern of soils, elevation, topography, climate, water resources, potential natural vegetation, and land uses. Large MLRAs may be further subdivided to create smaller more homogeneous resource areas. The CRAs are the basic unit of an MLRA, a subdivision based on significant geographic differences in climate, water resources, or land use and resource concerns where resource problems or treatment needs are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a CRA. In both ND and SD, the MLRA and CRA boundaries coincide.

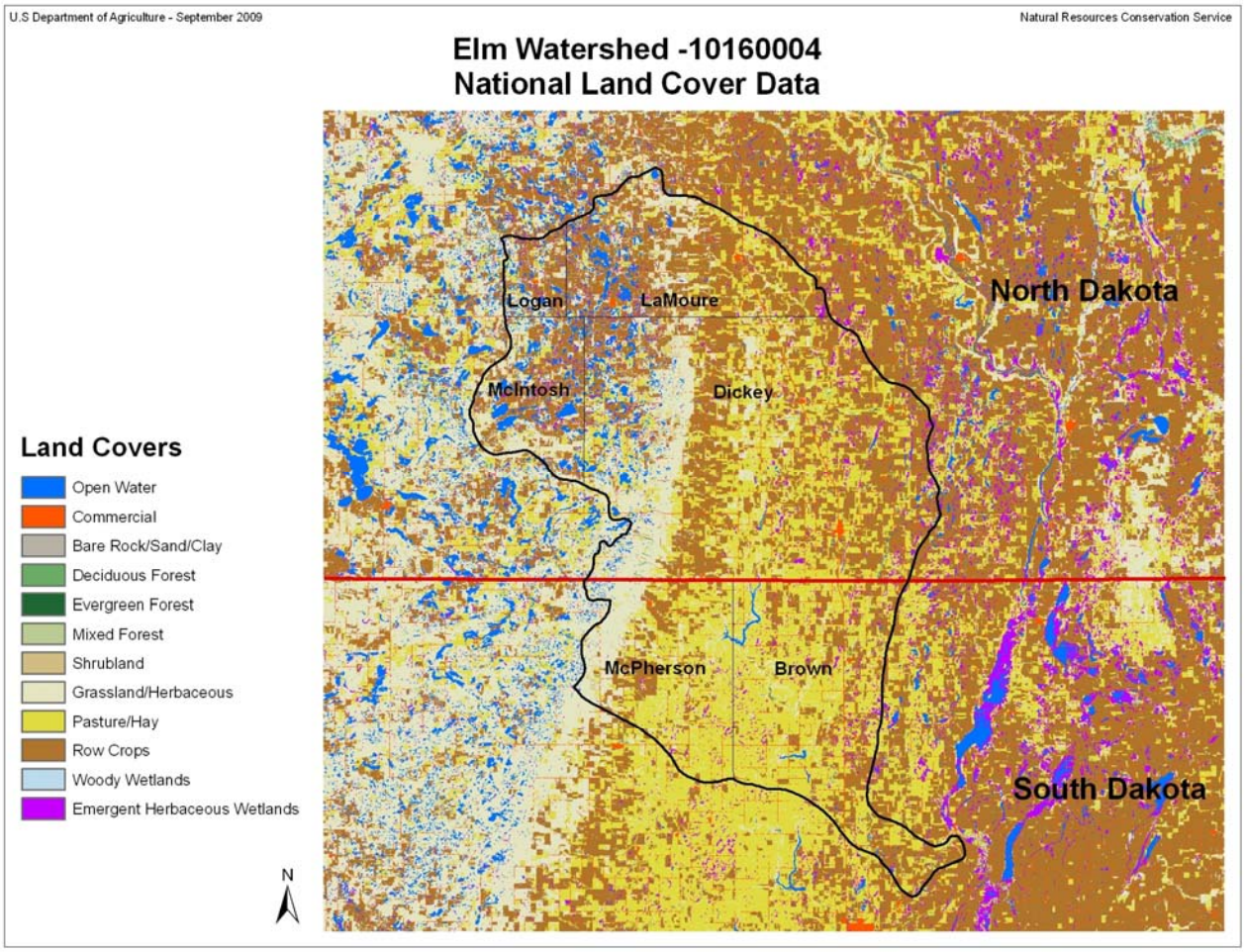


4.1.1 Common Resource Area Descriptions

Symbol	Name	Brief Description
53B.1	Central Dark Brown Glaciated Plains	Most of this area is in cropland with the major crops being small grain and sunflowers. The more sloping soils are used for livestock grazing. This area is nearly level to rolling till plains. Moderately steep and steep slopes are adjacent to the major streams. Most of the soils are deep, well-drained, and medium textured with a frigid temperature regime and mixed mineralogy.
55B.1	Central Black Glaciated Plains	About seventy percent of this area is used for cropland. The principal crops are small grain, corn, soybeans and sunflowers. Most of this area is nearly level to undulating till plains with some areas consisting of glacial lake plains. Most of the soils are deep, well-drained and moderately well-drained, sandy to clayey and have a frigid temperature regime.

4.2 LAND COVER AND LAND USE DISTRIBUTION[8]

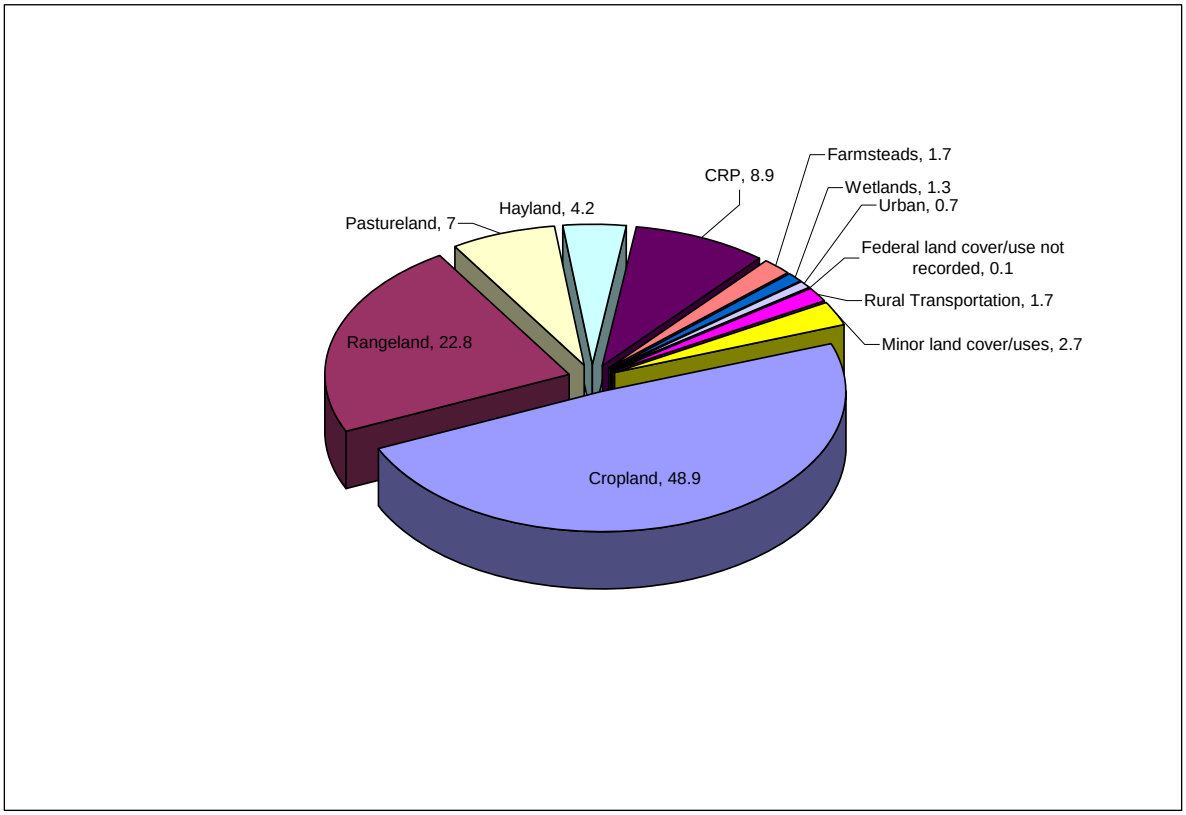
The National Resources Inventory (NRI) uses the term land cover/use to identify the categories that account for all the surface area in the United States. Land cover describes the different types of vegetation or other kind of material that covers the land surface. Land use is defined as the purpose of human activity on the land, it is usually, but not always, related to land cover.



4.2.1 Land Cover and Land Use Summary

Elm Watershed Land Cover/Use (1997 NRI)*	Acres	Percent
Cropland	515,200	49
Rangeland	239,900	23
Pastureland	73,400	7
Hayland	43,800	4
Forestland	0	0
CRP	93,300	9
Farmsteads	18,100	2
Wetlands	14,200	1
Urban	7,900	1
Federal land cover/use not recorded	1,200	<1
Rural Transportation	17,800	2
Minor land cover/uses	28,600	3
Totals	1,053,400	100

*Rounded to the nearest whole number.



Primary Land Uses [NRI-97]

Cropland - A land cover/use category that includes areas used for the production of adapted crops for harvest. Two subcategories of cropland are recognized: cultivated and noncultivated. Cultivated cropland consists land in row crops or close-grown crops and other cultivated cropland, for example, hayland or pastureland that is in a rotation with row or close-grown crops. Noncultivated cropland includes permanent hayland and horticultural cropland.

Pastureland –A land use category managed primarily for the production of introduced or native forage plants for livestock grazing. Pastureland may consist of one species in a pure stand, a grass mixture, or a grass-legume mixture. Management consists of cultural treatments; fertilization, weed control, reseeding or renovation, and controlled grazing. For NRI, this includes land that has a vegetative cover of grasses, legumes, and/or forbs, regardless of whether or not it is being grazed by livestock.)

Hayland - A subcategory of cropland managed for the production of forage crops that are machine harvested. These crops may be grasses, legumes, or a combination. Hayland also includes land in set-aside or other short-term agricultural programs. [NRI-97]

Rangeland - A land cover/use category on which the climax or potential plant cover is composed principally of native grasses, grasslike plants, forbs or shrubs suitable for grazing and browsing, and introduced forage species that are managed like rangeland. This would include areas where introduced hardy and persistent grasses, such as crested wheatgrass, are planted and such practices as deferred grazing, burning, chaining, and rotational grazing are used, with little or no chemicals or fertilizer being applied. Grasslands, savannas, many wetlands, some deserts, and tundra are considered to be rangeland. Certain communities of low forbs and shrubs, such as mesquite, chaparral, mountain shrub, and pinyon-juniper, are also included as rangeland. [NRI-97]

Urban and built-up –Land that is used for residential, industrial, commercial, and institutional land; construction sites; public administrative sites; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures and spillways; small parks (less than 10 acres) within urban and built-up areas; and transportation facilities if they are surrounded by urban areas. This also includes tracts of less than 10 acres that do not meet the above definition but are completely surrounded by urban and built-up land. Two size categories are recognized in the NRI: (i) areas 0.25 to 10 acres, and (ii) areas greater than 10 acres. [NRI-97]

Minor land cover/use includes farmsteads, farm structures, field windbreaks, barren land, and marshland.

Federal land - A land ownership category designating land that is owned by the federal government. It does not include Trust lands administered by the Bureau of Indian Affairs. No data is collected for any year that land is in this ownership category.

Rural transportation land consists of all highways, roads, railroads, and associated right-of-ways outside urban and built-up areas*;* also includes private roads to farmsteads or ranch headquarters, logging roads, and other private roads (field lanes are not included).

Conservation Reserve Program - (CRP) land is highly erodible or other environmentally sensitive acreage normally devoted to crop production which is converted to long-term vegetative cover.

4.2.2 Land Capability Class (LCC)[1]

Land capability classification (LCC) is a system of grouping soils primarily on the basis of their ability to produce common cultivated crops and pasture plants without the deterioration of the soil resource over a long period of time. The LCC reflects the physical and chemical properties, along with the topographic relief of a soil. The LCC can be used as a guide for land management decisions based on the capability or limitations of the soil.

Land Capability Class (1997 NRI Estimate)	**Acres**	**Percent**
I - slight limitations	0	0
II - moderate limitations	542,300	52
III - severe limitations	221,300	21
IV - very severe limitations	88,300	8
V - no erosion hazard, but other limitations	3,400	0
VI - very severe limitations, unsuited for cultivation, limited to pasture, range, forest	95,300	9
VII - very severe limitations, unsuited for cultivation, limited to grazing, forest, wildlife	39,100	4
VIII – misc. areas have limitations, limited to recreation, wildlife, and water supply	15,300	1
Other Acres Not Determined – includes water, rock outcrop, non-soil areas	48,000	5
Total Acres	1,053,000	100

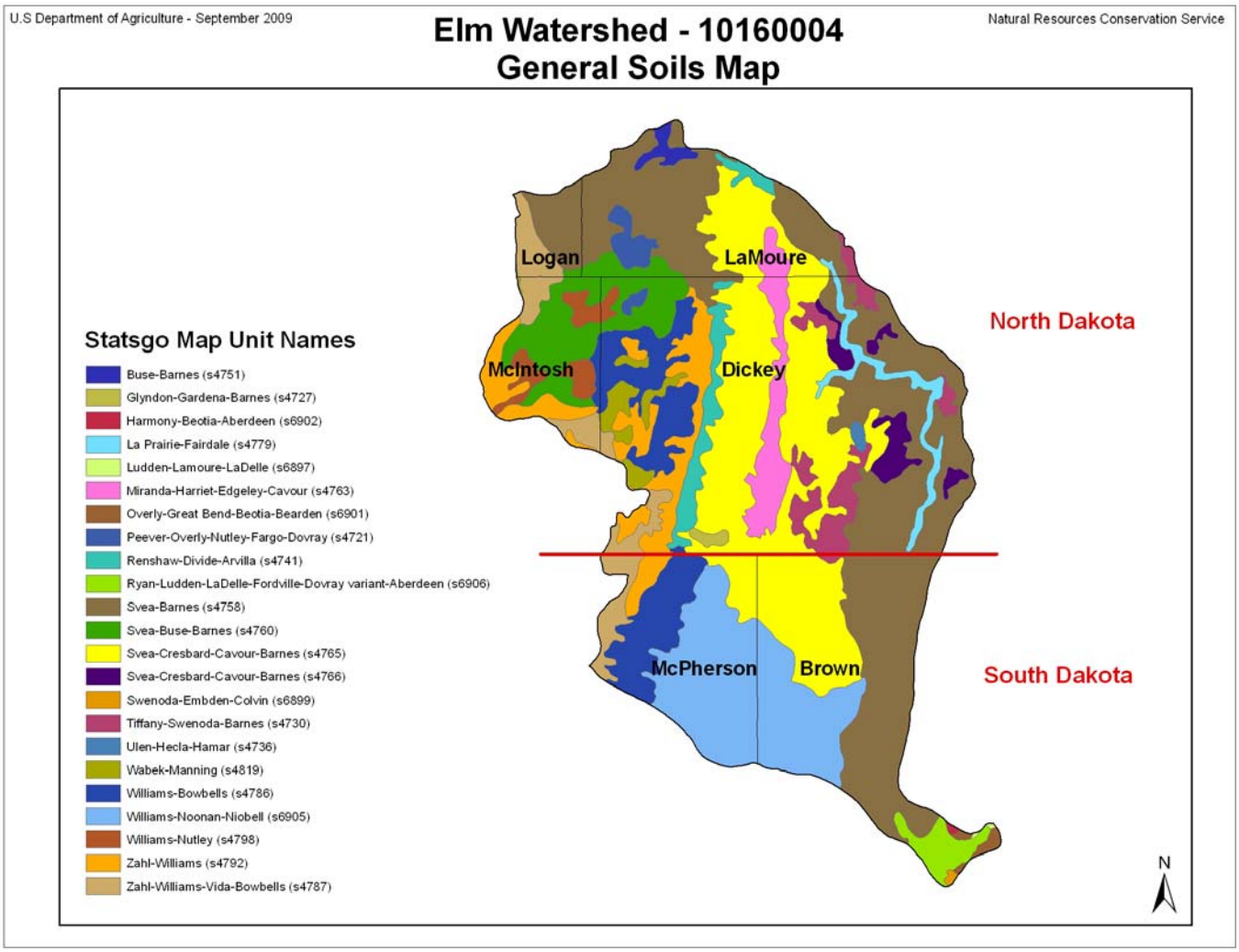
4.2.3 Prime Farmland[1]

Prime farmland, as defined by the USDA, is land that has the best combination of physical and chemical characteristics for food, feed, forage, fiber, and oilseed crop production. It must also be available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. Prime farmland soils are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

Prime Farmland 1997 NRI	**Acres**	**Percent**
Total Acres Prime Farmland	316,020	30
Other Acres	737,380	70

4.3 GENERAL SOILS

Most of the soils in the watershed were formed in the exposed glacial materials which were eroded, transported, and deposited by the repeated movement of ice across the region. The formation of soils is influenced not only by geologic forces but also topographic relief. Factors such as drainage, runoff, erosion, plant cover, and soil temperature cause soils to develop with certain characteristics and qualities.



4.3.1 General Soil Descriptions

Soils in the watershed have been placed into 23 broad groups or associations that are geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit. Each soil association has a distinctive pattern of soils, relief, drainage, and natural landscape. The dominant soils within the watershed are loamy and silty soils formed in glacial till on the uplands, loamy soils over sand and gravel on the outwash plains, and clayey and silty soils formed in alluvium on the floodplains and low terraces.

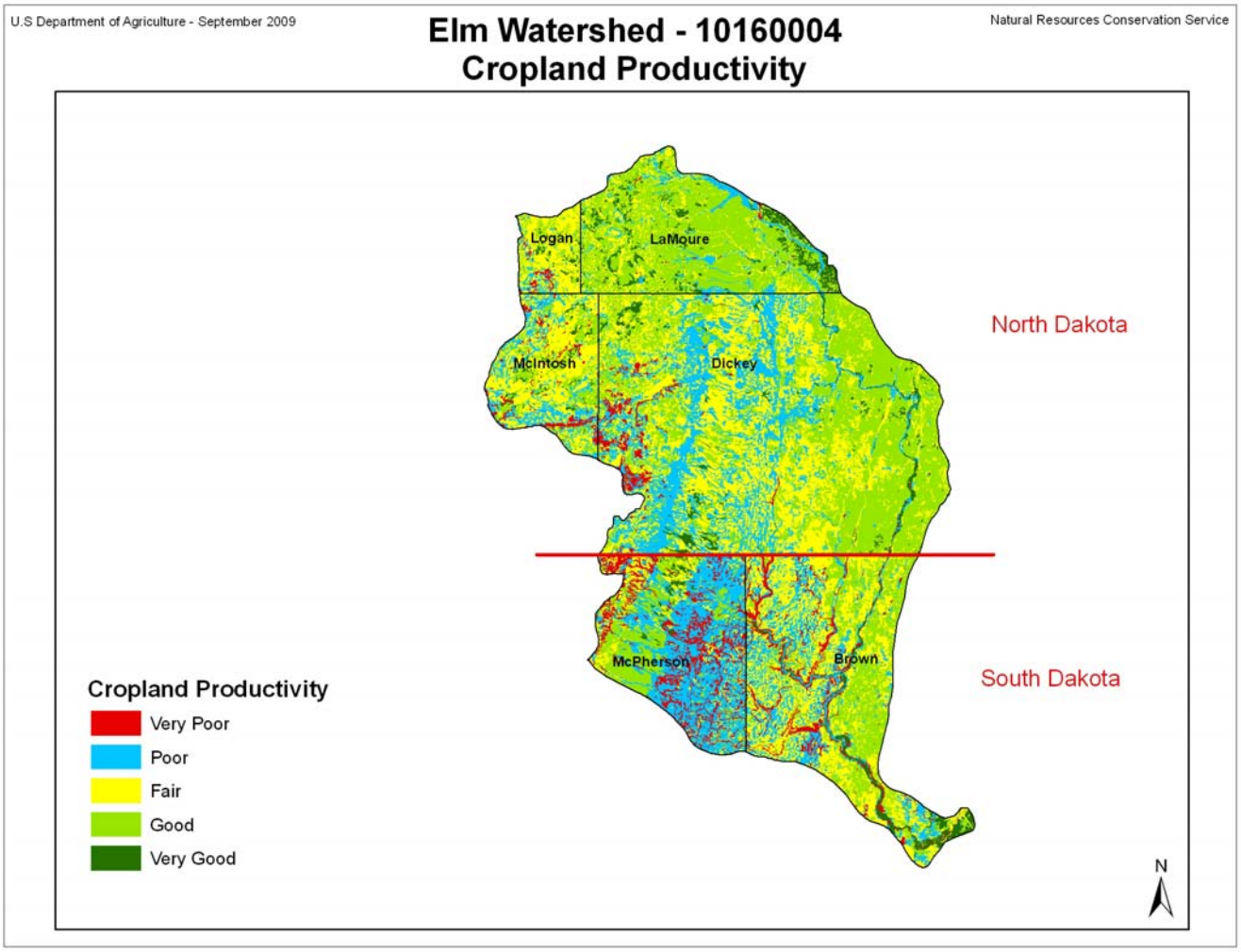
More detailed information on individual soils is available in the published county soil survey reports. The accompanying map is of a general nature and is not intended for any type of intensive planning and management.

Map Unit Identification	Statsgo Soil Association Name	General Soils Description
s4751	Buse-Barnes	Very deep, well-drained, well-drained, undulating to steep, loamy soils on glacial till plains.
s4727	Glyndon-Gardena-Barnes	Very deep, somewhat poorly to well-drained, level to undulating loamy and silty soils on till plains.
s6902	Harmony-Beotia-Aberdeen	Very deep, well and moderately well-drained, level to gently sloping loamy and clayey soils on glacial lake plains.
s4779	La Prairie-Fairdale	Very deep, moderately drained, level and nearly level, loamy soils on drainage ways.
s6897	Ludden-Lamoure-LaDelle	Very deep, very poorly drained to moderately well-drained, level to nearly level, clayey and silty soils formed in alluvium on flood plains and low terraces.
s4763	Miranda-Harriet-Edgeley-Cavour	Moderately deep to very deep, poorly to well-drained, level to gently sloping, loamy soils on glacial till plains.
s6901	Overly-Great Bend-Beotia-Bearden	Very deep, well to somewhat poorly drained, level to very gently sloping silty soils on glacial lake plains.
s4721	Peever-Overly-Nutley-Fargo-Dovray	Very deep, poorly to well-drained, level to gently sloping fine textured soils on lake plains.
s4741	Renshaw-Divide-Arvilla	Very deep, somewhat poorly to well-drained, level to gently sloping, loamy over sand or loamy over sand and gravel soils on outwash plains.
s6906	Ryan-Ludden-LaDelle-Fordville-Dovray variant-Aberdeen	Very deep, moderately well-drained to very poorly drained, level and nearly level, clayey and silty soils, on terraces and floodplains.
s4758	Svea-Barnes	Very deep, well-drained to moderately well-drained, level to gently rolling, loamy and clayey soils, on till plains and glacial lake plains.
s4760	Svea-Buse-Barnes	Very deep, moderately well to well-drained, nearly level to gently rolling, loamy soils on glacial till plains.
s4765	Svea-Cresbard-Cavour-Barnes	Very deep, moderately well to well-drained, nearly level to gently rolling, loamy soils on glacial till plains.
s4766	Svea-Cresbard-Cavour-Barnes	Very deep, moderately well to well-drained, nearly level to gently rolling, loamy to clayey soils on glacial till plains.
s6899	Swenoda-Embden-Colvin	Very deep, well-drained to very poorly drained, level to gently sloping, loamy and silty soils on glacial lake plains.

Map Unit Identification	Statsgo Soil Association Name	General Soils Description
s4730	Tiffany-Swenoda-Barnes	Very deep, poorly to well-drained, level to undulating, loamy soils on till plains.
s4736	Ulen-Hecla-Hamar	Very deep, poorly to moderately well-drained, level to gently sloping, sandy soils on eolian sand plains.
s4819	Wabek-Manning	Deep, well-drained to excessively drained, nearly level to strongly sloping loamy soils on outwash plains and terraces.
s4786	Williams-Bowbells	Very deep, moderately well to well-drained, level to undulating, loamy soils on glacial till plains.
s6905	Williams-Noonan-Niobell	Very deep, well-drained and moderately well-drained, level to gently sloping loamy soils on glacial till plains.
s4798	Williams-Nutley	Very deep, well-drained, nearly level to moderately sloping, loamy and clayey soils on ice walled lakes on glacial till plains.
s4792	Zahl-Williams	Very deep, well-drained, gently sloping to steep, loamy soils on glacial till plains.
s4787	Zahl-Williams-Vida-Bowbells	Very deep, moderately well to well-drained, level to gently rolling, loamy soils on glacial till plains.

4.4 CROPLAND PRODUCTIVITY[1]

Cropland Productivity Index (CPI) is a rating assigned to each soil map unit to rate the soil for cropland production. The rating is based on a scale of 1 to 100, with 100 being the most productive map unit in the county. The CPI assigned to each map unit is based on the physical and chemical properties of each soil type in the map unit. Properties such as slope, organic matter levels, topsoil thickness, soil texture, available water capacity, pH, and salinity levels will directly affect the productivity level of each soil type. The experience of soil scientists and university researchers is used to develop the ratings.



Cropland Productivity Index			Descriptions
1-25	Very Poor	Red	Soils with >15 percent slopes; soils with claypan, bedrock or gravels near the surface; high salinity soils
26-50	Poor	Blue	Soils with 9-15 percent slopes; soils with claypan, bedrock, or gravels within 20 inches of the surface
51-75	Fair	Yellow	Soils with 6 - 9 percent slopes; soils with claypan, bedrock, or gravels at 20 to 40 inches of the surface
76-89	Good	Light Green	Soils with two - six percent slopes
90-100	Very Good	Dark Green	Silty or loamy soils with high soil organic matter levels

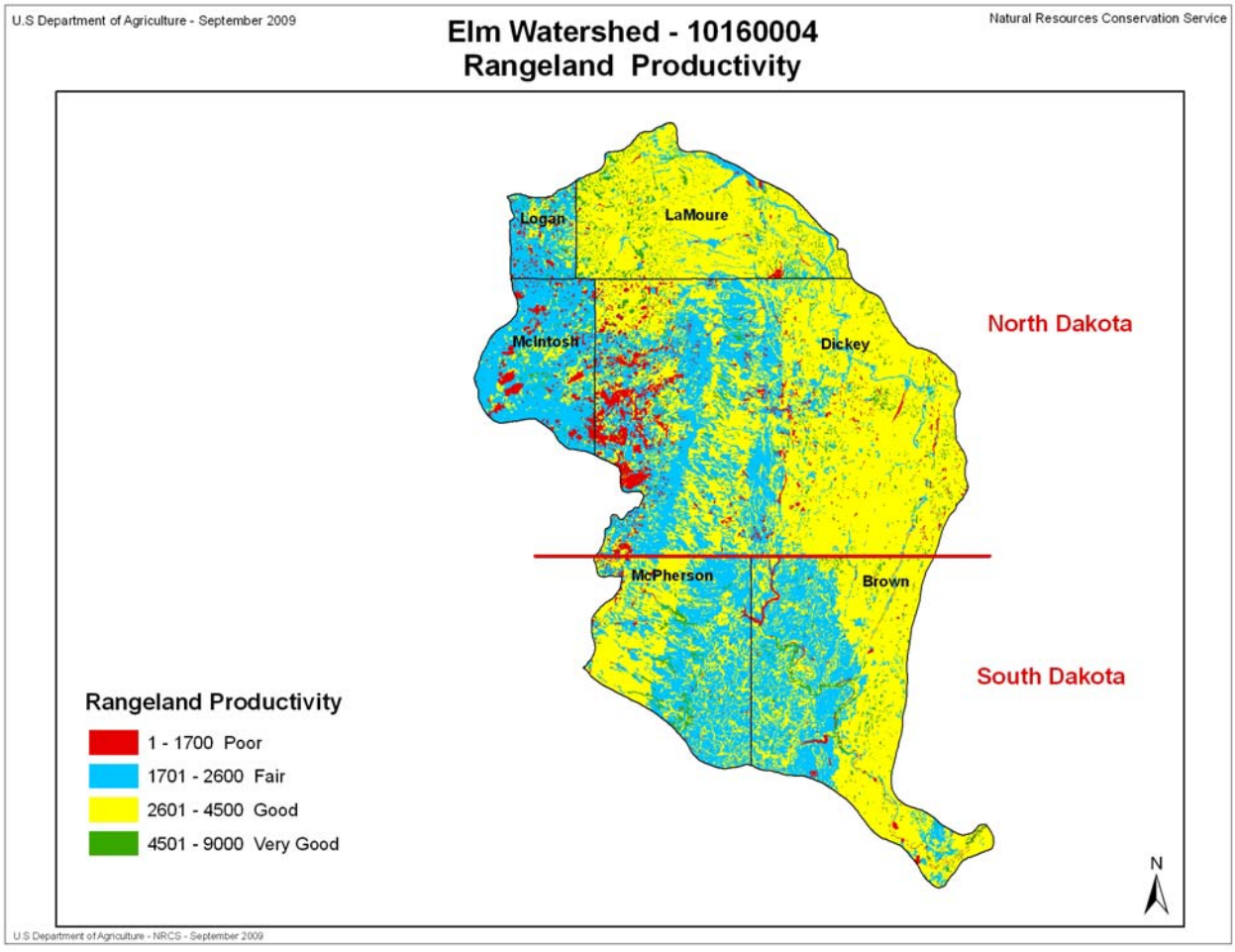
4.5 RANGELAND PRODUCTION (NORMAL YEAR)[1]

Rangeland has a native vegetation of grasses, grasslike plants, forbs, and shrubs. In many areas, introduced forage species are also managed as rangeland. The vegetation is suitable for grazing and browsing by animals. Rangeland includes natural grasslands, savannahs, many wetlands and deserts, tundra, and certain shrub and forb communities.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils, vegetation, and water.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It is expressed in pounds per acre of air-dry vegetation for normal years.

Yield and production values are represented as a single value for the map unit. They are calculated based on a weighted average.



Rangeland Normal Year Production			Descriptions
1-1700 lbs/Ac	Poor	Red	Low rainfall areas or shallow soils
1701-2600 lbs/Ac	Fair	Blue	Areas that are high in sodium or salts or shallow to bedrock or gravel
2601-4500 lbs/Ac	Good	Yellow	Areas where there is no additional moisture and the soil properties do not influence the grasses
4501-9000 lbs/Ac	Very Good	Light Green	Low lying areas that receive additional moisture

5.0 RESOURCE CONCERNS

Resource concerns or problems are issues related to the environment that impact the health, productivity, or condition of natural resources in a watershed. The most common resource concerns are associated with the SWAPA+H.

5.1 SUMMARY OF RESOURCE CONCERNS[1]

Specific resource concerns have been identified for each major land use at the state level. The following table is a summary of state level concerns. The resource concerns specific to the watershed have been identified and evaluated by land use in the watershed assessments.

SWAPA + H Concerns	Specific Resource Concerns/Issue	Pasture/ Hay	Cropland	Rangeland	Forest	Wildlife
Soil Erosion	Streambank	X	X	X	X	X
	Sheet and Rill		X			
	Wind		X			
	Ephemeral Gully		X			
	Classic Gully		X			
	Shoreline	X	X	X	X	X
	Irrigation Induce	X	X			
Soil Condition	Organic Matter		X			
	Excess Nitrogen		X			
	Excess Phosphorous		X			
	Contaminants – Residual Pesticides	X	X	X	X	X
	Damage from Sediment Deposition	X	X	X	X	X
	Compaction		X			
	Soil Salinity		X			
	Rangeland Site Stability			X		
Water Quantity	Inefficient Water Use on Irrigated Lands		X			
	Inefficient Water Use on Nonirrigated Lands		X			
Water Quality	Harmful levels of Pesticides in Ground Water	X	X	X	X	X
	Harmful levels of Pesticides in Surface Water	X	X	X	X	X
	Nutrients and Organics in Ground Water	X	X	X		X
	Nutrients and Organics in Surface Water	X	X	X		X
	Pathogens in Ground Water	X	X	X		X
	Pathogens in Surface Water	X	X	X	X	X
	Suspended Sediment in Surface Water	X	X	X	X	X
Plant Suitability	Plants Not Adapted to Site	X				
Plant Condition	Productivity Health and Vigor	X		X	X	X
	Forage Quality and Palatability	X		X	X	
	Noxious and Invasive Plants	X	X	X	X	X
Domestic Animals	Inadequate Feed and Forage Quantities and Quality	X		X	X	
	Inadequate Stock Water	X		X	X	
Fish and Wildlife	Species of Concern	X	X	X	X	X
	Inadequate Cover and Shelter	X	X	X	X	X
	Inadequate Food	X	X	X	X	X

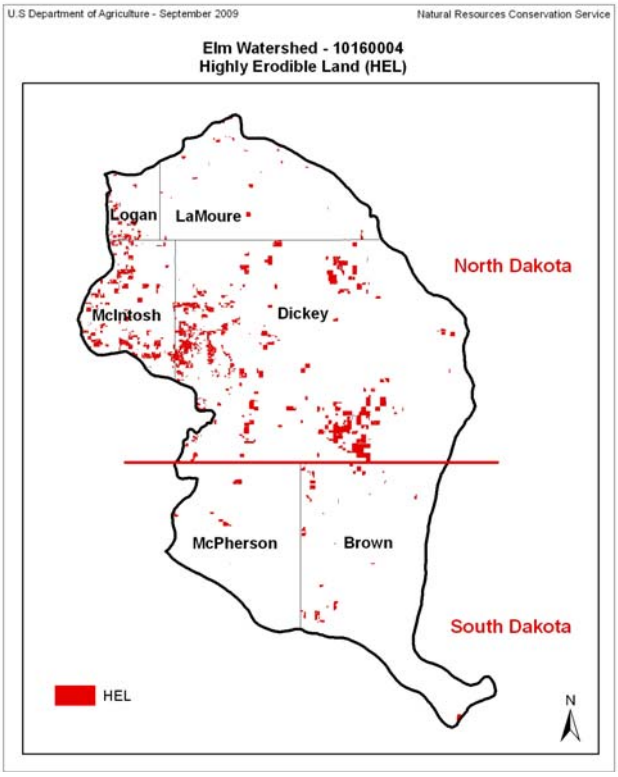
5.2 SOIL EROSION - WIND AND WATER[1]

Soil erosion is defined as the detachment and movement of topsoil, or soil material from the upper part of the soil profile, through the action of wind or running water, especially as a result of changes associated with human activity related to agricultural practices. Soil erosion from water includes rill, gully, and sheet.

Soil loss wind and water (cultivated cropland, hayland, pastureland, and CRP.	Erosion	Average Annual Erosion Rate (T/Ac/Yr	Acres	Total (T/Yr)
	Wind (WEQ)	1.71	725,700	1,240,947
	Water (USLE)	0.83	725,700	602,331

5.2.1 Highly Erodible Land

The basis for identifying highly erodible land (HEL) is the erodibility index (EI) of a soil map unit. The "EI" of a soil is determined by dividing the potential erodibility for each soil by the soil loss tolerance (T) value established for the soil as of January 1, 1990. The "T" value represents the maximum annual rate of soil erosion that can take place without causing a decline in long-term productivity. A soil map unit with an "EI" of eight or more is a highly erodible soil map unit. Refer to the National Food Security Act Manual (NFSAM) for further guidance.



5.3 WATER RESOURCE CONSIDERATIONS

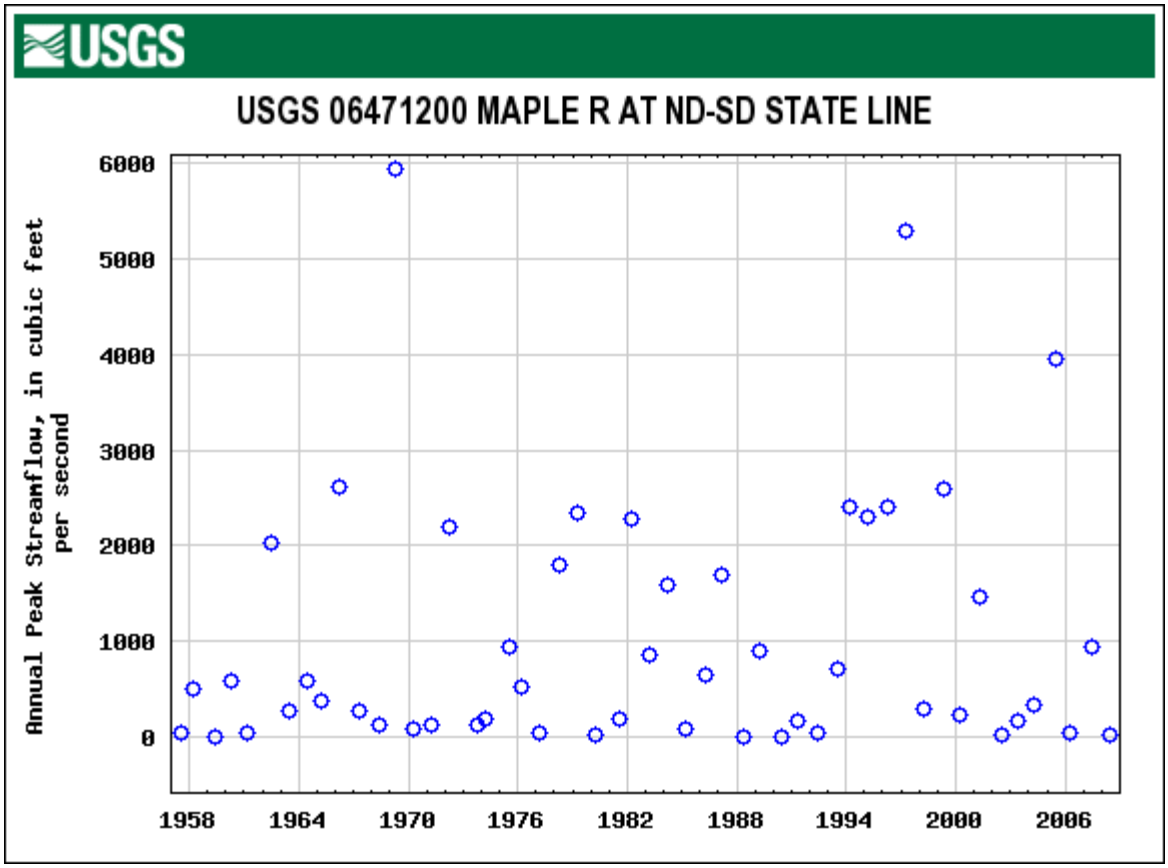
5.3.1 Water Resources Table[1]

The NRI data collected for streams and water bodies within the watershed.

Water Resources - 1997 NRI	Acres	Percent
Streams <660’ wide and water bodies <40 Ac	4,800	0.5
Streams >660' wide and water bodies >40 Ac	7,100	0.3

5.3.2 Peak Stream Flow[8]

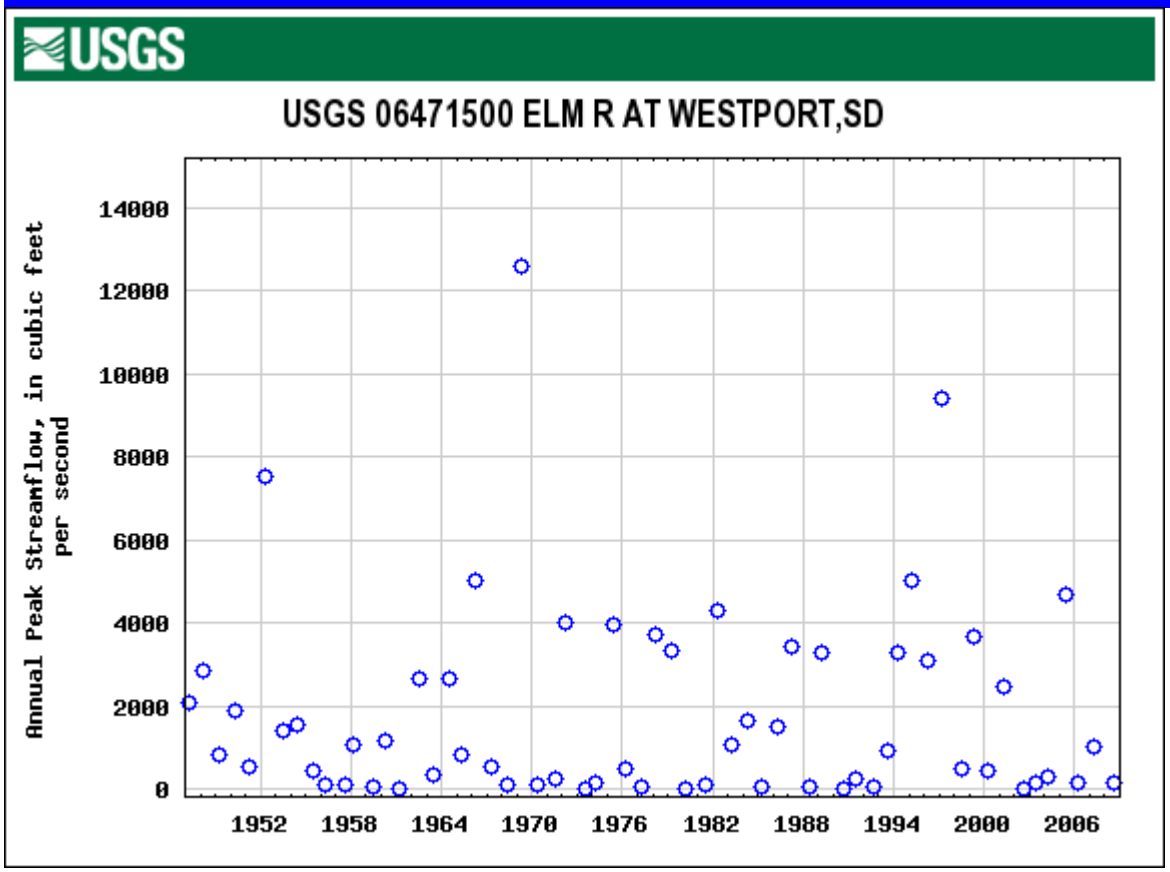
The USGS collected peak stream flow data on several of the tributaries to the James River in the Elm watershed. For this report, two collection sites were selected to represent historic peak stream flows for the watershed. Site one is located on the Maple River near the ND – SD state line. This site has a contributing drainage area of 716 square miles. This station collected peak stream flow data from 1958 through 2007. Site two is located on the Elm River near Westport, SD and has a contributing drainage area of 1,049 square miles. This station collected peak stream flow data from 1950 through 2007.



North Dakota
South Dakota

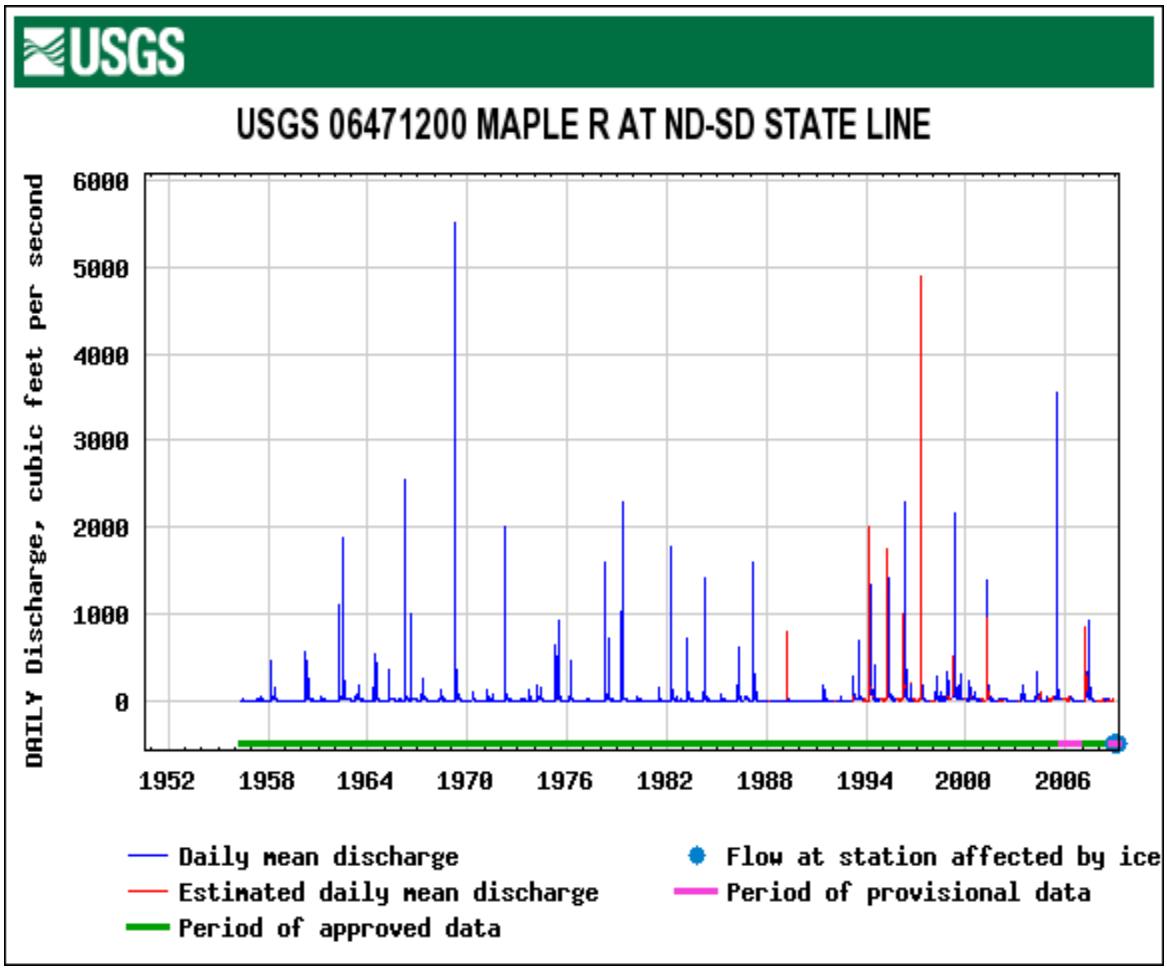
ELM - 10160004
8-DIGIT HYDROLOGIC UNIT PROFILE

USDA Natural Resources Conservation Service (NRCS) **September 2009**



5.3.3 Daily Discharge[8]

The two gauging stations USGS used to collect peak stream flow data were also used to collect daily discharge data within the watershed. The following data was collected from the Maple River at the ND – SD state line and from the Elm River near Westport, SD.



North Dakota
South Dakota

ELM - 10160004
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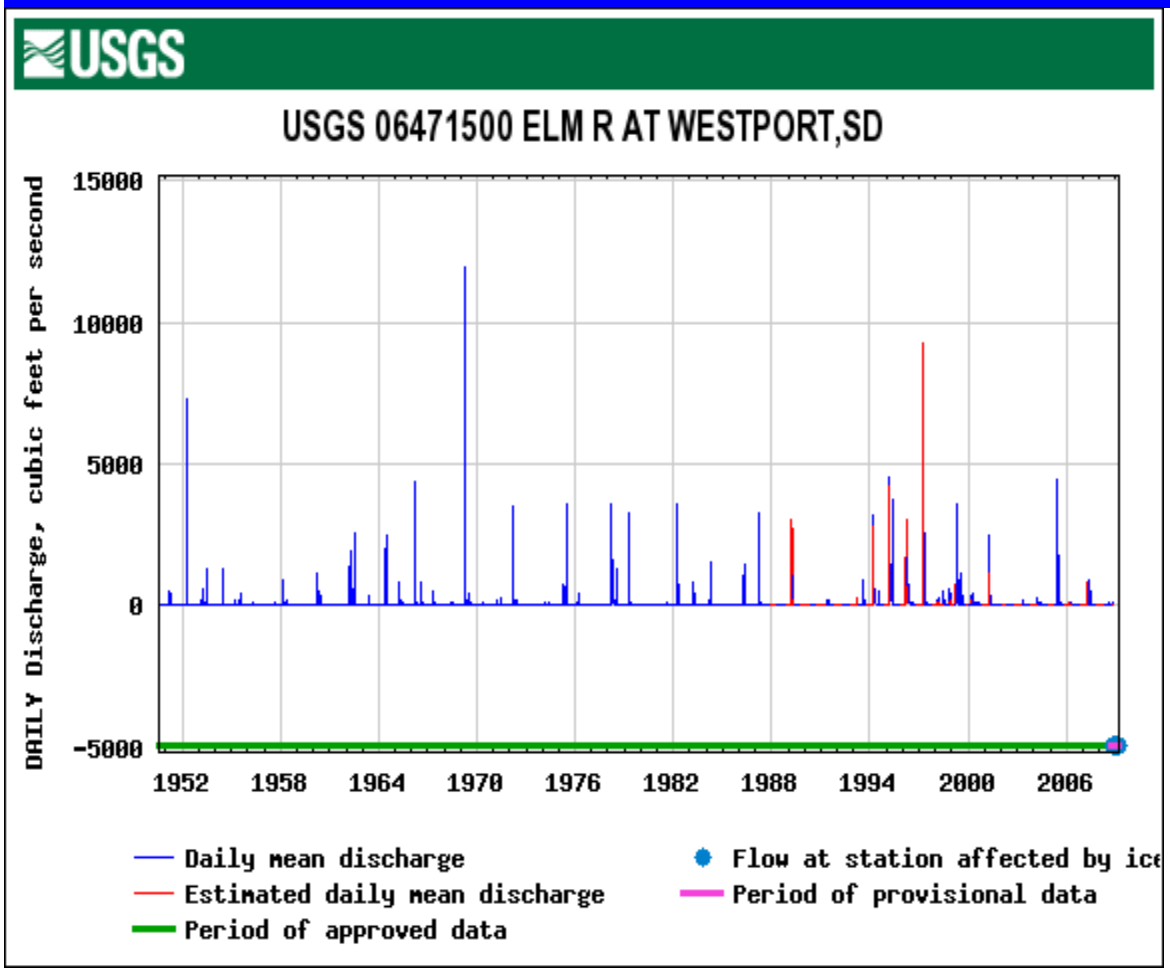


5.3.4 Groundwater[1]

Several major and minor aquifers of varying depths and water quality are utilized for domestic and agricultural purposes. Shallow aquifers tend to be smaller and usually have higher quality water but are also more vulnerable to leaching of nutrients, pesticides, organic waste, and pathogens. Recharge of shallow aquifers occurs primarily from infiltration of precipitation but also from wetlands, lakes, and streams. Deep aquifers often occur between layers of impenetrable bedrock. The quality of this water is often variable but usually of lower quality than that of shallow aquifers. As a result of the restrictive soil layers protecting these aquifers and the depth at which they occur, they are less susceptible to leaching and other surface activities and impacts. Important aquifers within this watershed are:

Several major and minor aquifers of varying depth and quality are utilized within the watershed. Shallow aquifers tend to be smaller and usually have higher quality water but are also more vulnerable to leaching of nutrients, pesticides, organic waste, and pathogens. Recharge of shallow aquifers occurs primarily from infiltration of precipitation but also from wetlands, lakes, and streams. Deep aquifers often occur between layers of impenetrable bedrock. The quality of this water is often variable but usually of lower quality than that of shallow aquifers. As a result of the restrictive soil layers protecting these aquifers and the depth at which they occur, they are less susceptible to leaching and other surface activities and impacts. There are five major aquifers in the watershed; three are glacial drift aquifers and two bedrock aquifer:

Glacial drift includes all rock material transported by glacier ice even though subsequently affected by wind or water. It can be divided into till and outwash. The till is unstratified and unsorted drift deposited by ice without subsequent movement by wind or water. Generally, till is composed of a heterogeneous mixture of clay, silt, and sand that contain lesser amounts of rock fragments ranging in size from gravel to huge boulders. Because of the large clay content, the till has low permeability and usually is a poor source of water. However, till locally contains small sand lenses that may yield as much as 5 gallons per minute.

Outwash and loess are considered stratified drift, most of which has been re-worked and deposited by wind or water. Outwash is material deposited by melt water that flowed on or away from the glacier; loess is material deposited by wind. Outwash consisting of sorted gravel, sand, and silt constitutes the most permeable glacial aquifers.

Aquifers in glacial drift:

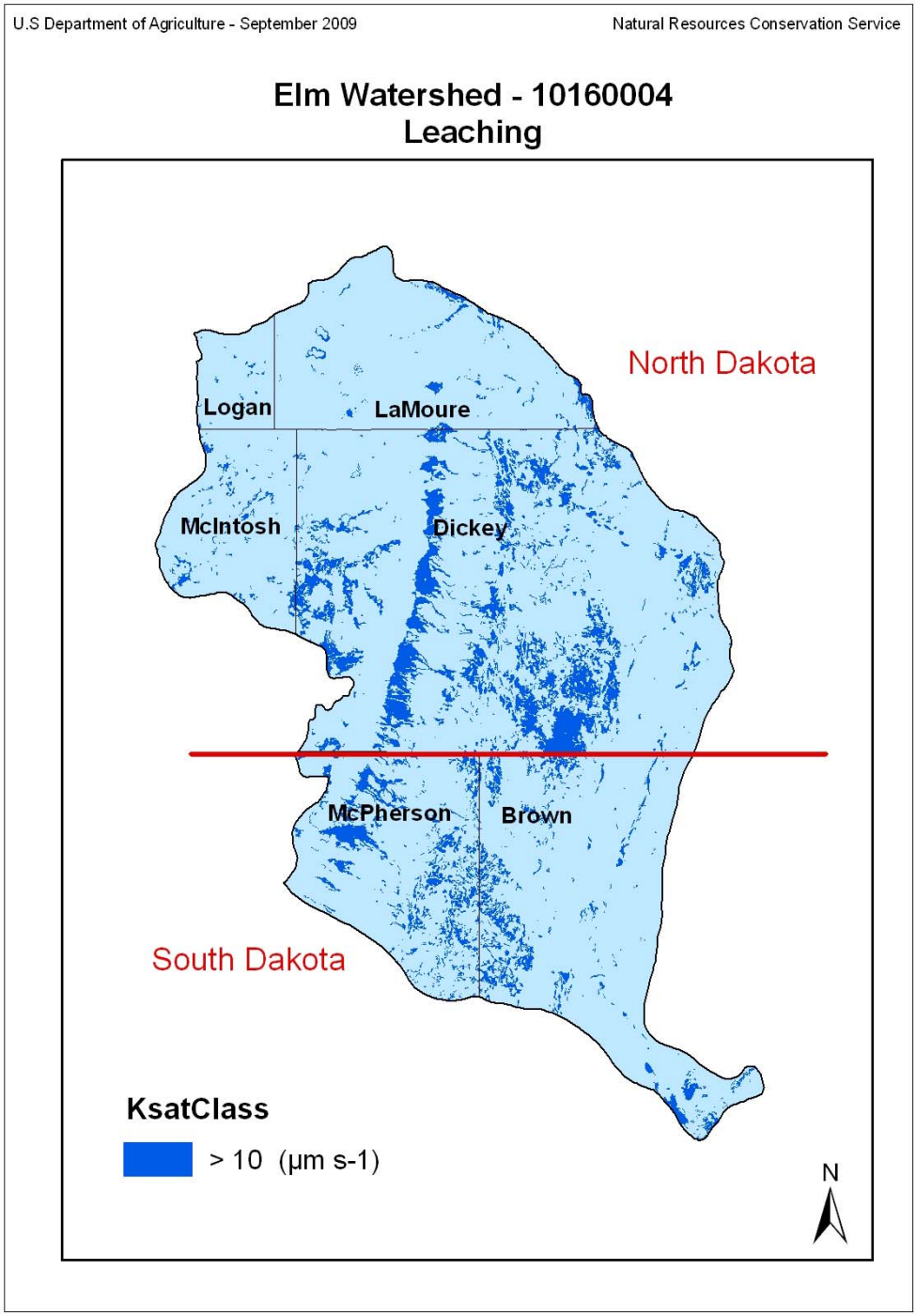
Deep James, Middle James, and Elm.

Aquifers in bedrock:

As many as eight major bedrock aquifers underlie parts of the Elm watershed, however only the uppermost two are used as sources of water:

Fall River and Dakota Formations.

The NRCS makes groundwater leaching assessments based on a soils “saturated hydraulic conductivity” (Ksat). Ksat refers to the ease with which pores in a saturated soil transmit water and is expressed in terms of micrometers per second. Soil map units that have a Ksat value of 10 micrometers/second or greater and with <6 percent slope would be considered to have a “high leaching risk”.



5.3.5 Public Water Supply Systems[9] [10]

Approximately 670 public water systems (PWS) currently exist in SD and 515 in ND. The public water supply systems within this watershed rely on both surface and ground water sources. These systems meet the needs of rural and municipal households as well as industrial and agricultural needs. Protection and conservation of both surface and groundwater sources is critical.

The North Dakota Source Water Protection Program was developed in response to the 1996 Safe Drinking Water Act amendments that require all states to define and assess the source waters of public water systems. All public water systems that have wells or intakes are participants in the Source Water Protection Program. Three elements of the Source Water Protection Program are federally-mandated requirements and are completed by the Department of Health, while the remaining elements can be pursued voluntarily by the governing body of the public water system. The North Dakota Source Water Assessment Strategic Plan was approved by EPA in 1999.

The Source Water Protection Program strives to meet several goals:

1. Prevent contamination of public water supplies;
2. Encourage the placement of certain activities in areas less likely to contaminate public water supplies; and,
3. Raise public awareness of water resources used for public water supplies.

Mandatory Program Elements - completed for the public water system:

1. Delineation of a wellhead protection area
1. Contaminant Source Inventory
2. Susceptibility Analysis

Voluntary Program Elements - pursued voluntarily by the public water system:

1. Development of Management Strategies
2. Development of Contingency Plans
3. Public Awareness
4. New Well Locations

Primary enforcement of the federal Safe Drinking Water Act (SDWA) began in 1983. The SD Drinking Water Program, part of the Department of Environment and Natural Resources (DENR), develops and enforces the SD Drinking Water Regulations (http://www.state.sd.us/denr/des/drinking/regs.htm) that apply to public water systems in the state. To see a list of drinking water contaminants that the Drinking Water Program regulates visit the Drinking Water Standards Web page at http://www.state.sd.us/denr/des/drinking/standard.htm. Plans and specifications reviews are part of the department's regulatory efforts to protect the state's surface and groundwater resources and public health. The areas of responsibility include design criteria development, technical assistance, and plan approvals for the Drinking Water, Groundwater Quality, Minerals and Mining, Surface Water and Waste Management Programs within the Division of Environmental Services.

5.3.6 Surface Waters - Designated Beneficial Uses[9] [10]

In ND, beneficial uses are assigned based on the *Standards of Quality for Waters of the State* (NDDH, 2006). These regulations define the protected beneficial uses of the state's rivers, streams, lakes and reservoirs. The six beneficial uses assessed for purposes of Section 305(b) reporting and Section 303(d) listing are:

(1) Aquatic life
(2) Recreation
(3) Drinking water
(4) Fish consumption
(5) Agriculture
(6) Industrial

All streams and lakes in ND are assigned the beneficial uses (1) and (2). All streams are also assigned to beneficial uses (5) and (6) unless available data exists providing evidence of impairment. Beneficial use (4) has been assigned to all Class I, IA, and II rivers and streams, to those Class III streams known to provide a sport fishery and to all Class 1 through 4 lakes.

Surface waters in SD are classified for one or more of the following beneficial uses:

(1) Domestic water supply waters;
(2) Cold water permanent fish life propagation waters;
(3) Cold water marginal fish life propagation waters;
(4) Warm water permanent fish life propagation waters;
(5) Warm water semipermanent fish life propagation waters;
(6) Warm water marginal fish life propagation waters;
(7) Immersion recreation waters;
(8) Limited contact recreation waters;
(9) Fish and wildlife propagation, recreation, and stock watering waters;
(10) Irrigation waters; and
(11) Commerce and industry waters.

All streams, in SD, are assigned the beneficial uses (9) and (10) unless otherwise stated. All lakes, in SD, are assigned the beneficial uses of (7), (8), and (9).

5.3.7 Total Maximum Daily Loads (TMDLs) 2008 Report[9] [10]

Section 303(d) of the federal Clean Water Act requires that states develop TMDLs for water bodies that are impaired. The NDDH and SD DENR are responsible for managing the monitoring of water bodies and development of TMDLs in each respective state. The TMDLs are calculations to determine the sum allowable load of a pollutant from all contributing point and nonpoint sources, that a waterbody can receive and still meet the applicable water quality standards. The TMDLs must be developed for water bodies that do not meet the water quality standards. The TMDLs developed by NDDH and SD DENR are required to be approved by the Environmental Protection Agency (EPA) and to public notice the TMDL.

The following data was presented by NDDH in" North Dakota 2008 Integrated Section 305(b) Water Quality Assessment Report and Section 303(d) List of Waters Needing Total Maximum Daily Loads" and DENR in "THE 2008 SOUTH DAKOTA INTEGRATED REPORT FOR SURFACE WATER QUALITY ASSESSMENT." This information represents the current status of water quality for waters within Elm Watershed.

Elm Watershed					
Segment or Lake Name	**Stream Segment or Lake Location**	**Impairment**	**Status**	**Status Date**	**Initial Listing**
ND Lakes					
None	NA	NA	NA	NA	NA
ND Streams					
Elm River	Elm River from Pheasant Lake, downstream to the ND/SD border and Elm Lake.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
Maple River	Maple River from its confluence with South Fork Maple River, downstream to the ND/SD border.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
Maple River	Maple River from its confluence with South Fork Maple River, downstream to the ND/SD border.	Fecal Coliform	Not Supporting	2008	NA
Elm River	Elm River, downstream to Pheasant Lake. Located in Dickey County.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
Elm River Watershed (Upper)	Upper Elm River, including all tributaries. Located in Dickey County.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
Bristol Gulch Watershed	Bristol Gulch, including all tributaries. Located in Dickey County.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
Tributaries To The Elm River	Unnamed tributaries to the Elm River (ND-10160004-005-S_00). Located in Dickey County.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
Tributary To Pheasant Lake	Unnamed tributary to Pheasant Lake. Located in Dickey County.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA

Maple River	Maple River from its confluence with Maple Creek, downstream to its confluence with South Fork Maple River. Located in Dickey County.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
Maple River	Maple River from its confluence with Maple Creek, downstream to its confluence with South Fork Maple River. Located in Dickey County.	Fecal Coliform	Fully Supporting But Threatened	2008	NA
South Fork Maple River	South Fork Maple River from its confluence with three tributaries, downstream to its confluence with the Maple River. Located in Dickey County.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
South Fork Maple River	South Fork Maple River from its confluence with three tributaries, downstream to its confluence with the Maple River. Located in Dickey County.	Fecal Coliform	Not Supporting	2008	NA
Maple Creek	Maple Creek, downstream to its confluence with the Maple River. Located in Lamoure County.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
Maple Creek	Maple Creek, downstream to its confluence with the Maple River. Located in Lamoure County.	Fecal Coliform	Not Supporting	2008	NA
Maple River	Maple River from Schlect-Thom Dam, downstream to its confluence with Maple Creek. Located in Lamoure County.	Sedimentation/ Siltation	Fully Supporting But Threatened	2008	NA
Maple River	Maple River from Schlect-Thom Dam, downstream to its confluence with Maple Creek. Located in Lamoure County.	Fecal Coliform	Fully Supporting But Threatened	2008	NA
SD Lakes					
Elm Lake	Brown County, SD	TSI	Has an approved TMDL	4/12/99	NA
Richmond Lake	Brown County, SD	TSI	Has an approved TMDL	8/8/97	NA
SD Streams					
Foot Creek	Brown and McPherson Counties SD	Unknown	Some Uses Met Insufficient Data to Determine Support of Other Uses	2008	Not Listed

Impairments	
DO -	Dissolved Oxygen, results from the photosynthetic and respiratory activities of the biota in the water body. DO is essential for aquatic life.
pH -	Acidity/Alkalinity the measure of the hydrogen ion concentration. pH can affect many chemical reactions in water.
TSI -	Carlson's (1977) Trophic State Indices (TSI), Carlson's TSI is a measure of productivity in a lake. Typically Secchi depth, chlorophyll *a*, and phosphorus measurements are used to calculate a mean TSI value.
TSS -	Total Suspended Solids, the organic and inorganic material left on a standard glass fiber filter (0.45 micron) after a water sample is filtered through it. TSS can be used to measure the volume of solids in a water body. Too much suspended solids can be harmful to the biota in a stream.

TMDL Project Status	
Assessment Initiated -	Data for developing the TMDL is being collected.
Delist -	A water body has been removed from the TMDL list. Delisting may occur when a TMDL is approved by EPA, water quality standards are met, a water body was listed in error, additional state effluent controls address water quality problems, s have been breached and are no longer a viable water body, or data assessment methodologies have been modified.
Delist* -	Water quality standards have been met; however, a TMDL was completed because an assessment had already been initiated while the segment was previously listed.
Not Initiated -	Projects are proposed and waiting final funding to begin assessment.
Special Approvals -	A water body that had sufficient data to write a TMDL before the first 303(d) list was published.
TMDL in Public Notice -	During the public notice phase, a TMDL has been developed and is ready for public review and comment. Comments received are reviewed and considered before submitting a final TMDL to EPA for approval.
TMDL Public Noticed -	The public notice comment period has passed. Comments received are being reviewed and considered before submitting a final TMDL to EPA for approval.
TMDL Approved -	EPA has approved a TMDL as submitted by the state.
TMDL Not Required -	Water body is meeting its beneficial uses.

Watershed Projects, Plans, Studies, and Assessments

North Dakota					
ND NRCS Watershed Project			**ND NRCS Watershed Plans, Studies, and Assessments**		
Name	**Status**	**Goals:**	**Name**	**Status**	**Goals:**
Maple River, West Branch	Withdrawn	NA	Maple River SVAP	Complete 1999	
			Elm River Stream Assessment	Withdrawn 2001	
NDDH – EPA 319 Watershed Projects			**NDDH or ND Soil Conservation District Watershed Plans, Studies or Assessments**		
Name	**Status**	**Goals:**	**Name**	**Status**	**Goals:**
Maple Creek Watershed	Ongoing		Maple Creek Watershed	Complete	NA
Pheasant Lake Watershed	Ongoing		Pheasant Lake Watershed	Complete	
South Dakota					
SD NRCS Watershed Projects			**SD NRCS Watershed Plans, Studies, and Assessments**		
Name	**Status**	**Goals:**	**Name**	**Status**	**Goals**
None	NA	NA	None	NA	NA
SD DENR or Conservation District Water Quality Projects			**SD DENR or SD Conservation District Water Quality Assessments or Studies**		
Name	**Status**	**Results:**	**Name**	**Status**	**Results:**
Elm Lake Implementation Project	In Progress		None	NA	NA

5.3.8 Confined Animal Feeding Operations (CAFO)[10] [11]

The NDDH and SD DENR are the state agencies responsible for regulating animal feeding operations in the respective states. A CAFO is a lot or facility that stables or confines and feeds or maintains animals for a total of 45 days or more in any 12-month period and meets the criteria for either a large, medium, or small concentrated animal feeding operation. Concentrated Animal Feeding Operations are regulated by a general water pollution control permit. Producers must submit plans for manure management systems to the respective state agency. These plans must meet design requirements and be approved by a department engineer.

Livestock production is an important industry within the Elm watershed. Farms and ranches raise beef cattle, dairy cattle, hogs, and poultry.

North Dakota

Animal Feeding Facilities – North Dakota Department of Health Permit					
Animal Type	**Dairy**	**Beef**	**Swine**	**Other**	**Total**
Number of Animal Feeding Operations	5	25	7	6	43
Number of Animals	1,221	10,371	1,206	83,271	96,069
No. of State Permitted Operations					22

South Dakota

CAFO Watershed Summary –South Dakota Department of Environment and Natural Resources					
Animal/Operation Type	Cattle	Sheep	Swine	Poultry	Not Specified
Number of Permitted Farms	13		12		1
- Number of Permitted Animals	42,614		81,955		76,776
- Permitted Acres for Waste Management	28,625		20,557		2,767
Partially Permitted Farms					3
- # of Animals Permitted					134,838
- Total Animals					229,782
- # of Acres					16,790
Approved Farms Not yet permitted	4		1		
- # of Animals	8,179		2,880		
- # of Acres	8,192		585		
Operations Under Review					1
- # of Animals					10,300
- # of Acres					Under Review
Other Acres Not Specified					2,458

5.4 RESOURCES OF SPECIAL CONCERN

In support of federal actions proposed by the NRCS, the agency prepares programmatic, policy, legislative, and other Environmental Assessments (EA) or Environmental Impact Statements (EIS), as necessary, for environmental compliance with federal regulations. All conservation programs administered by the agency have a program level EA or EIS. Additionally, the NRCS policy requires that for all projects or conservation practices where the NRCS provides financial or technical assistance, a site-specific environmental evaluation (EE) of practice effects is completed to ensure the proposed action has been sufficiently analyzed in an existing NRCS environmental document.

Both ND and SD NRCS site-specific EE reviews and evaluates the proposed activity impacts with regard to the following federal laws, Executive Orders, regulations, or agency policy as applicable:

National Historic Preservation Act (1966), as amended, and implementing regulations found at 36 CFR Part 800;
Endangered Species Act (1973), as amended;
Fish and Wildlife Coordination Act (1943), as amended;
Executive Order 11988 (1987) - Floodplain Management;
Executive Order 13112 (1999) - Invasive Species;
Migratory Bird Treaty Act (1918), as amended, and Executive Order 13186 – Responsibility of Federal Agencies to Protect Migratory Birds;
The NRCS policy General Manual (GM), Title 190, Part 410.23 - Natural Areas;
Farmland Protection Policy Act and 7 CFR 658.5 regulations;
The NRCS policy GM, Title 190, Part 411.03(d) Riparian Areas;
Clean Water Act and Waters of the U.S. (1972);
Executive Order 11990 “Protection of Wetlands,” the Food Security Act of 1985, revised NRCS Wetland Technical Assistance Policy - 7 CFR Part 650 (1997);
Wild and Scenic Rivers Act – PL 90-542.

5.4.1 Endangered and Threatened Species[1]

Status of federally and state listed threatened and endangered species in the watershed.

Scientific Name	Common Name	Federal Status	South Dakota State Status*
Haliaeetus leucocephalus	Bald Eagle		Threatened
Canis lupus	Gray Wolf	Endangered	
Lontra canadensis	Northern River Otter		Threatened
Charadrius melodus	Piping Plover	Threatened	
Notropis topeka	Topeka Shiner	Endangered	
Grus americana	Whooping Crane	Endangered	Endangered

* North Dakota does not designate state specific endangered or threatened species.

5.5 RESOURCE ACCOMPLISHMENTS

5.5.1 Performance Results Systems (PRS) Data

The PRS is an Integrated Accountability System (IAS) application that collects practice-based information for NRCS conservation programs. Currently, the PRS program is used by NRCS employees and partners to record performance data on conservation plans and practices that are planned and applied.

PRS Data	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
Applied Conservation Treatment (Units/Acres)						
Access Control (472) (ac)231			105	481	411	
Access Road (560) (ft)		6,400		2,125	1	1,240
Comprehensive Nutrient Management Plan (100) (no)		3	4			
Conservation Cover (327) (ac)	2,534		1,345	3,085	3,018	903
Conservation Crop Rotation (328) (ac)						
Cover Crop (340) (ac)				56		84
Critical Area Planting (342) (ac)		3	10			
Dike (356) (ft)	2,500		2,200		1	1,500
Diversion (362) (ft)	1,740		2,450	1,000	1	2,000
Early Successional Habitat Development/Mgmt (612) (ac)		1,666	1,919	76	301	
Fence (382) (ft)						
Filter Strip (393) (ac)	84		15	48		
Forage Harvest Management (511) (ac)	525		82	237		
Irrigation System, Sprinkler, (442) (ac)					129	
Irrigation Water Management (449) (ac)					129	
Heavy Use Area Protection (561) (ac)	3	34	134	7	1	1
Mulching (484) (ac)			39	33	49	
Nutrient Management (590) (ac)	6668	8,020	2,498	5,441	2,644	443
Pasture and Hay Planting (512) (ac)	552	62	10	20		
Pest Management (595) (ac)	1,286	3,193	6,647	5,129	2,786	51
Pipeline (516) (ft)	11,670	9,571	10,615	3,453	22,118	942
Pond (378) (no)	6	3	8			1
Prescribed Burning (338) (ac)					120	
Prescribed Grazing (528) (ac)	3,574	2,327	3,462	2,571	6,582	96
Pumping Plant (533) (no)					1	
Range Planting (550) (ac)					24	
Residue Management, No-Till/Strip Till/Direct Seed (329) (ac)	11,396	5,202	5,356	4,945	2,981	84
Residue Management, Mulch Till (345) (ac)	736	2,306	1,794	63	1,916	
Residue Management, Seasonal (344) (ac)	2,327	670	153	1,003	8,859	
Riparian Herbaceous Cover (390) (ac)	1					
Salinity and Sodic Soil Management (610) (ac)				56	93	
Solid/Liquid Waste Separation Facility (632) (no)						2
Spring Development (574) (no)	1				2	
Underground Outlet (620) (ft)			150		220	60
Upland Wildlife Habitat Management (645) (ac)	23	1,426	22	720	4,991	738
Waste Storage Facility (313) (no)	2		4	5	1	1
Waste Transfer (634) (no)		3				

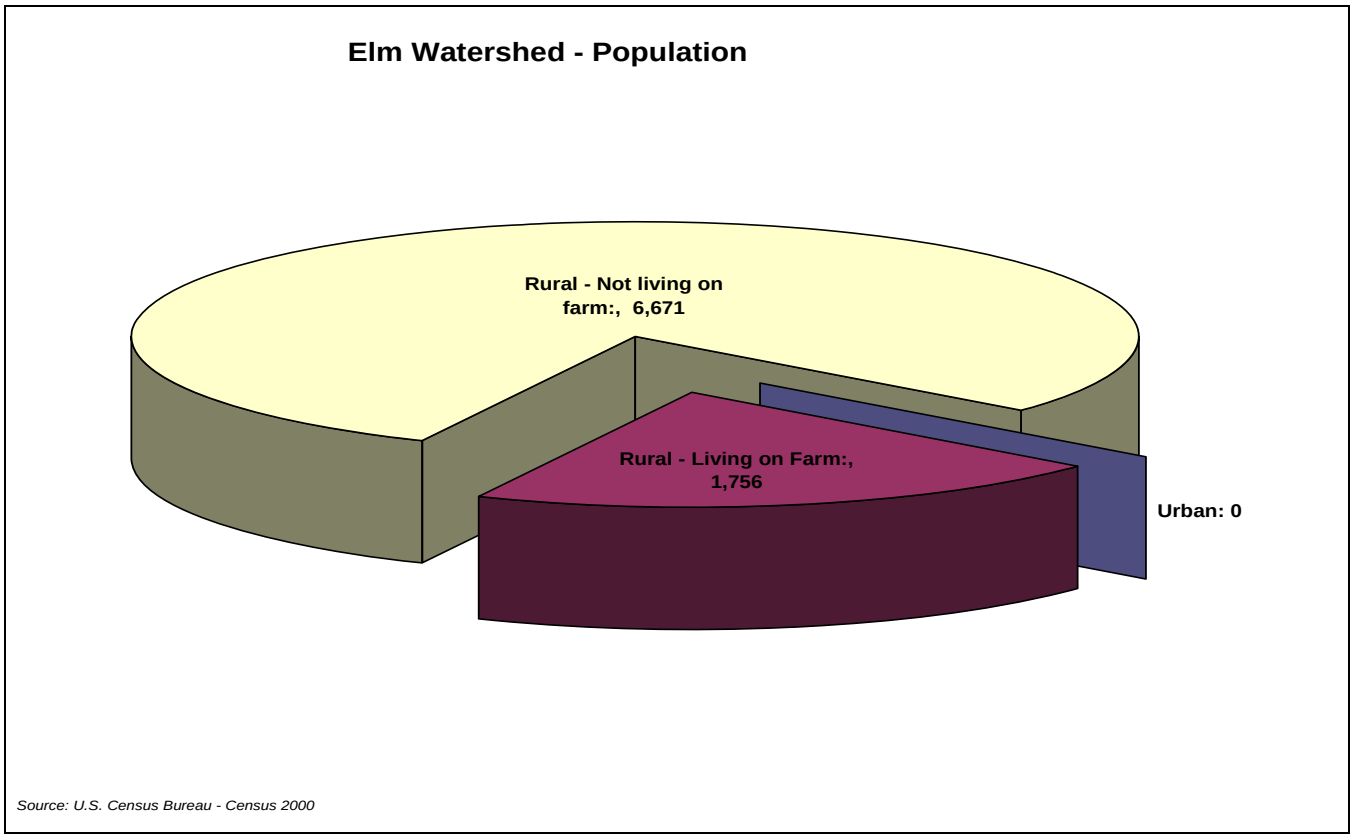
PRS Data	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
Applied Conservation Treatment (Units/Acres)						
Waste Utilization (633) (ac)	77	154	340			
Water Well (642) (no)	2		1	3	3	
Watering Facility (614) (no)	10	2	5	17	7	1
Well Decommissioning (351) (no)						1
Wetland Creation, Enhancement, and Restoration (658, 659, 657) (ac)	308		39	168	123	41
Wetland Wildlife Habitat Management (644) (ac)	7	11	187		44	41
Windbreak/Shelterbelt Establishment/Restoration (380 and 650) (ft)	154,815	41,874	122,355	26,521	40,307	1,029

6.0 CENSUS AND SOCIAL DATA[12] [13]

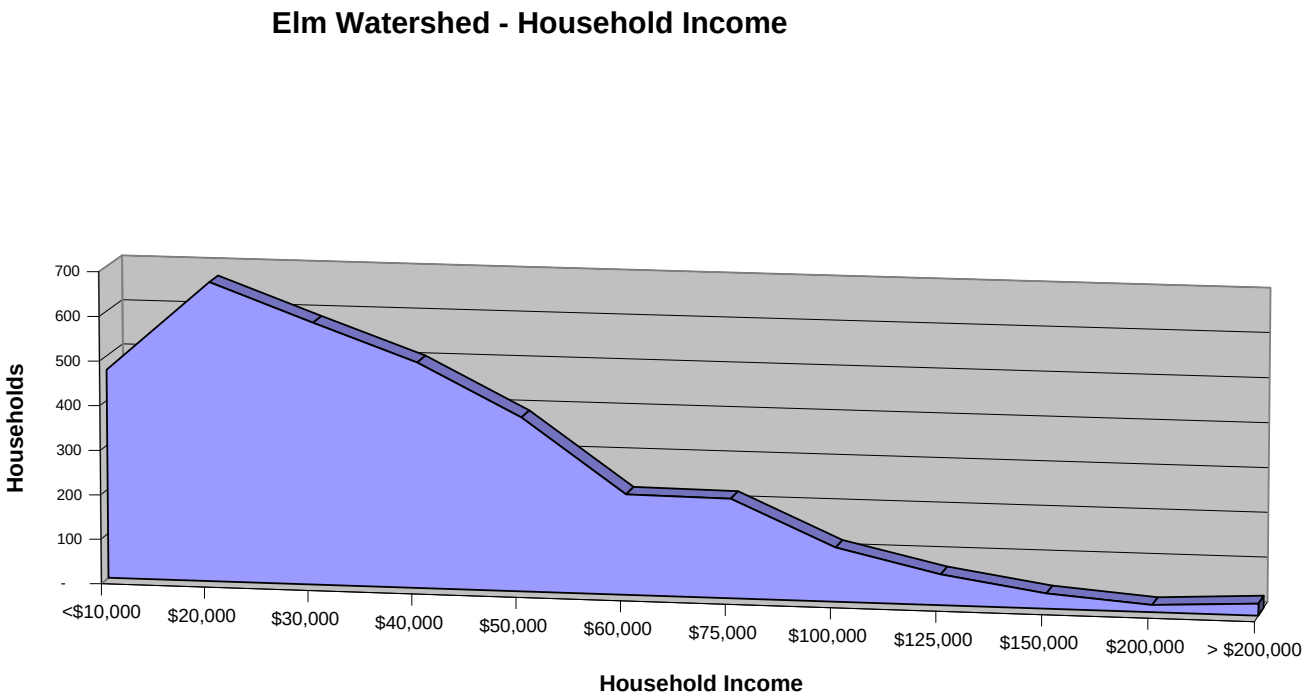
This section provides basic social data gathered from the 2007 Census of Agriculture and the United States Census 2000.

6.1 POPULATION CHART

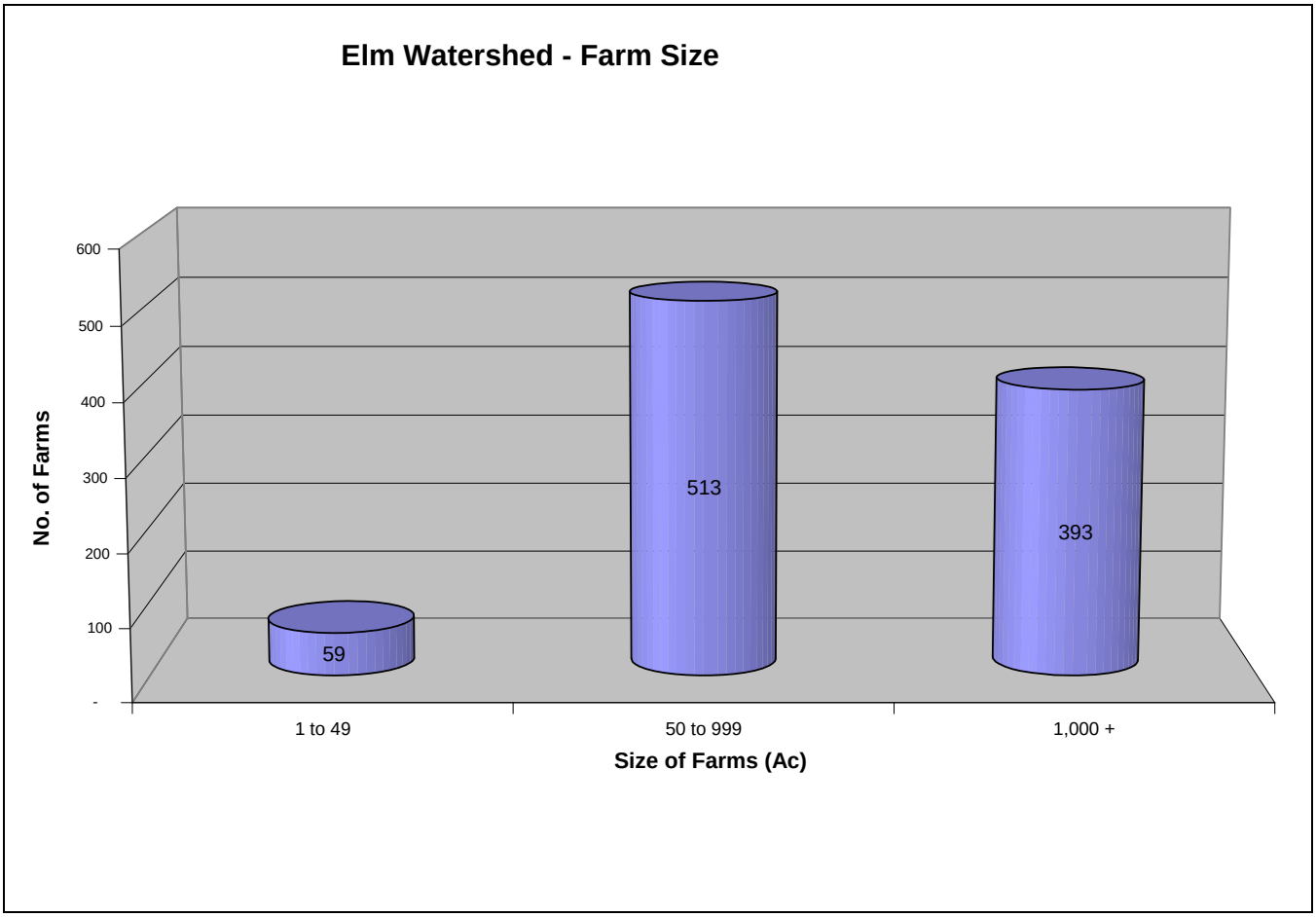
Census data for the rural and urban population within the watershed.



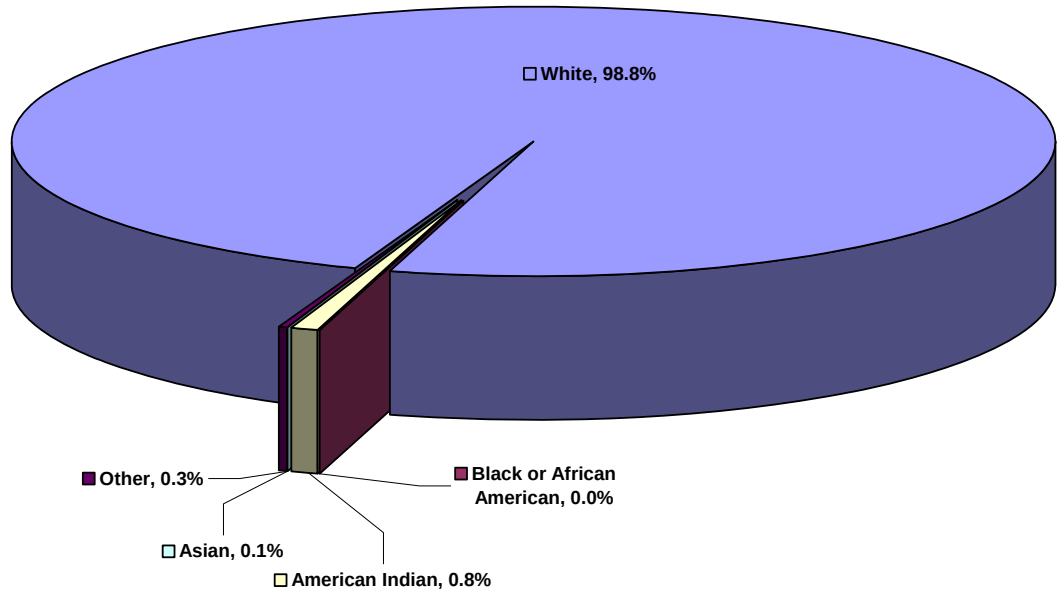
6.2 HOUSEHOLD INCOME



6.3 FARM SIZE

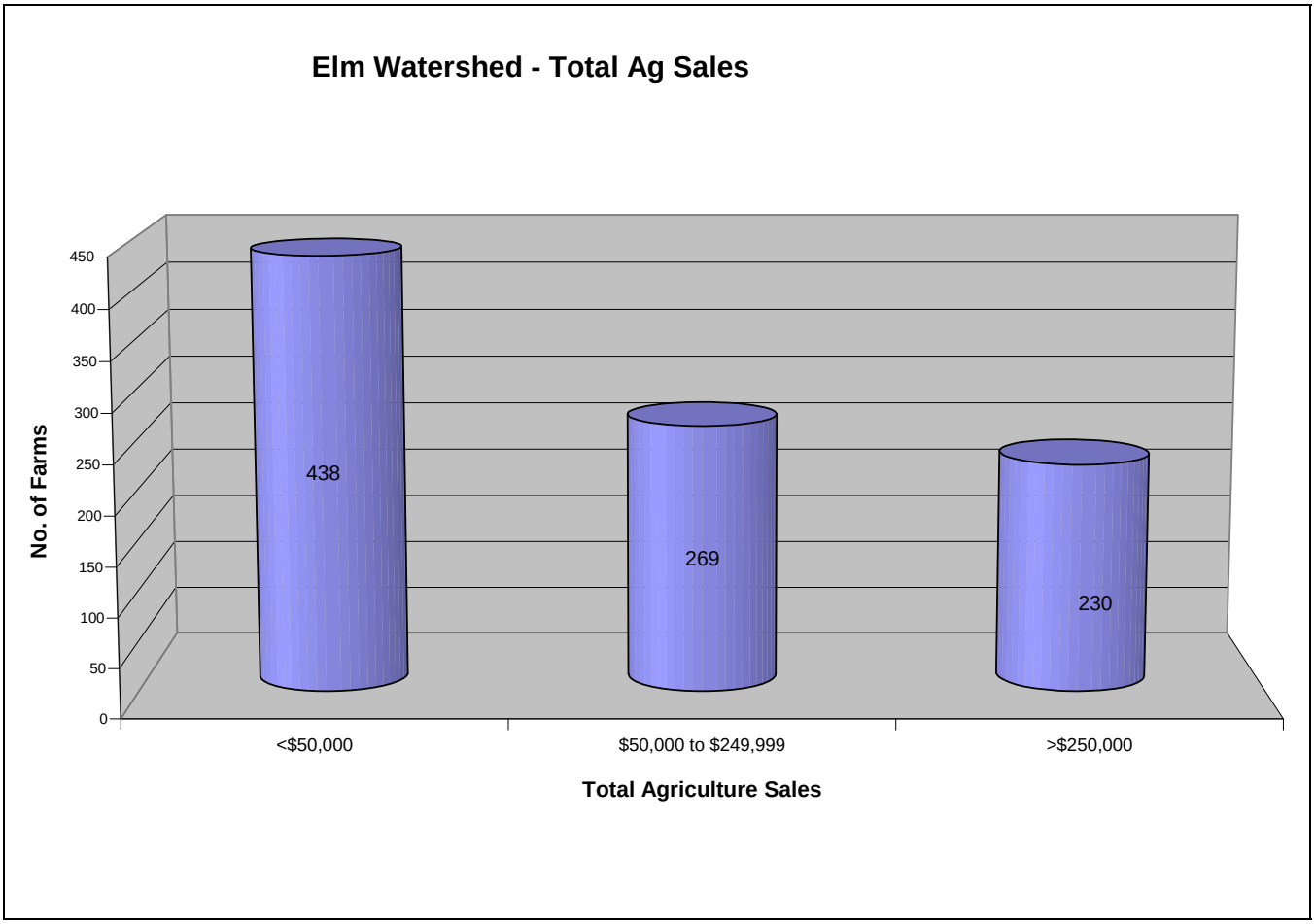

Elm Watershed - Farm Size
No. of Farms
600
500
400
300
200
100
-
59
513
393
1 to 49
50 to 999
1,000 +
Size of Farms (Ac)

6.4 DEMOGRAPHICS



Source: U.S. Census Bureau - Census

6.5 TOTAL AGRICULTURAL SALES



7.0 REFERENCES/PREPARERS

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7.2 REFERENCES

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[1] Natural Resources Conservation Service, 2002
[2] South Dakota Geological Survey, 2004
[3] North Dakota Geological Survey
[4] Prism Group, 1990. South Dakota Annual Precipitation Data 1961-1990
[5] South Dakota State University, 2007. South Dakota Office of Climatology
[6] North Dakota State University, 2009, North Dakota State Climate Office
[7] High Plains Regional Climate Center, 2007.
[8] United States Geological Survey (USGS) – Originator of National Land Cover Dataset (NLCD)
[9] South Dakota Department of Environment and Natural Resources (SD DENR)
[10] North Dakota Department of Health – Division of Water Quality
[11] SD DENR – Surface Water Quality
[12] 2007 Census of Agriculture, National Agricultural Statistics Service. Adjusted by percent of HUC in the county or by percent of zip code in the HUC, depending on the level of data available.
[13] United States Census 2000, United States Census Bureau. Adjusted by percent of HUC in the county or by percent of the census block in the HUC, depending on the level of data available.