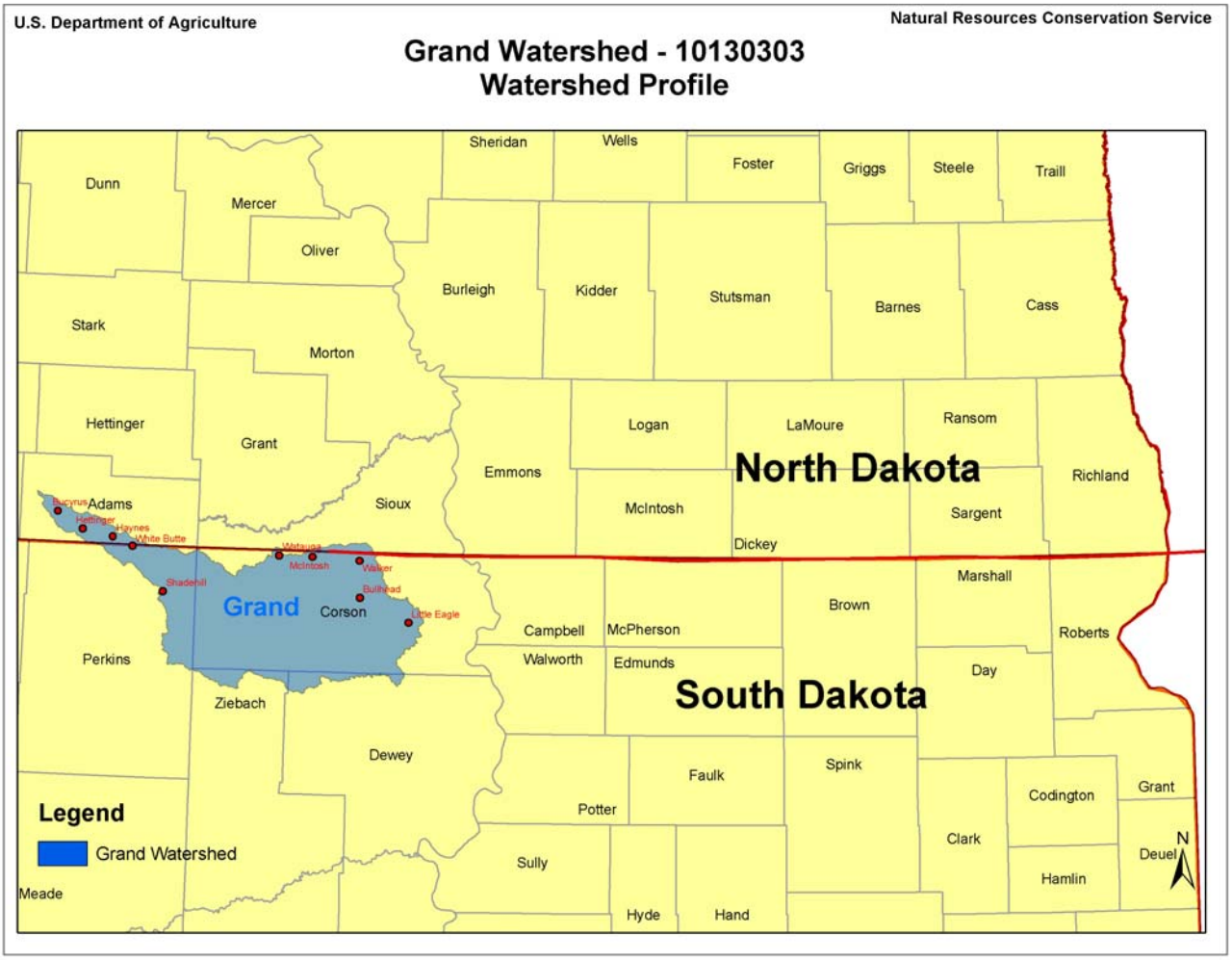
North Dakota
South Dakota

GRAND - 10130303
8-DIGIT HYDROLOGIC UNIT PROFILE

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

NORTH DAKOTA AND SOUTH DAKOTA
Rapid Watershed Assessment



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North Dakota
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GRAND - 10130303
8-DIGIT HYDROLOGIC UNIT PROFILE

USDA Natural Resources Conservation Service (NRCS) September 2009

Grand Watershed

North Dakota (ND) and South Dakota (SD)

Rapid Watershed Assessment

Sponsored by:

ND Association of Soil Conservation Districts

ND Department of Health

Standing Rock Sioux Tribe

Standing Rock Conservation District

Adams County Soil Conservation District

Cedar 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

Corson Conservation District

Dewey Conservation District

Tri-County Conservation District

North Dakota
South Dakota

GRAND - 10130303
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USDA Natural Resources Conservation Service (NRCS) **September 2009**

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.

Rapid Watershed Assessment Contents
Part I Watershed Profile

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 Grand 8-Digit Hydrologic Unit Code (HUC) subbasin is approximately 1,607,800 acres in six counties located in southwest ND and northwest SD. The watershed counties include Adams and Sioux in ND and Corson, Dewey, Perkins, and Ziebach counties in SD.

The Grand River is a major tributary to the Missouri River located in both ND and SD. It is formed by the confluence of the North Fork and the South Fork of the Grand River near Shadehill Reservoir in SD. It flows east and joins the Missouri River in Lake Oahe near Mobridge, SD. Unique to the watershed is that portions of the Cheyenne River Indian Reservation and the Standing Rock Indian Reservation, as well as, a portion of the Grand River National Grasslands are located within the watershed.

The dominant land use is rangeland consisting of over 969,600 acres or 60 percent of the watershed. Pastureland accounts for 65,800 acres or 4 percent of the watershed. Beef cattle production is the primary use of pasture and rangeland. Cultivated cropland accounts for approximately 241,700 acres (15 percent) and is used to produce winter wheat and spring wheat for cash income. Most of the cropland is used to grow feed and forage crops for livestock. Agricultural production is vital to the local economy.

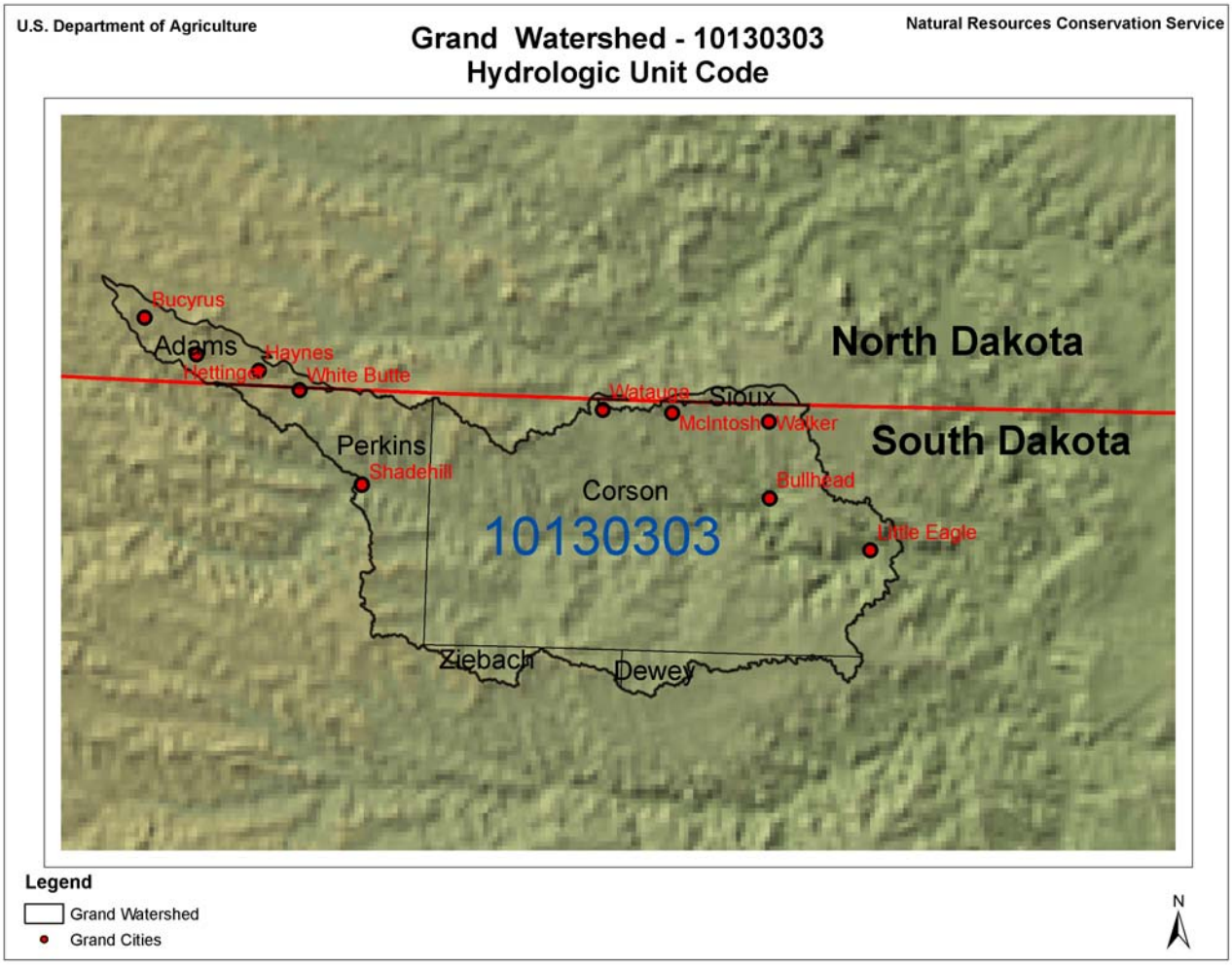
Conservation assistance is provided by six NRCS field office service centers, two field support/area offices, three Resource Conservation and Development (RC&D) Areas, and six conservation districts (CDs).

3.0 PHYSICAL DESCRIPTION

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

3.1 HYDROLOGIC UNIT CODE (HUC)[1]

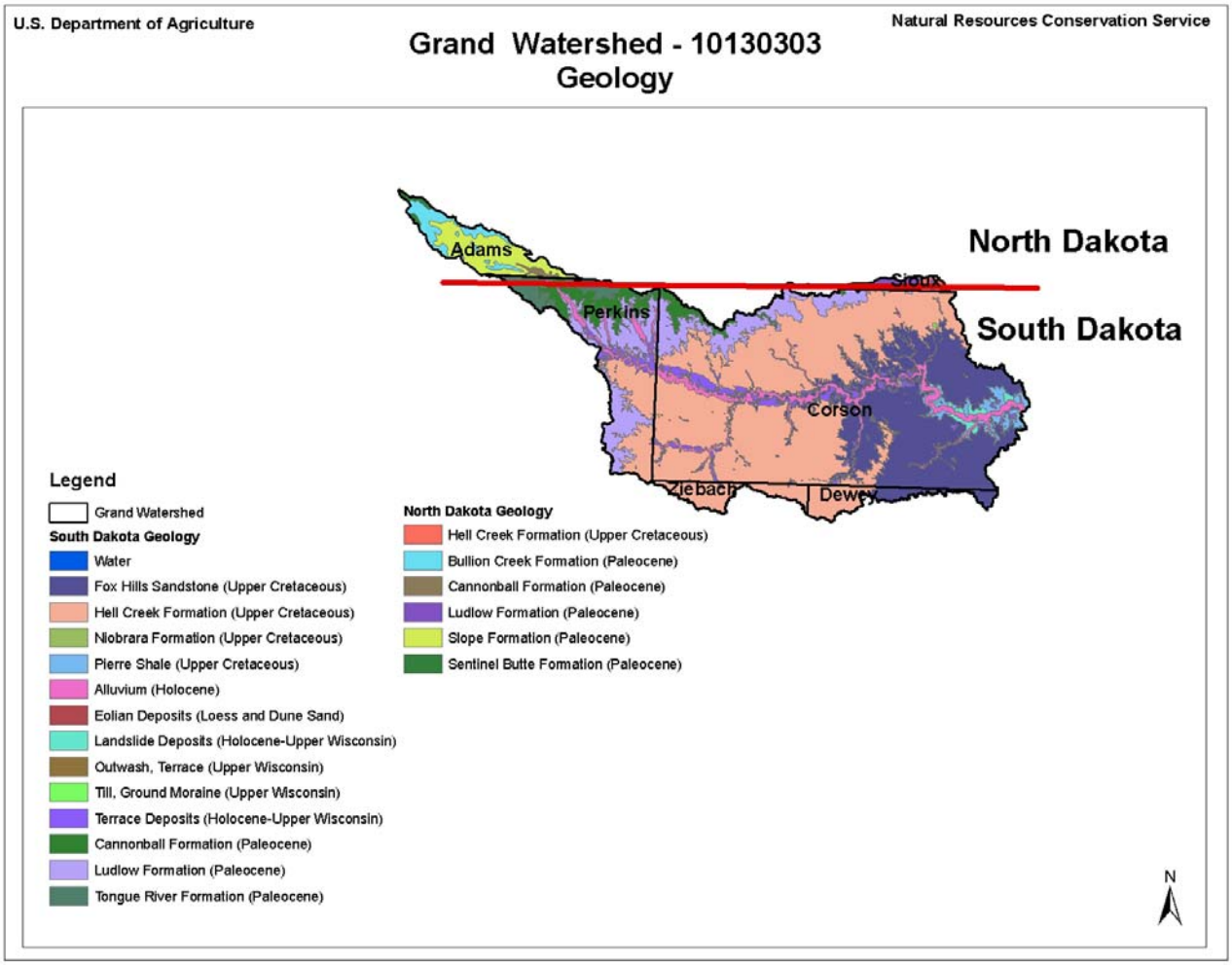
A HU is part of a multi-level watershed mapping classification system. The HU boundaries are defined by hydrographic and topographic criteria used to delineate areas of land that contribute surface water runoff to a designated outlet point, such as a lake or stream segment. The United States Geological 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]

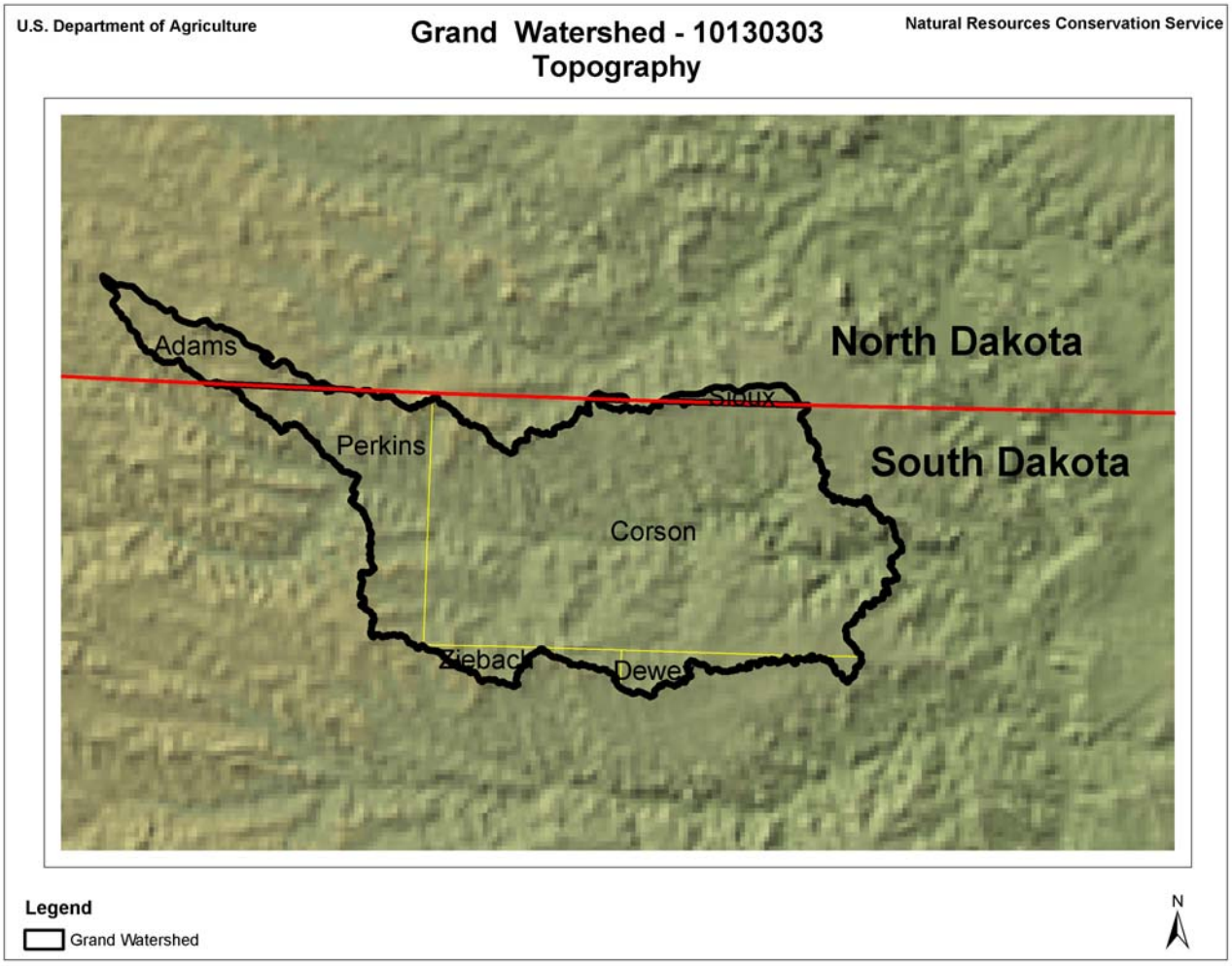
The bedrock geology of the watershed consists of a sequence of essentially horizontal, well stratified Cretaceous and Tertiary age sedimentary rocks (shale, siltstone, sandstone, and limestone) of marine origin. A large inner-continental sea periodically inundated the area depositing thick layers of sediment followed by a period of non-deposition and erosion. Near the end of the Cretaceous era the sea permanently receded and an extended period of erosion began. The bedrock layers commonly range between 100 and 300 feet thick, but may be in excess of 1,000 feet thick in some areas of the watershed.

The surface geology of the watershed is profoundly influenced by the erosion of the poorly consolidated sedimentary rock. The major streams and the tributary drainages in the watershed are highly dissected exposing the sedimentary layers. In and along the Grand River valley these rocks are mantled by terrace deposits, colluvium and alluvium of Quaternary age. The surface of the exposed layers is deeply cracked and weathers to a light gray or brown smectitic clay.



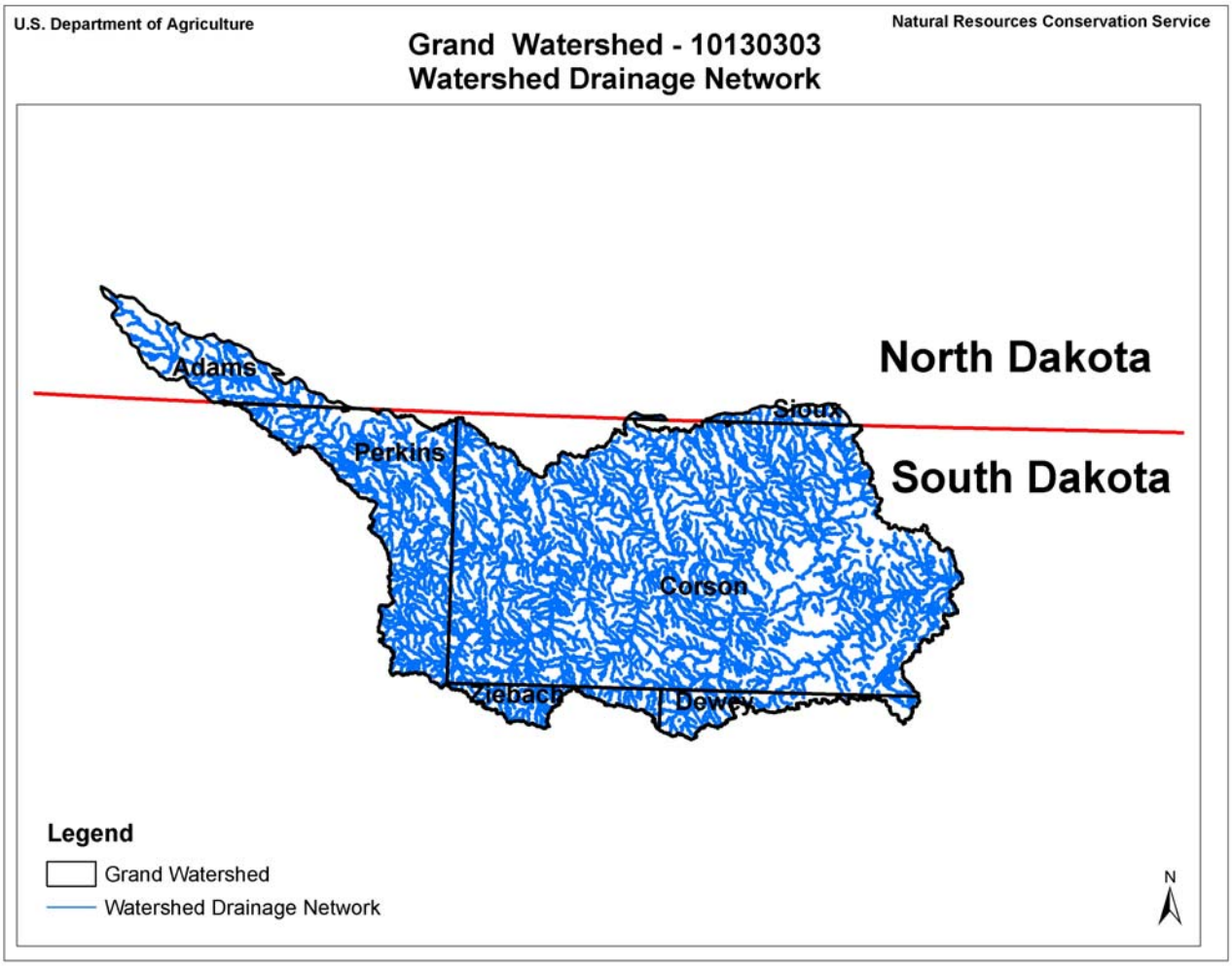
3.3 TOPOGRAPHY[1]

The watershed is in the Great Plains Physiographic Province and lies within the Missouri Plateau division. The relief of much of the watershed is characterized by gently rolling prairie topography with, numerous isolated buttes capped by resistant sandstone beds, and locally incised gullies and channels. Wide terraces, 10 to 100 feet above the channel, parallel the river along much of its course. Tributary streams have eroded channels along the edges of the terrace near the river, leaving the steep, rugged terrain of the "river breaks" above the floodplain.



3.4 DRAINAGE NETWORK

The Grand River is the principal drainage system of the watershed. Stream flow is highly variable in the Grand River and its tributaries, the highest stream flow rates occur in March – April a result of melting snow or flash floods following intense summer rain storms. No base flow is maintained and portions of the river may be dry following extended dry periods in the summer and fall.



3.5 CLIMATE

The climate of the Grand Watershed is semi-arid and continental, characterized by large seasonal fluctuations in temperature, long winters, warm summers with moderate to low 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-

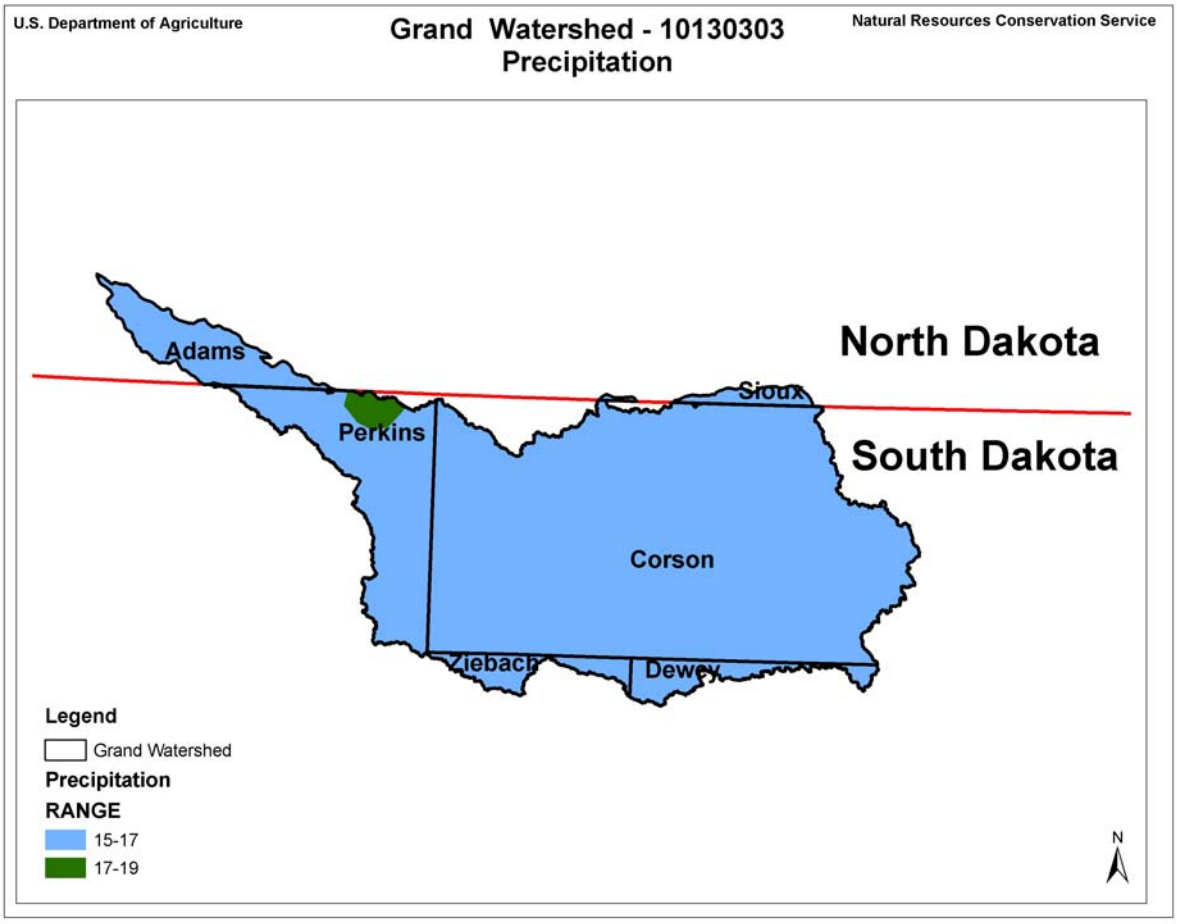
May and the first killing frost in mid-September. Many freeze-thaw events occur in the fall and early spring.

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, precipitation, wind speed, and relative humidity data used to represent the watershed are from the U.S. Weather Bureau Station at McIntosh, SD the county seat of Corson County, which is located on the north central edge of the watershed and the weather reporting station at the municipal airport in Lemmon, SD.

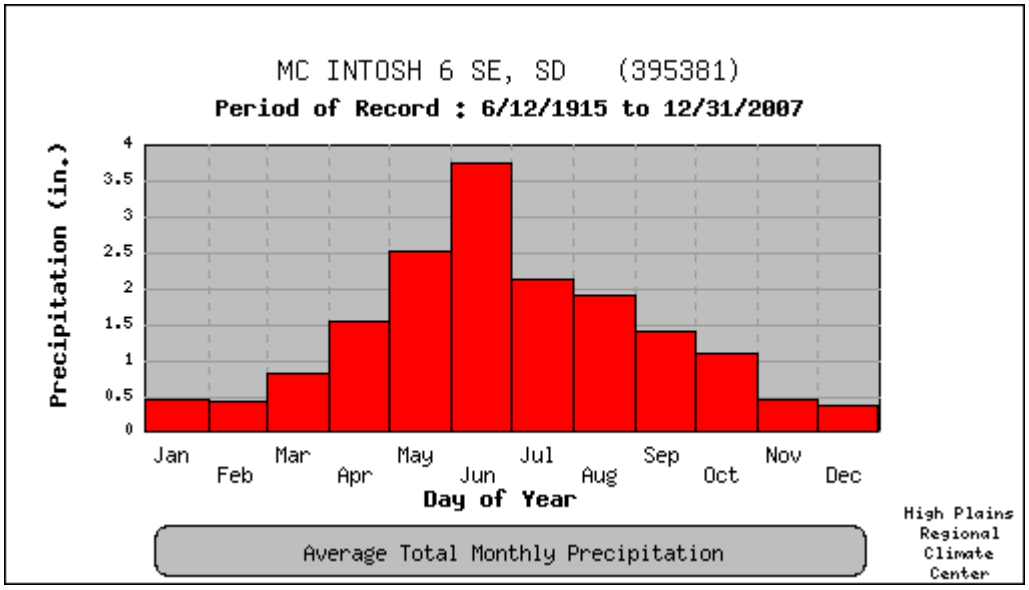
3.5.1 Precipitation[4]

The average annual precipitation for the watershed area is 16.4 inches per year measured at the U.S. Weather Bureau Station at McIntosh, SD.



3.5.1a Precipitation Distribution Graph

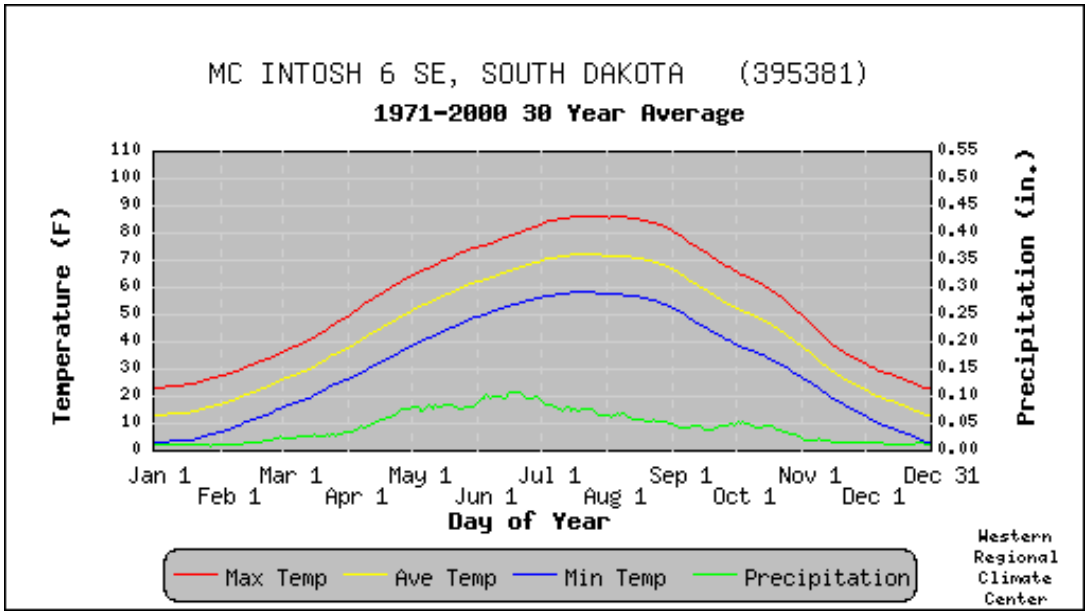
Period of Record - Monthly Average Total Precipitation



- 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.

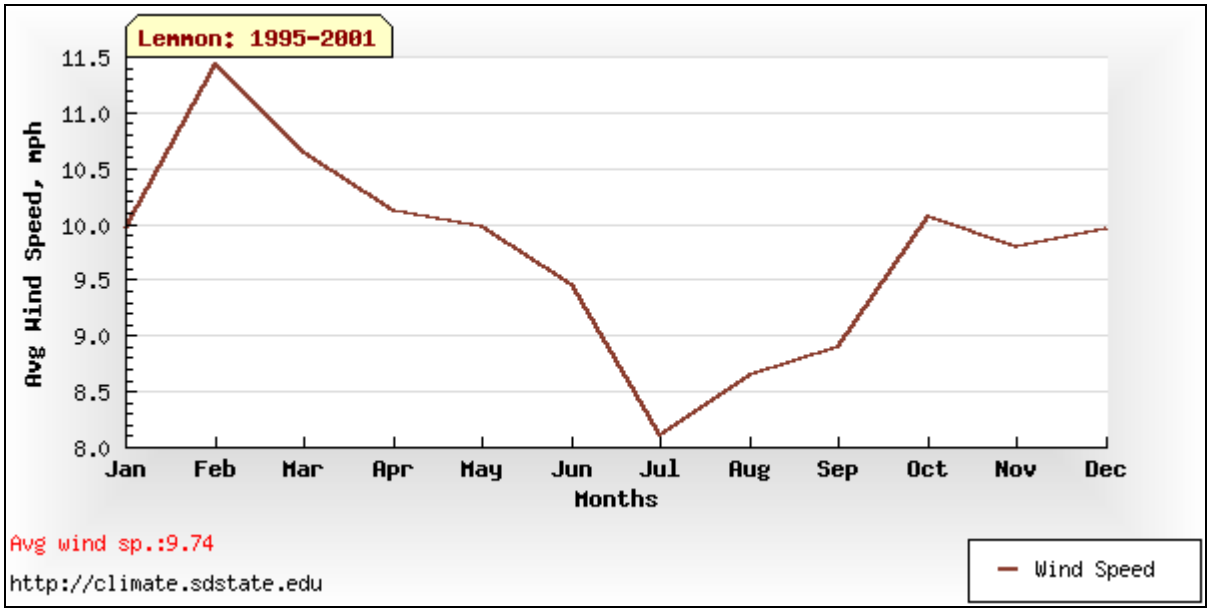


Data is smoothed using a 29 day running average.

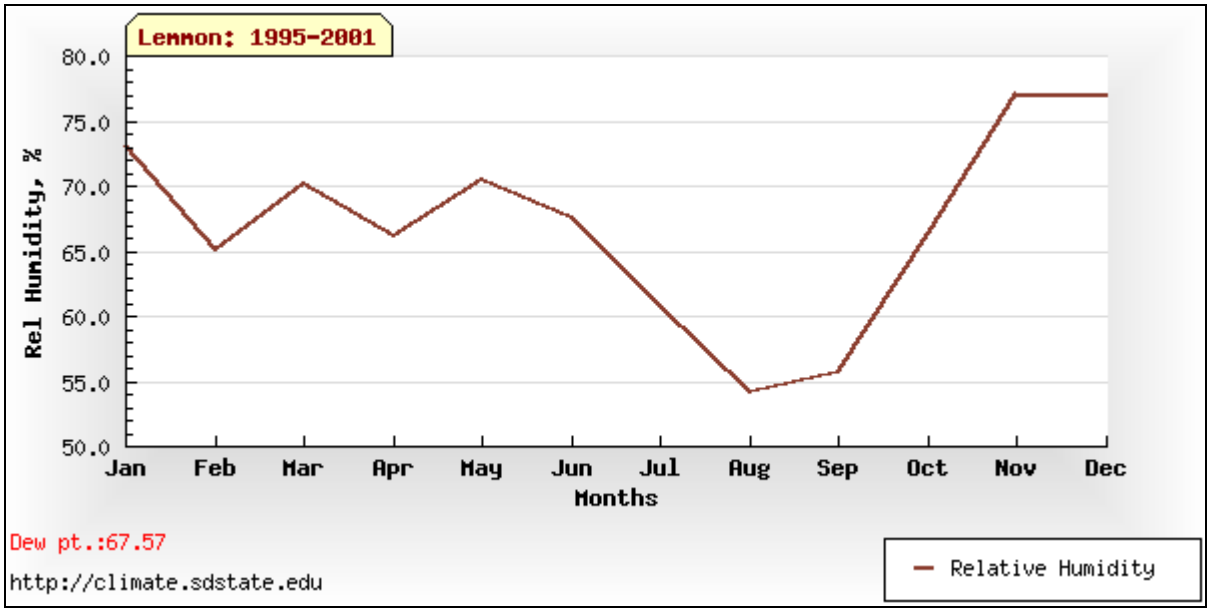
- Maximum Temp. is the average of all daily maximum temperatures recorded for the day of the year between the years 1971 and 2000.
- Average Temp. is the average of all daily average temperatures recorded for the day of the year between the years 1971 and 2000.
- Minimum Temp. is the average of all daily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

Average Wind

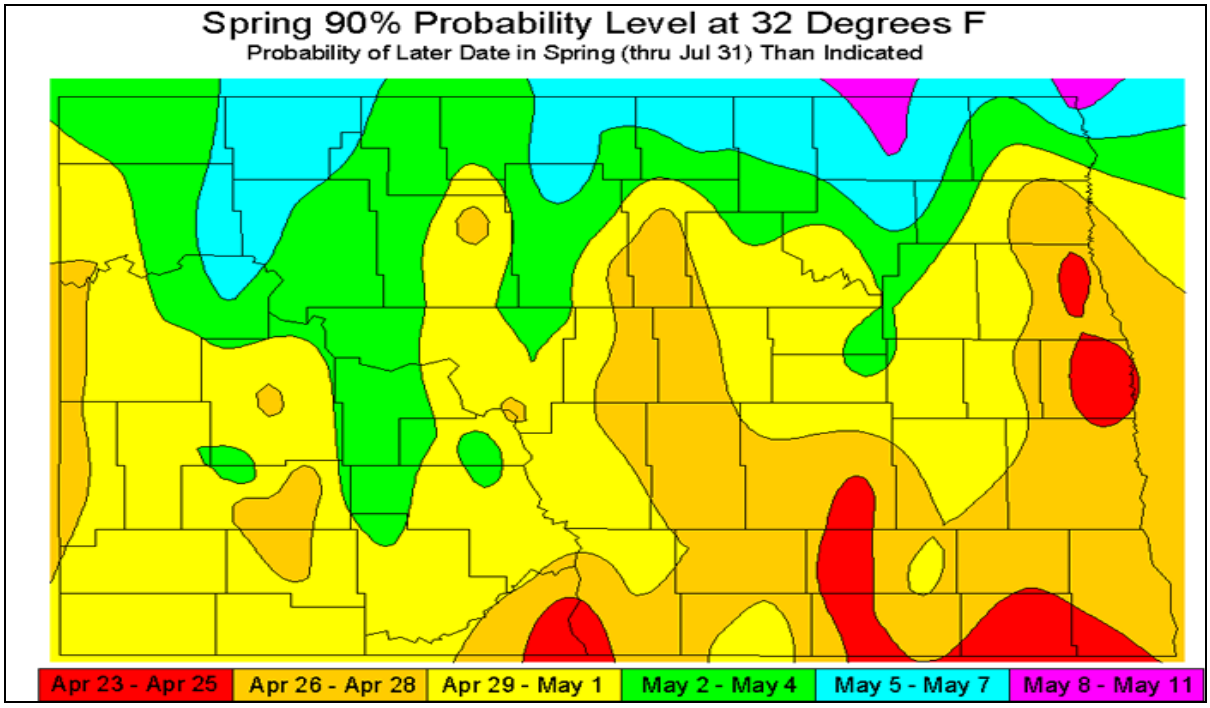


3.5.4 Average Monthly Relative Humidity[5]



3.5.5 Last Spring Freeze[5] [6]

North Dakota



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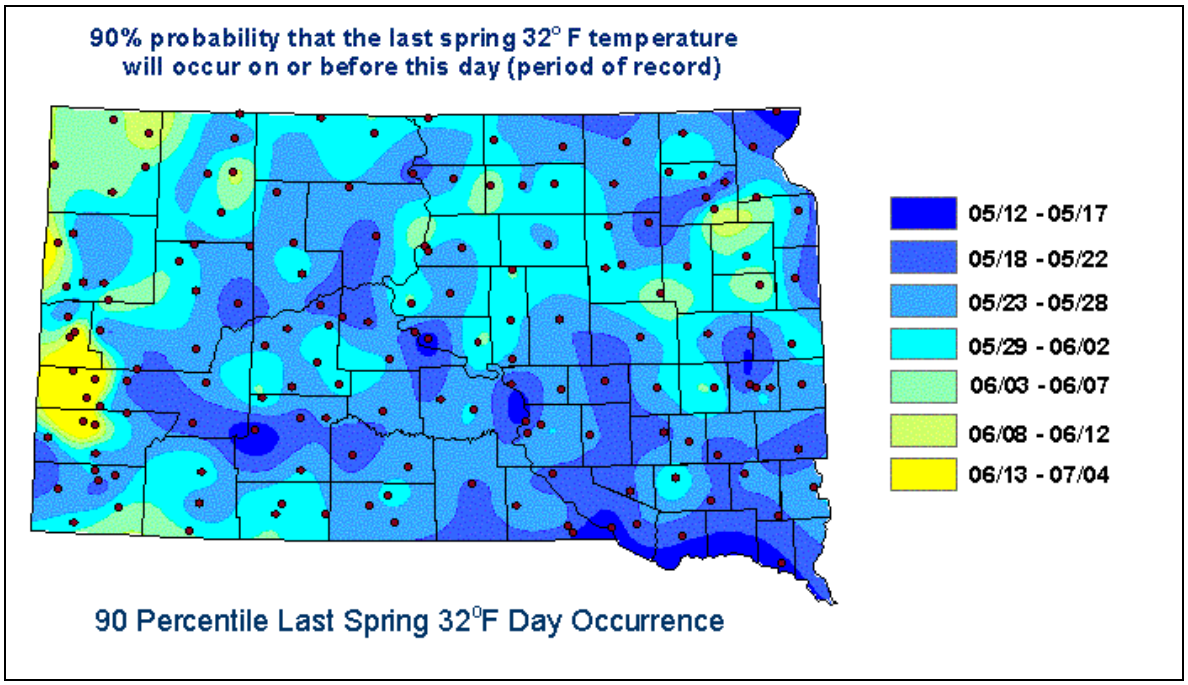

3.5.6 First Fall Freeze[5 6]

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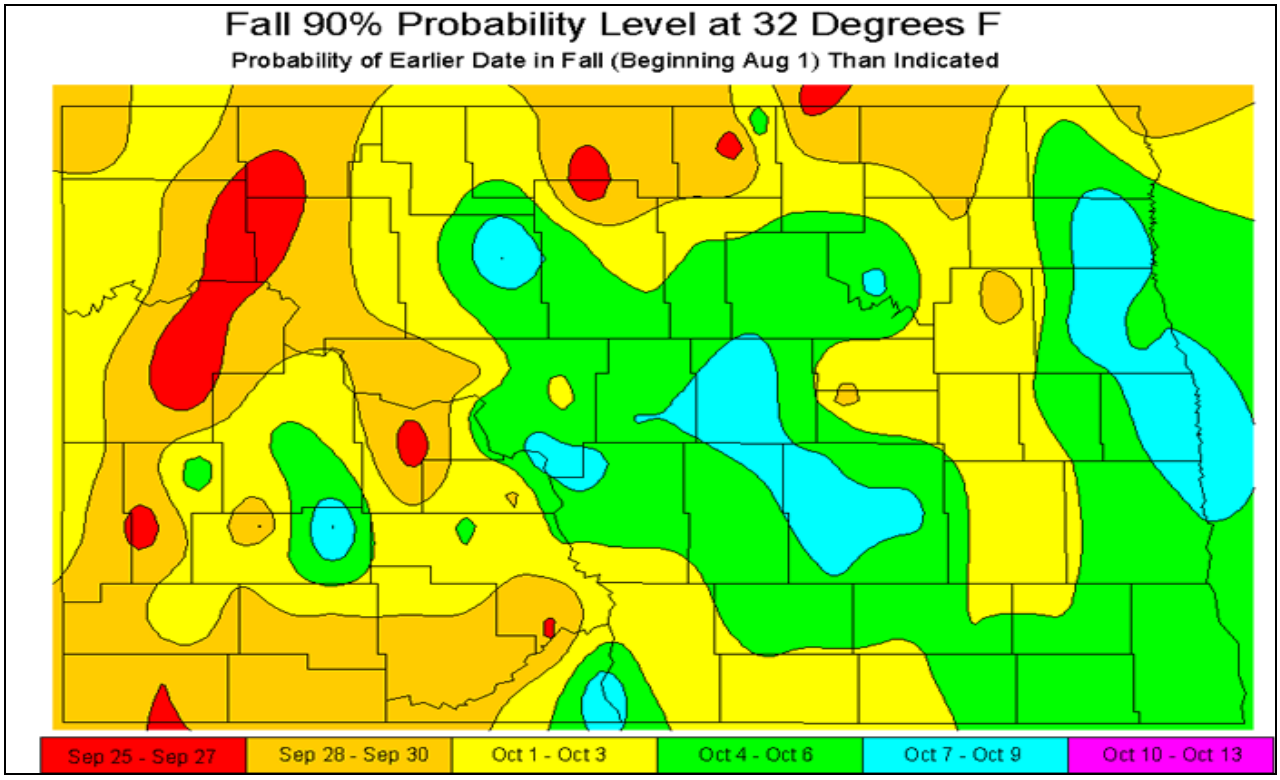

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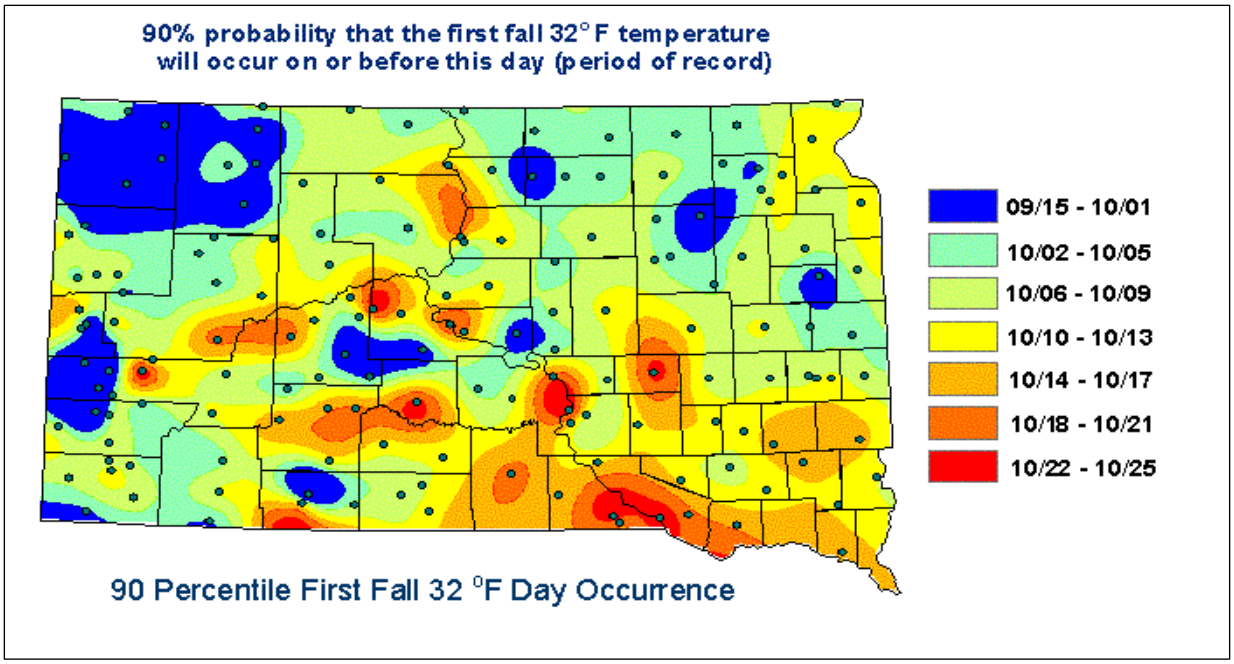


3.5.7 Climate Summary[7]

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

MCINTOSH, SD (395381)
Period of Record Monthly Climate Summary

Period of Record : 6/12/1915 to 12/31/2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	24.1	28.8	40.0	56.5	68.6	78.0	86.3	85.1	73.5	60.4	41.0	28.6	55.9
Average Min. Temperature (F)	2.4	7.3	18.2	31.1	42.2	52.2	57.8	55.7	45.3	34.1	19.7	7.9	31.2
Average Total Precipitation (in.)	0.38	0.38	0.78	1.53	2.47	3.53	2.13	1.87	1.41	1.08	0.45	0.36	16.35
Average Total SnowFall (in.)	4.6	4.7	6.7	3.4	0.5	0.0	0.0	0.0	0.1	1.1	3.7	4.3	29.0
Average Snow Depth (in.)	4	5	3	0	0	0	0	0	0	0	1	3	1

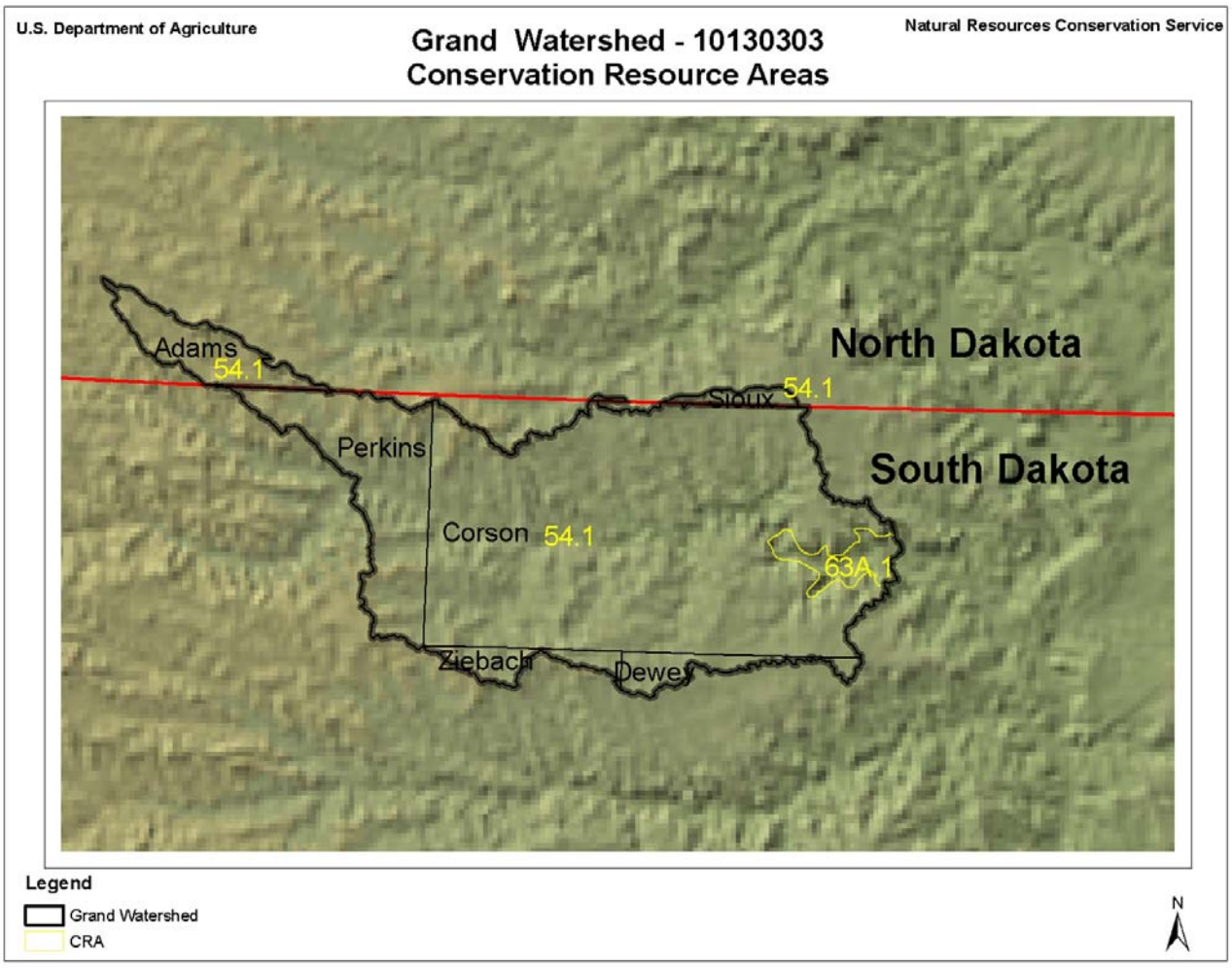
High Plains Regional Climate Center

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 MLRA' 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.

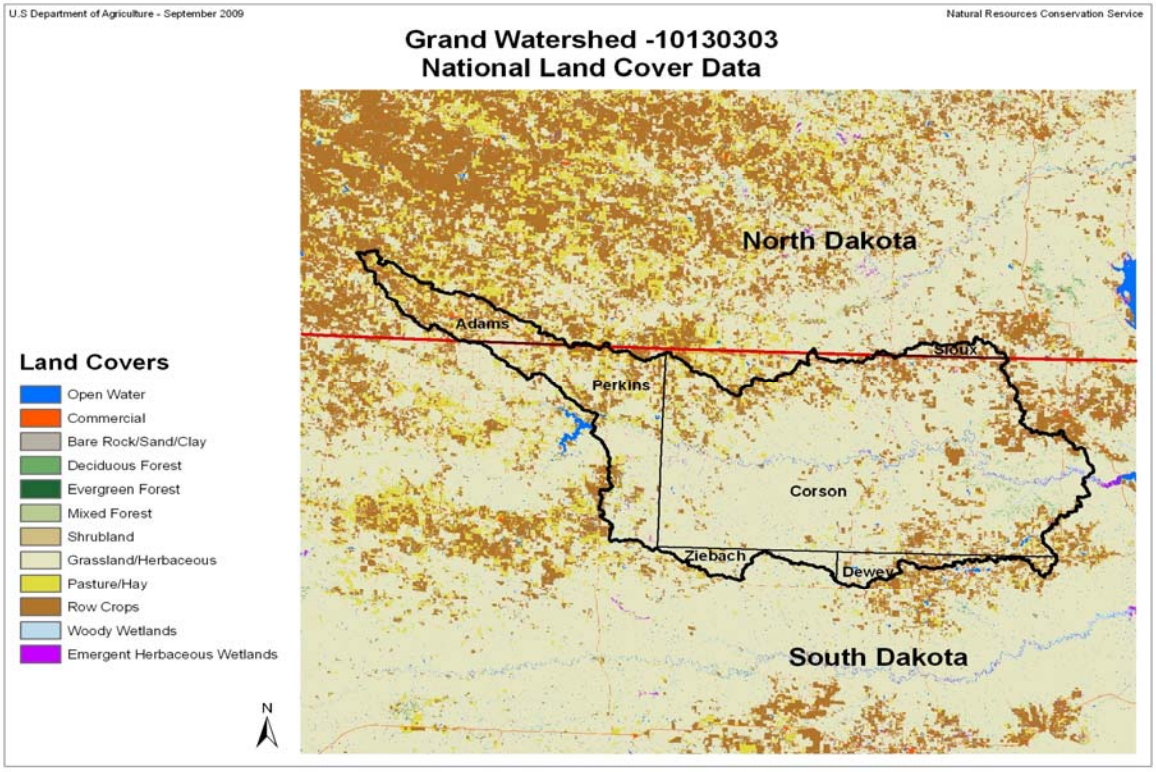


4.1.1 Common Resource Area Descriptions

Symbol	Name	Brief Description
54.1	Rolling Soft Shale Plain	About three-fifths of this area is in native grasses and shrubs used for grazing livestock. The cropped areas are used for dominantly small grain production and some sunflowers. The area is moderately dissected rolling plain. Most soils are moderately deep and deep, well drained and moderately well drained, loamy and clayey and have a frigid temperature regime.
63A.1	Northern Rolling Pierre Shale Plains	Most of the area is used for livestock production with some cropped areas. Winter wheat is the main crop. Most of these soils are fine and very fine textured with a mesic temperature regime.

4.2 LAND COVER AND LAND USE DISTRIBUTION[8]

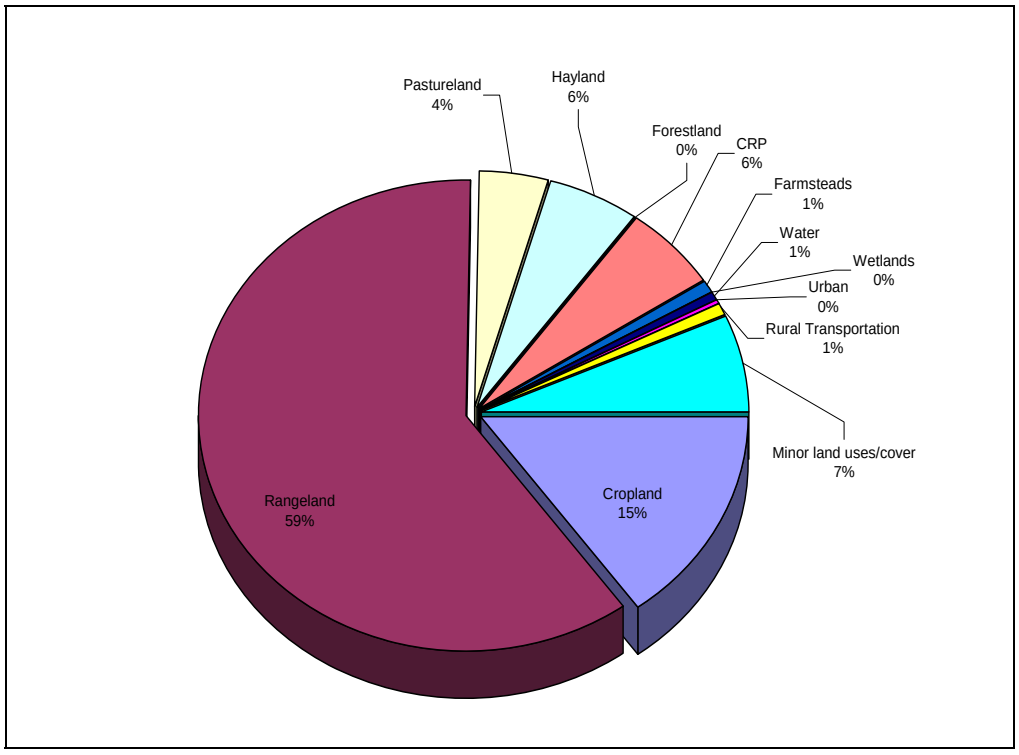
The National Resources Inventory (NRI) uses the term land cover/use to identify the categories that account for all the surface area in the United States. Land cover describes the different types of vegetation or other kind of material that covers the land surface. Land use is defined as the purpose 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

Grand Land Cover/Use (1997 NRI)	Acres	Percent*
Cropland	241,700	15
Rangeland	969,600	60
Pastureland	65,800	4
Hayland	91,100	6
Forestland	0	0
CRP	92,200	6
Farmsteads	13,200	1
Wetlands	0	0
Water	8,700	1
Urban	4,600	0
Rural Transportation	13,300	1
Minor land uses/cover	107,600	7
Total	1,607,800	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 includs 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	361,800	22
III - severe limitations	273,300	17
IV - very severe limitations	224,900	14
V - no erosion hazard, but other limitations	0	0
VI - very severe limitations, unsuited for cultivation, limited to pasture, range, forest	495,300	31
VII - very severe limitations, unsuited for cultivation, limited to grazing, forest, wildlife	138,700	9
VIII – misc. areas have limitations, limited to recreation, wildlife, and water supply	38,900	2
Other Acres Not Determined – includes water, rock outcrop, non-soil areas	87,400	5
Total Acres	1,620,300	100

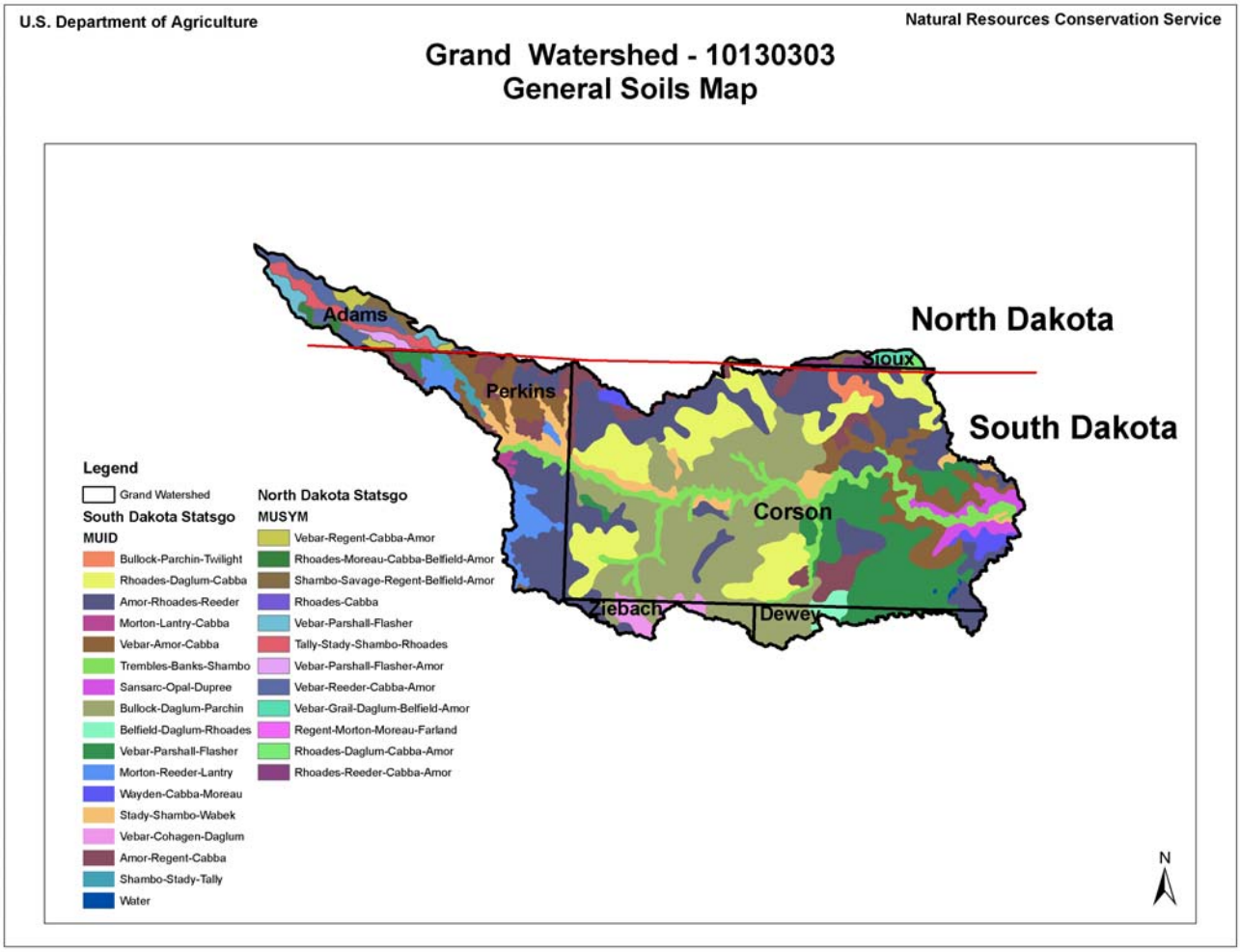
4.2.3 Prime Farmland[1]

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	23,100	1
Other Acres	1,597,200	99

4.3 GENERAL SOILS

The Pierre Shale is the parent material for the erodible, gray-black clay soils. Soils formed from this formation typically have clay content exceeding 50 percent (textural Class III) of the mineral fraction of the soil. Some younger, lighter-colored silt, sand, and clay soils overlie the shale in the uplands area. These deposits are less consolidated and generally more erodible than the Pierre Shale. 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 28 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.

North Dakota Soil Associations

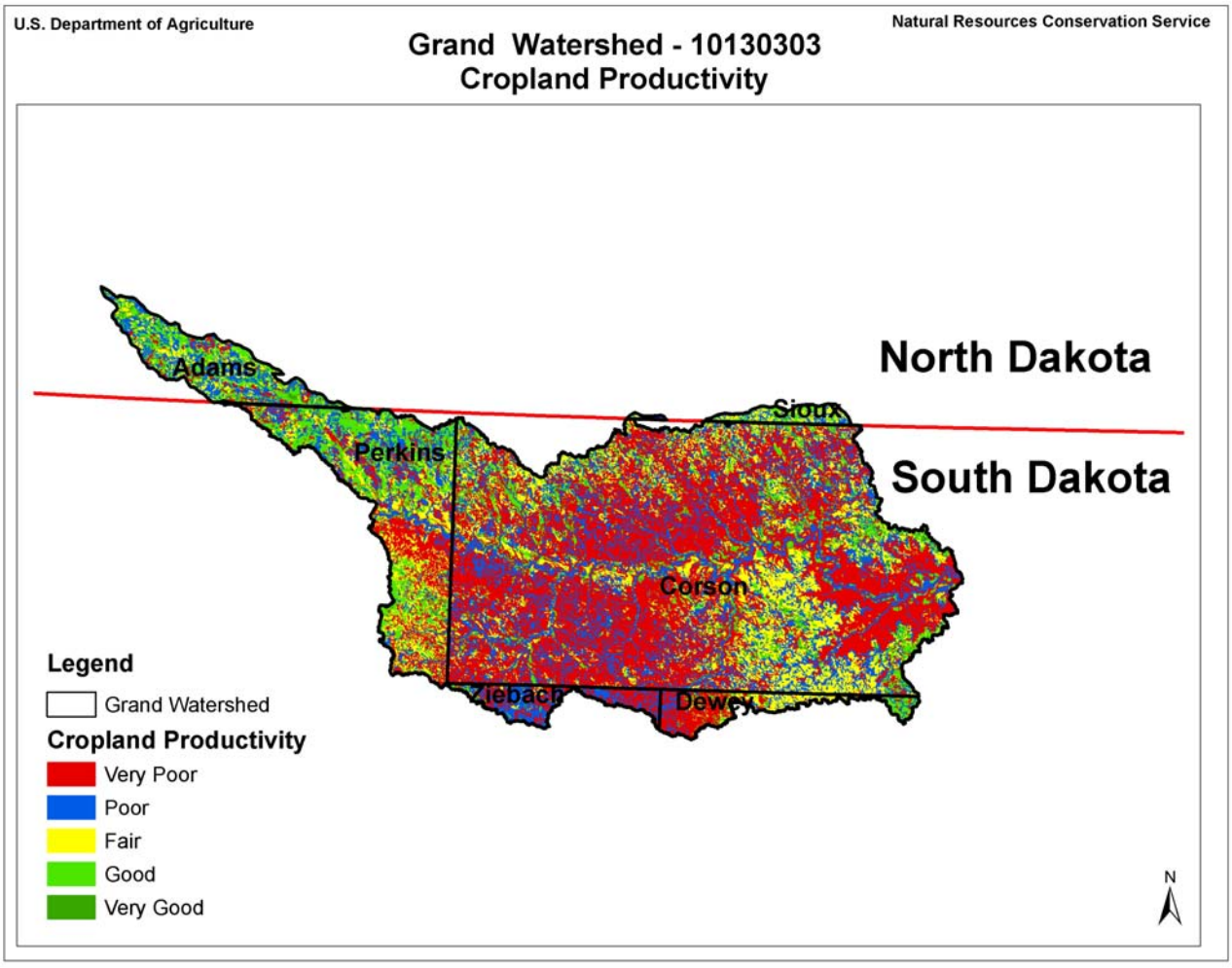
Map Unit Identification	Soil Association Name	General Soils Description
s4800	VEBAR-REGENT-CABBA-AMOR	Shallow and moderately deep, gently sloping to strongly sloping, loamy and clayey soils on residual uplands.
s4804	RHOADES-MOREAU-CABBA-BELFIELD-AMOR	Shallow and moderately deep, well drained and strongly sloping to steep loamy and clayey soils on uplands.
s4805	SHAMBO-SAVAGE-REGENT-BELFIELD AMOR	Moderately deep to very deep, nearly level to moderately sloping, loamy and clayey soils on uplands and terraces.
s4812	RHOADES-CABBA	Shallow and deep, well drained and moderately well drained, nearly level to moderately steep, loamy soils on uplands and terraces.
s4815	VEBAR-PARSHALL-FLASHER	Shallow to very deep, well drained and somewhat excessively drained, nearly level to steep sandy and loamy soils on uplands.
s4824	TALLY-STADY-SHAMBO-RHOADES	Very deep, moderately well drained to well drained, nearly level to moderately sloping loamy soils on uplands, fans and terraces
s4828	VEBAR-PARSHALL-FLASHER-AMOR	Shallow to very deep, well drained and somewhat excessively drained, nearly level to steep sandy and loamy soils on uplands.
s4829	VEBAR-REEDER-CABBA-AMOR	Shallow and moderately deep, well drained, nearly level steep loamy soils on uplands.
s4832	VEBAR-GRAIL-DAGLUM-BELFIELD-AMOR	Moderately deep to very deep, well drained, nearly level to strongly sloping, loamy and clayey soils on uplands and terraces.
s4842	REGENT-MORTON-MOREAU-FARLAND	Deep and moderately deep, well drained, nearly level to moderately sloping loamy and clayey soils on uplands.
s6782	RHOADES-DAGLUM-CABBA-AMOR	Deep to shallow, well drained and moderately well drained. nearly level to strongly sloping, loamy and clayey soils on uplands and terraces.
s6783	RHOADES-REEDER-CABBA-AMOR	Deep to shallow, well drained and moderately well drained, nearly level to moderately sloping loamy soils on uplands and terraces.

South Dakota Soil Associations

Map Unit Identification	Soil Association Name	General Soils Description
SD005	BULLOCK-PARCHIN-TWILIGHT	Moderately deep and deep, well drained, nearly level to strongly sloping, loamy soils on sedimentary plains.
SD012	RHOADES-DAGLUM-CABBA	Shallow and deep, well drained and moderately well drained, nearly level to moderately steep, loamy soils on uplands and terraces.
SD013	AMOR-RHOADES-REEDER	Deep and moderately deep, well drained and moderately well drained, nearly level to moderately sloping loamy soils on uplands and terraces.
SD014	MORTON-LANTRY-CABBA	Shallow and moderately deep, well drained, moderately sloping to steep loamy soils on uplands.
SD015	VEBAR-AMOR-CABBA	Shallow and moderately deep, well drained, nearly level steep loamy soils on uplands.
SD016	TREMBLES-BANKS-SHAMBO	Very deep, well drained to excessively drained, nearly level sandy and loamy soils on flood plains and terraces.
SD066	SANSARC-OPAL-DUPREE	Shallow and moderately deep, well drained, gently sloping to very steep clayey soils on shale hills.
SD192	BULLOCK-DAGLUM-PARCHIN	Moderately deep and deep, well drained, nearly level to moderately sloping, sodium affected loamy soils on sedimentary plains.
SD193	BELFIELD-DAGLUM-RHOADES	Very deep, moderately well and well drained, nearly level to gently sloping, sodium affected loamy and clayey soils on sedimentary plains.
SD194	VEBAR-PARSHALL-FLASHER	Shallow to very deep, well drained and somewhat excessively drained, nearly level to steep sandy and loamy soils on uplands.
SD195	MORTON-REEDER-LANTRY	Moderately deep, well drained, nearly level to moderately sloping loamy soils on uplands.
SD196	WAYDEN-CABBA-MOREAU	Shallow and moderately deep, well drained and strongly sloping to steep, loamy and clayey soils on uplands.
SD198	STADY-SHAMBO-WABEK	Very deep, well drained and excessively drained, nearly level to steep sandy and loamy soils on uplands.
SD208	VEBAR-COHAGEN-DAGLUM	Shallow to deep, well drained and moderately well drained, nearly level to steep, loamy soils on uplands and terraces.
SD209	AMOR-REGENT-CABBA	Moderately deep and shallow, well drained, nearly level to steep loamy soils on uplands.
SD258	SHAMBO-STADY-TALLY	Very deep, well drained, nearly level to moderately sloping loamy soils on uplands.

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.



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

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 2-6 percent slopes
90-100	Very Good	Dark Green	Silty or loamy soils with high soil organic matter levels

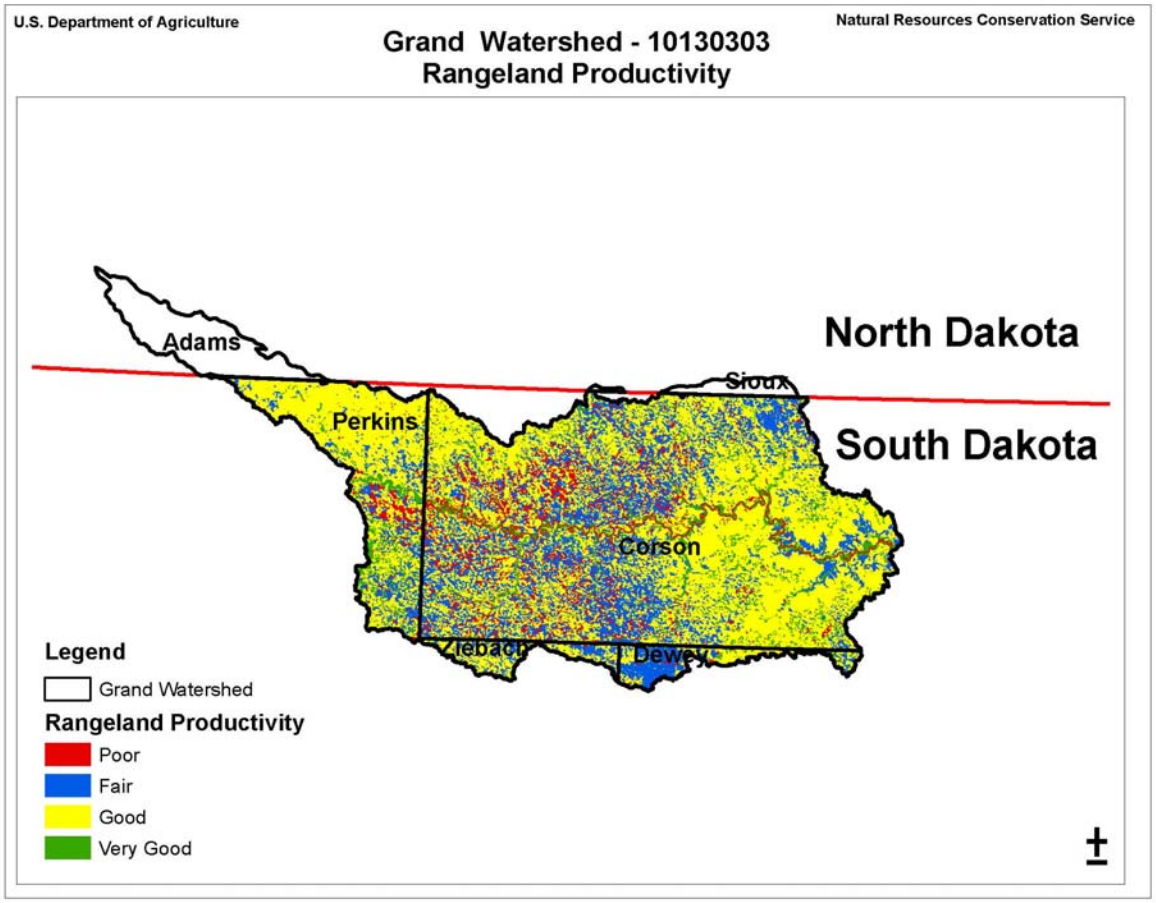
4.5 RANGELAND PRODUCTION (NORMAL YEAR)[1]

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.



The development of the ND Rangeland Productivity data base is in progress.

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 Induced	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		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

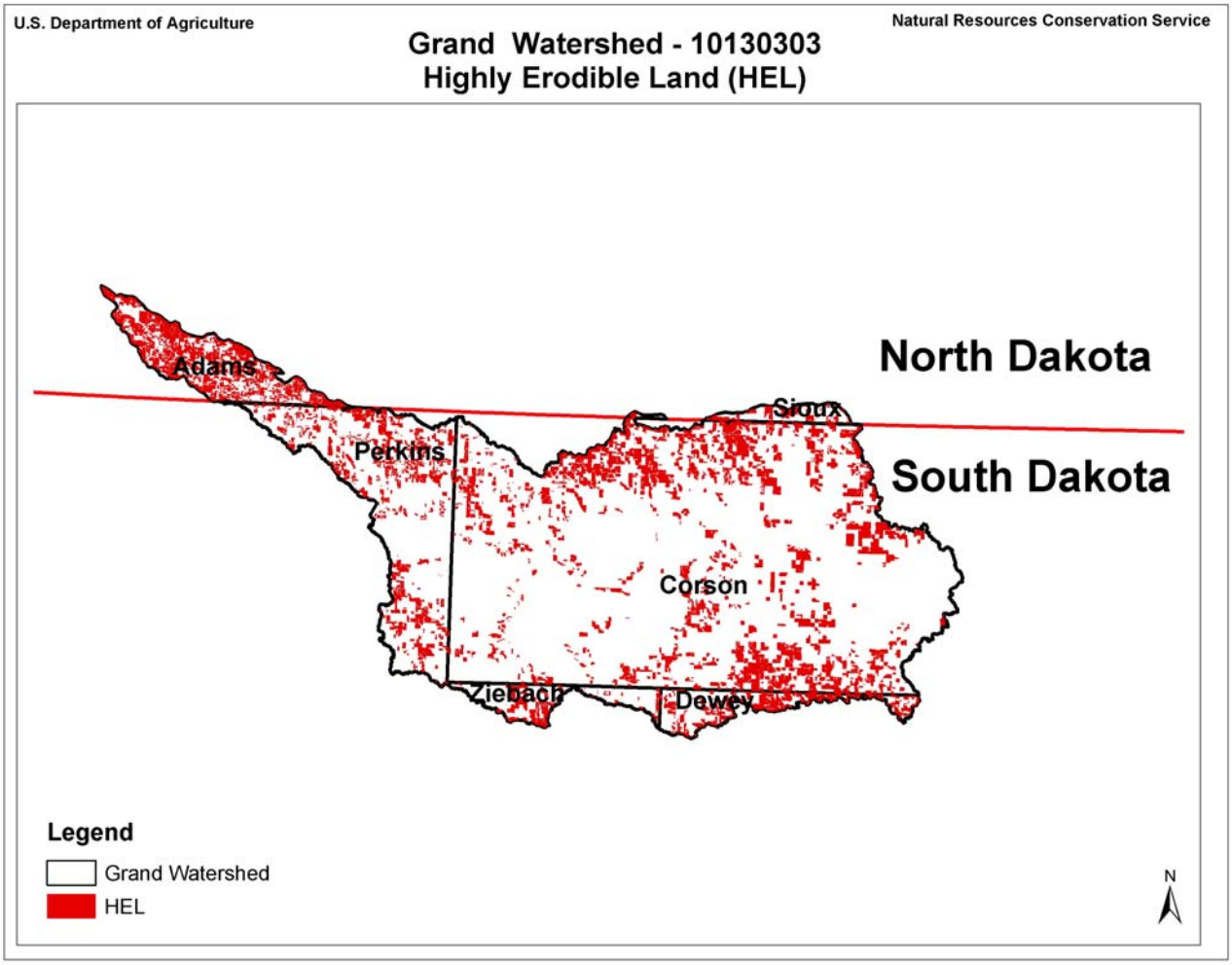
5.2 SOIL EROSION - WIND AND WATER[1]

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)	1.59	490,800	780,372
	Water (USLE)	1.17	490,800	574,236

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]

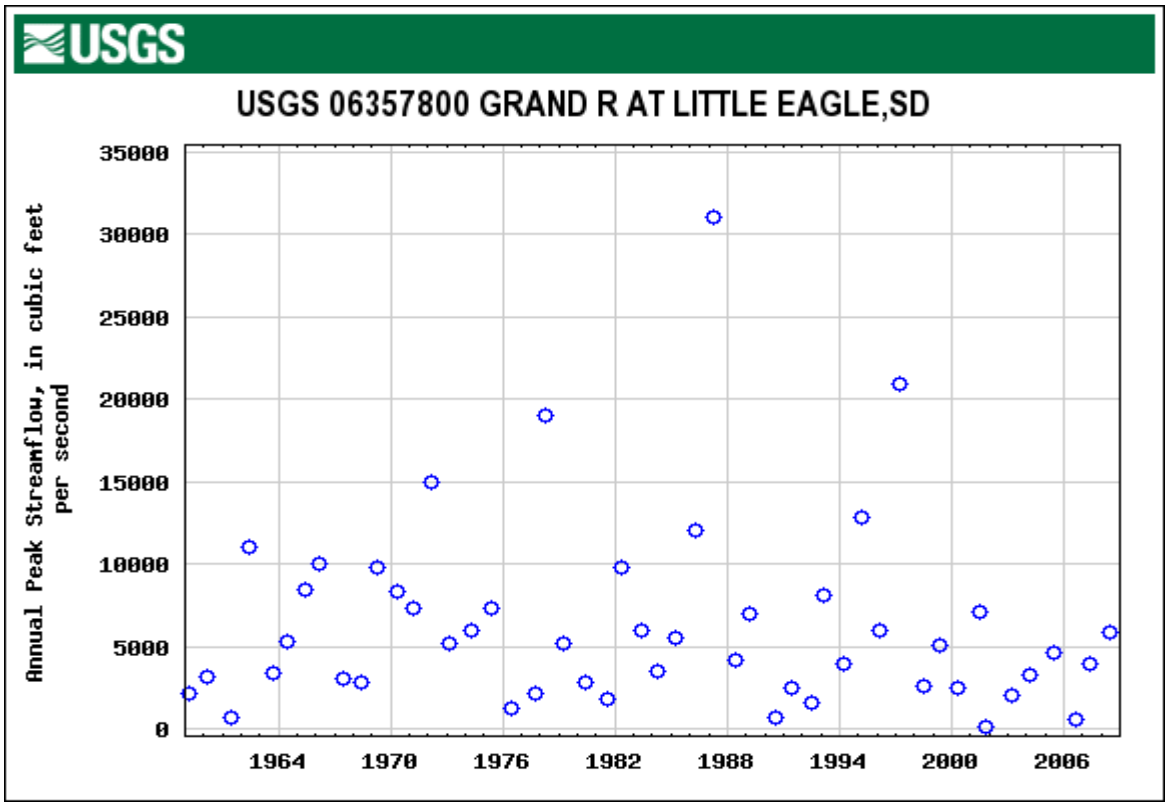
The NRI data collected for streams and water bodies within the watershed.

Water Resources – 1997 NRI	Acres	Percent
Streams <660’ wide and water bodies <40 Ac	7,2000	0.4
Streams >660' wide and water bodies >40 Ac	1,5000	0.1

5.3.2 Peak Stream Flow[8]

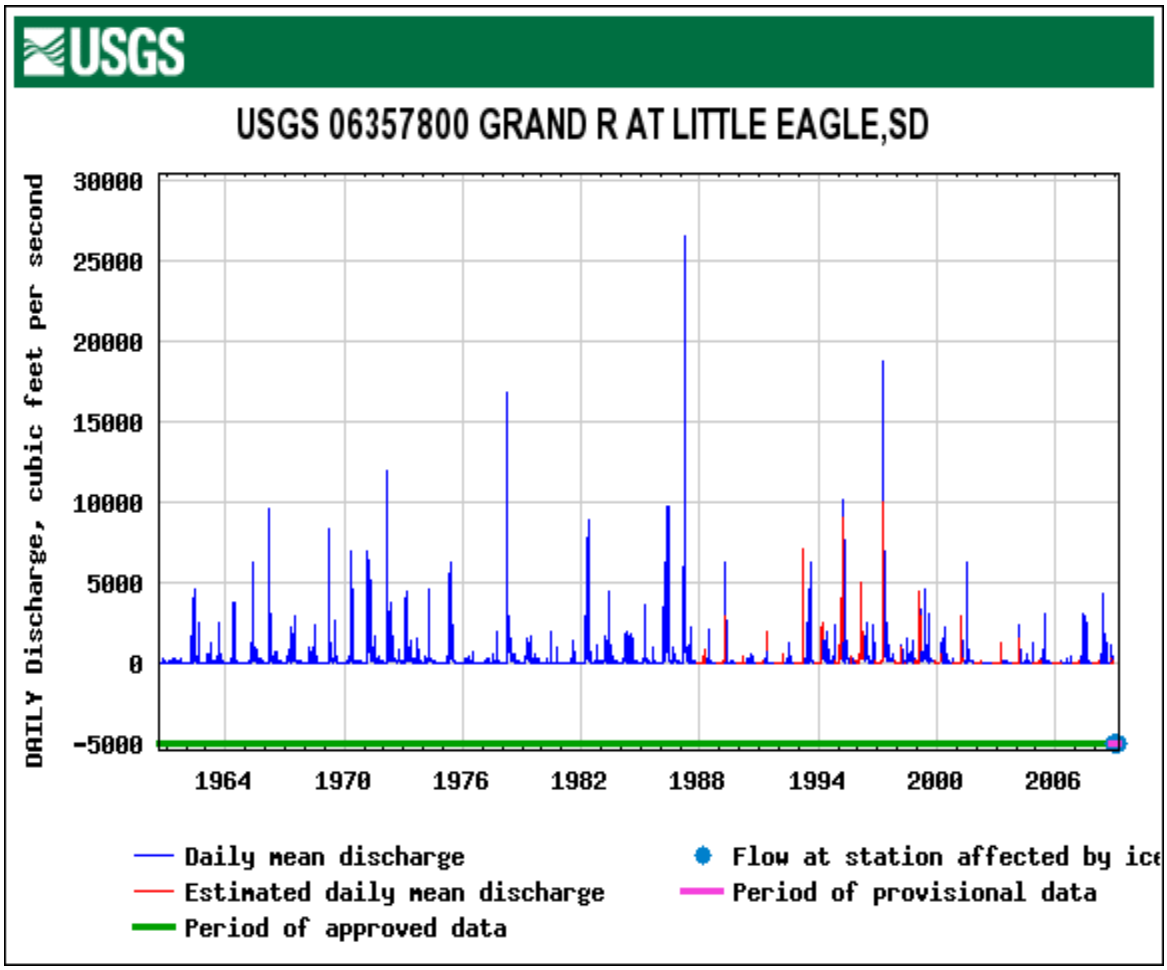
The USGS has collected stream flow data at several sites along the Grand River. For this report the recording station at Little Eagle, SD will represent historic peak stream flow and daily discharge within the watershed.. The site has a drainage area of 5,370 square miles and is located near the eastern boundary of the watershed.

Peak stream flow data was collected from 1960 through 2009.



5.3.3 Daily Discharge[8]

Daily discharge data was recorded from 1960 through 2009.



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, localized alluvial or colluvial deposits of sands and gravels along floodplains. These aquifers 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 occur between confining layers of impermeable bedrock. The quality of this water is often variable but usually of lower quality than that of shallow aquifers. As a result of the confining 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:

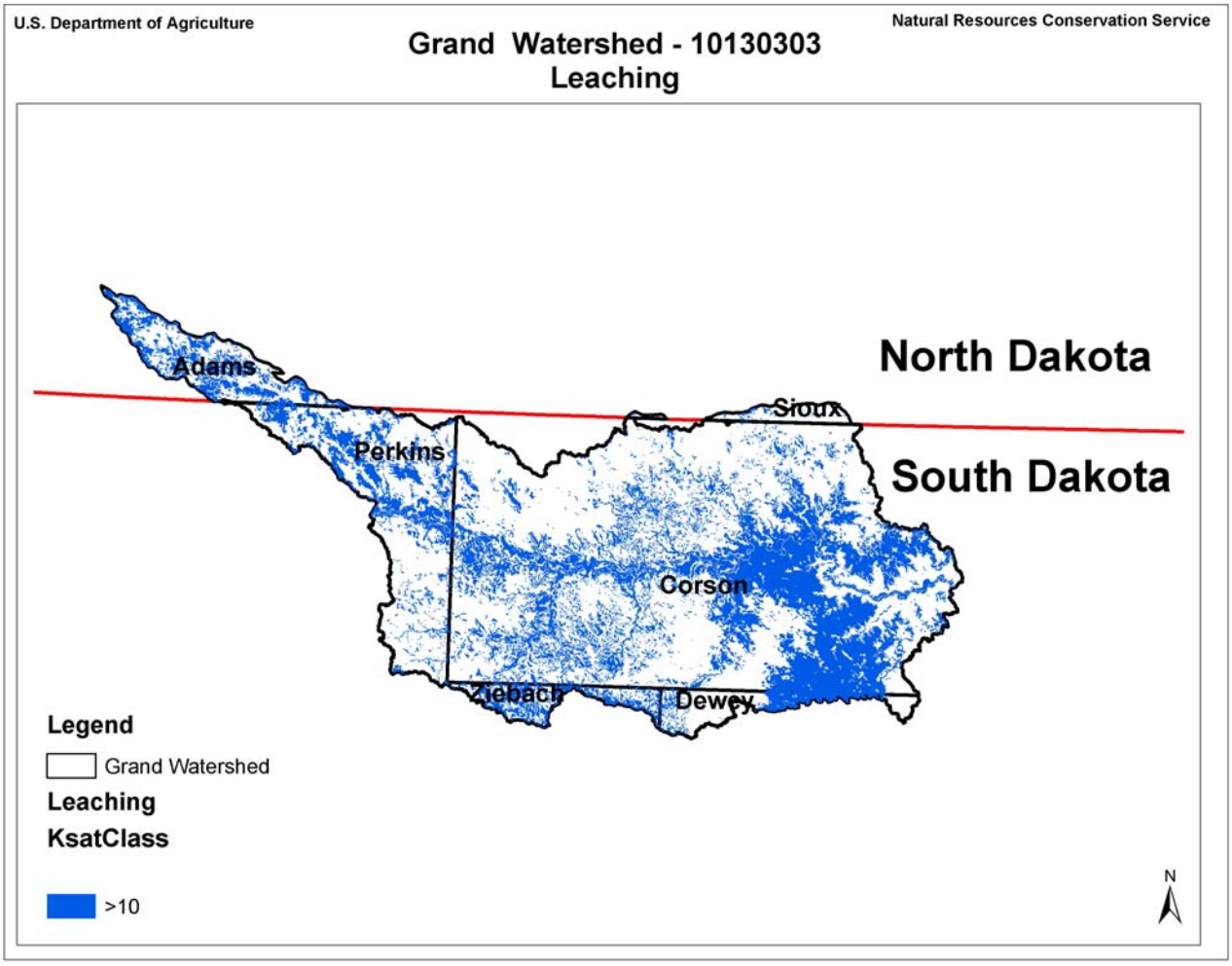
Factors that affect the availability, quantity, and occurrence of ground water in the Grand River valley include the type and permeability of the soil and the permeability, structure, thickness, and lateral extent of the underlying rock formations which constitute the underground reservoir. Water from rain and snow is transmitted freely to the ground water reservoir by the sandy soil that generally overlies the Fox Hills sandstone and the silty or sandy soil of the alluvium.

The alluvium that underlies the valley floor is the principal source of groundwater. It is recharged by water percolating from the bedrock by the river when it is at high stage and by precipitation. During periods of low precipitation and runoff, the alluvium discharges ground water into the river.

Shallow Aquifers:
- Alluvium

Bedrock Aquifers:
- Hell Creek Formation
- Fox Hills Sandstone

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.

North Dakota

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
(2) Contaminant Source Inventory
(3) 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

South Dakota

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]

North Dakota

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.

South Dakota

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 the 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 Grand Watershed.

Grand Watershed					
Segment or Lake Name	**Segment or Lake Location**	**Impairment**	**Status**	**Status Date**	**Initial Listing**
ND Lakes					
Mirror Lake	Adams County, ND	Nutrient/Eutrophication Biological Indicators; Oxygen, Dissolved; and Sedimentation/Siltation	Fully Supporting But Threatened	2008	NA
ND Streams					
Flat Creek	Flat Creek, downstream to Mirror Lake. Located in Adams County.	Nutrient/Eutrophication Biological Indicators	Fully Supporting But Threatened	2008	NA
Flat Creek	Flat Creek from Mirror Lake downstream to the ND-SD border. Located in Adams County.	Fecal Coliform	Fully Supporting But Threatened	2008	NA
SD Lakes					
Flat Creek Dam	Perkins County	TSI	Water Impaired Requires a TMDL; Not Initiated	2008	2004
Lake Isabel	Dewey County	Mercury, pH, TSI	Water Impaired Requires a TMDL; Not Initiated	2008	2004
SD Streams and Rivers					
Grand River	Shadehill Reservoir to the Mouth	Salinity, pH, Fecal Coliform, TSS, Temperature	Water Impaired Requires a TMDL; Not Initiated	2008	1998

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 or reservoir. 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, reservoirs 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.

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Watershed Projects, Plans, Studies, and Assessments

ND NRCS Watershed Project			ND NRCS Watershed Plans, Studies, and Assessments		
Name	**Status**	**Goals:**	**Name**	**Status**	**Goals:**
None	NA	NA	None	NA	NA
NDDH Water Quality Projects or ND Soil Conservation District Watershed Projects			NDDH or ND Soil Conservation District Watershed Plans, Studies or Assessments		
Name	**Status**	**Goals:**	**Name**	**Status**	**Goals:**
None	NA	NA	None	NA	NA
NDDH – EPA 319 Watershed Projects					
Mirror Lake Watershed	Completed				
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:**
None	NA	NA	None	NA	NA
Grand Watershed Projects, Plans, Studies, and Assessments					
NRCS Watershed Projects			**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 Conservation District Water Quality Assessments or Studies		
Name	**Status**	**Results:**	**Name**	**Status**	**Results:**
None	NA	NA	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 Grand Watershed. Farms and ranches raise mainly beef cattle or sheep. There are very few CAFOs in the watershed and livestock typically graze the open rangeland and grasslands

North Dakota

Animal Feeding Facilities – North Dakota Department of Health Permit					
Animal Type	**Dairy**	**Beef**	**Swine**	**Sheep**	**Total**
Number of Animal Feeding Operations	0	7	0	4	11
Number of Animals	0	8,410	0	3,400	11,810
No. of State Permitted Operations					5

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	1				
- Number of Permitted Animals	999				
- Permitted Acres for Waste Management	700.5				
Partially Permitted Farms					
- # of Animals Permitted					
- Total Animals					
- # of Acres					
Approved Farms Not yet permitted					
- # of Animals					
- # of Acres					
Operations Under Review					
- # of Animals					
- # of Acres					
Other Acres Not Specified					

Current as of August 2009

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

Status of federally and SD state listed threatened and endangered species in the watershed. The state of ND does not have a law regulating endangered, threatened, or species of concern.

Scientific Name	Common Name	Federal Status	South Dakota* State Status
Haliaeetus leucocephalus	Bald Eagle		Threatened
Mustella nigripes	Black-footed Ferret	Endangered	Endangered
Canus lupis	Gray Wolf	Endangered	
Sterna antillarum	Interior Least Tern	Endangered	Endangered
Phoxinus eos	Northern redbelly Dace		Threatened
Scaphirhynchus albus	Pallid sturgeon	Endangered	Endangered
Charadrius melodus	Piping plover	Threatened	Threatened
Macrhybopsis gelida	Sturgeon Chub		Threatened
Vulpes velox	Swift Fox		Threatened
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.

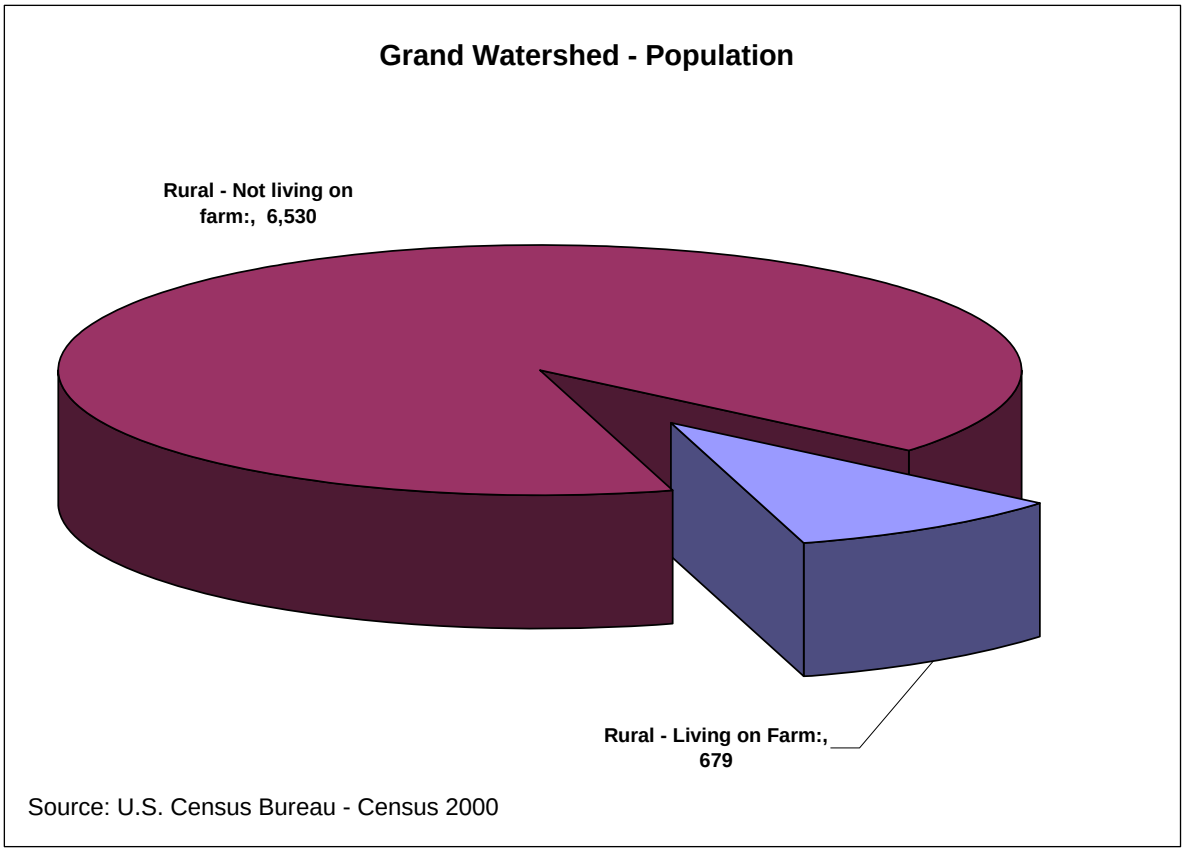
PRS Data	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
Applied Conservation Treatment (Units/Acres)						
Access Control (472) (ac)	19	16	1,187	147	7,926	196
Comprehensive Nutrient Management Plan (100) (no)		2	2			
Conservation Cover (327) (ac)	772	8	3,036	4,490	8,199	
Conservation Crop Rotation (328) (ac)	2,323	660	1,683	1,225	5,169	
Cover Crop (340) (ac)					302	
Fence (382) (ft)	3,702	25,602	62,874	53,337	40,496	18,445
Forage Harvest Management (511) (ac)	236		214	114		
Heavy Use Area Protection (561) (ac)	20		60			
Mulching (			18	9,980	6,545	
Nutrient Management (590) (ac)	298	324	390	209	4,608	
Pasture and Hay Planting (512) (ac)		512	1,049	192	398	298
Pest Management (595) (ac)	3	11	447	2,336	7,687	85
Pipeline (516) (ft)	31,918	133,932	217,572	195,104	265,765	33,057
Pond (378) (no)			1			
Prescribed Grazing (528) (ac)	2,175	983	7,998	11,711	734	838
Pumping Plant ( ) (no)	1	6	19	10	17	3
Range Planting (550) (ac)		273				57
Residue Management, Mulch Till (329B) (ac)			185		1,641	
Residue Management, No-Till/Strip Till(329A) (ac)	545		869	209	762	
Residue Management, Seasonal (344) (ac)	2,090	660	984	1,016	2,690	
Strip Cropping (585) (ac)			502			
Upland Wildlife Habitat Management (645) (ac)		3,429	20	118	158	26
Waste Storage Facility (313) (no)	10	2				
Waste Utilization (633) (ac)			390		2,124	
Water Well (642) (no)	3	10	12	8	11	9
Watering Facility (614) (no)	16	41	54	89	84	22
Windbreak/Shelterbelts (380 and 650) (ft)	86,327	68,510	90,557	76,183	93,892	18,020
Wildlife Watering Facility				1		

6.0 CENSUS AND SOCIAL DATA[12] [13]

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

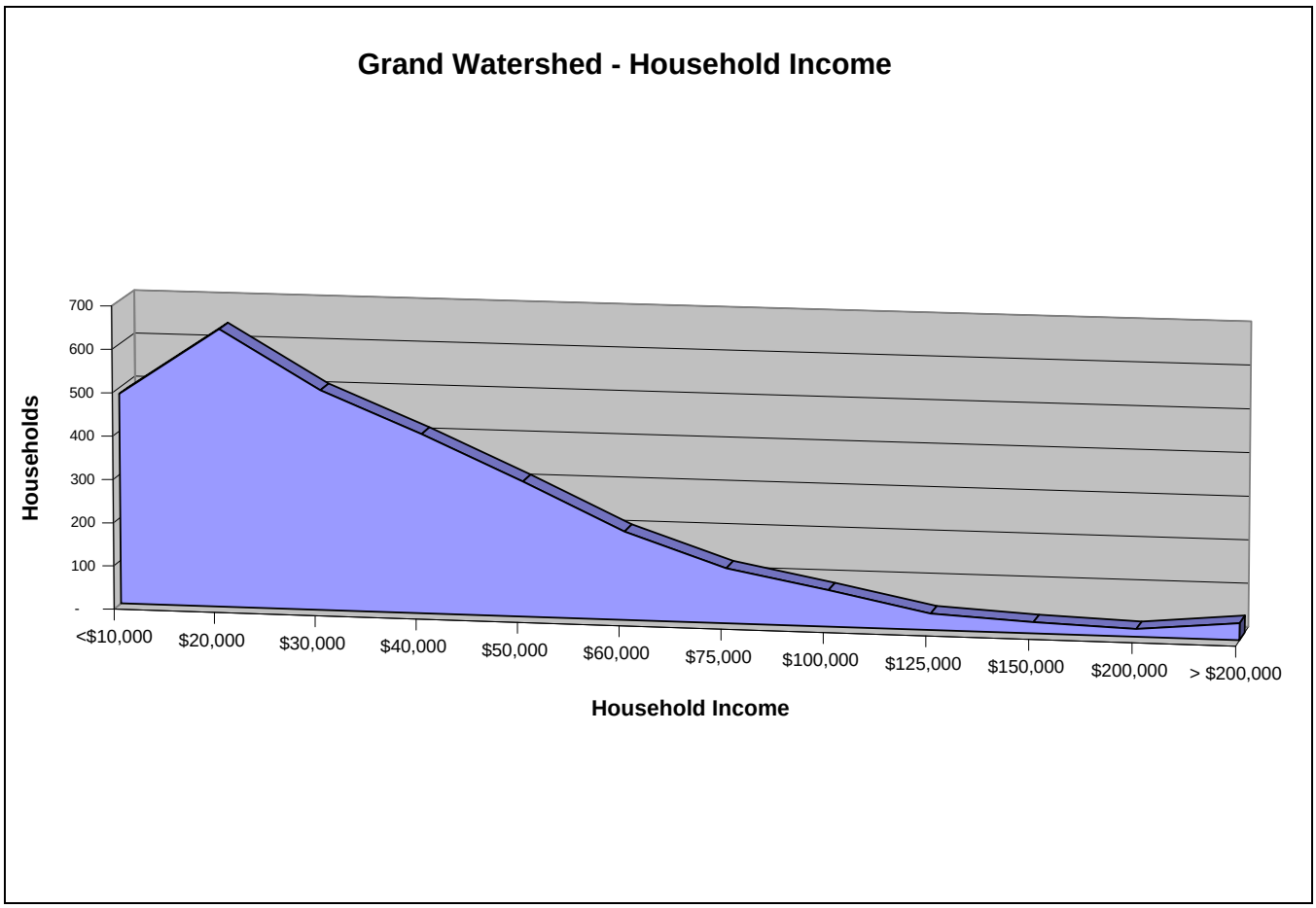
6.1 POPULATION CHART

Census data for the rural and urban population within the watershed. A portion of the watershed lies within the Standing Rock Sioux and Cheyenne River Sioux Reservations.

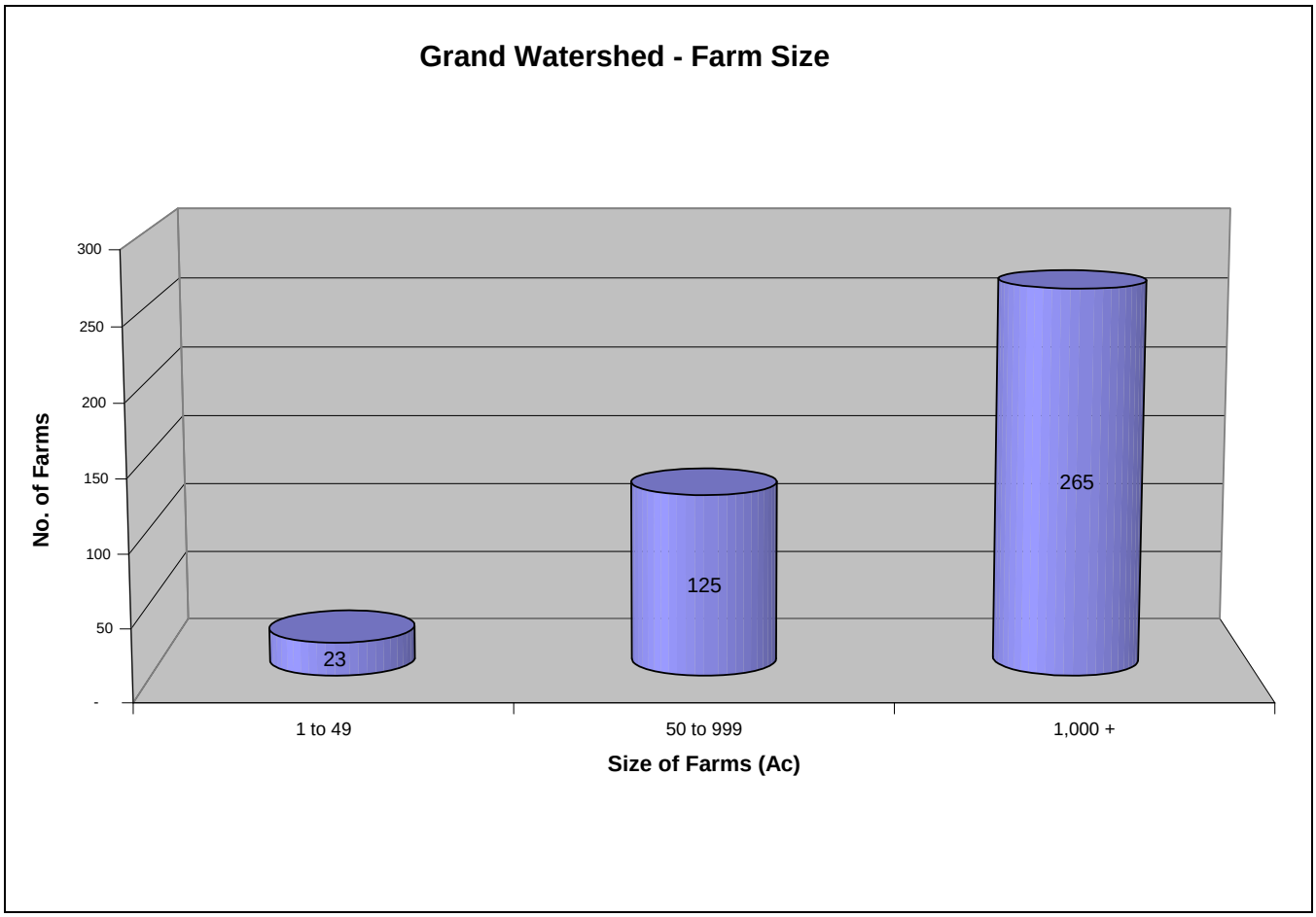


Source: U.S. Census Bureau - Census 2000

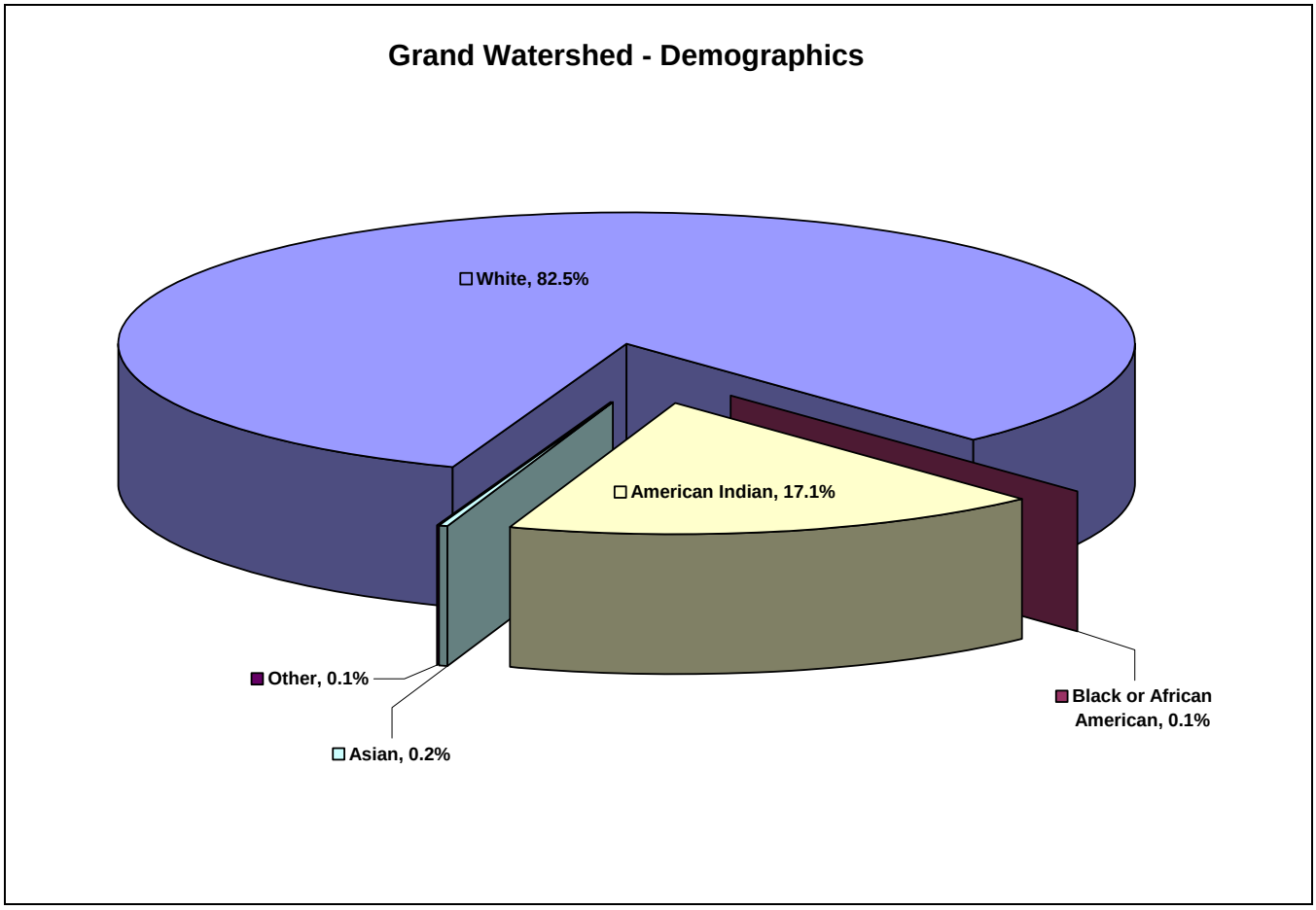
6.2 HOUSEHOLD INCOME



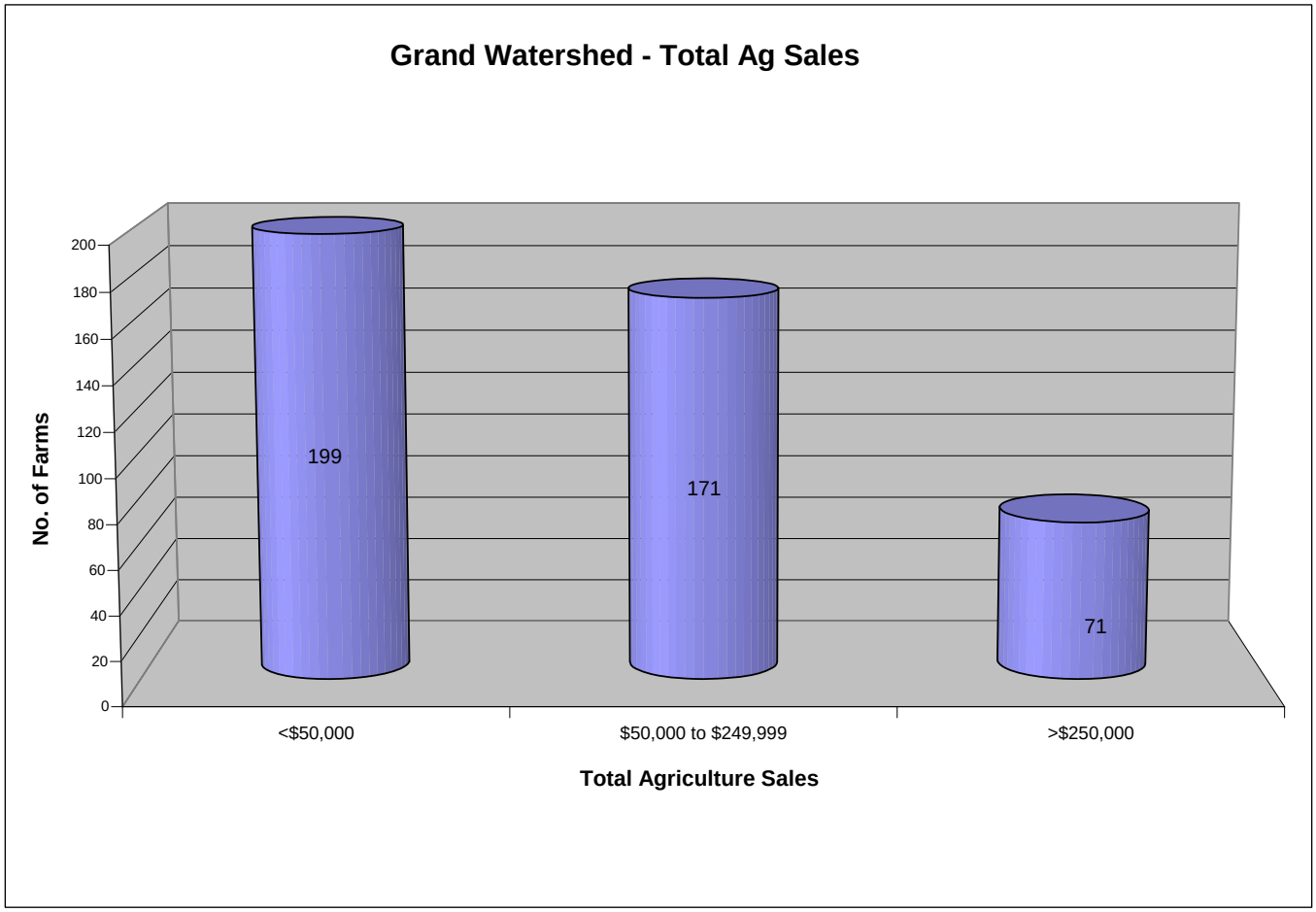
6.3 FARM SIZE


Grand Watershed - Farm Size
No. of Farms
300
250
200
150
100
50
-
23
125
265
1 to 49
50 to 999
1,000 +
Size of Farms (Ac)

6.4 DEMOGRAPHICS



6.5 TOTAL AGRICULTURAL SALES



7.0 REFERENCES/PREPARERS

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7.2 REFERENCES

[1] Natural Resources Conservation Service
[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 Climate Office
[7] High Plains Regional Climate Center, 2007
[8] United States Geological survey – Originator of National Land Cover Dataset
[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.