

**Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007**



PURPOSE

A rapid watershed assessment (RWA) profile document compiles resource information within a watershed to assist conservation districts, landowners, and other community organizations and stakeholders to identify where conservation investments are best utilized. The RWA can assist landowners and local organizations in determining the technical and financial resources required to achieve their conservation goals within the watershed. This project was completed in cooperation with the Natural Resource Conservation Service, the Belle Fourche River Watershed Partnership and RESPEC.

Beginning in October 2007, the land within this RWA project area will receive higher priority when applying for technical and financial assistance for the Natural Resource Conservation Service (NRCS) conservation cost-share programs such as Environmental Quality Incentive Program (EQIP) and the Wildlife Habitat Incentive Program (WHIP).

The physical, biological, and sociological data acquired to develop this profile are available in an Environmental Systems Research Institute, Inc. (ESRI) Geodatabase.

Profile Contents

<u>Introduction</u>	<u>Census and Social Data</u>
<u>Physical Description</u>	<u>Conservation Progress</u>
<u>Resource Concerns</u>	<u>References</u>

INTRODUCTION

The Redwater 8-Digit Hydrologic Unit Code (HUC) subbasin includes areas in western South Dakota and eastern Wyoming. Approximately 50 percent of the HUC, approximately 336,900 acres, is located in western South Dakota. This RWA profile includes only the portion of the HUC that falls solely within South Dakota (Figure 1). For the purpose of this report, “the HUC” refers to the portion within South Dakota. The assessment area is located in Butte, Lawrence and Pennington Counties with 14 percent, 84 percent, and 2 percent of the total, respectively.

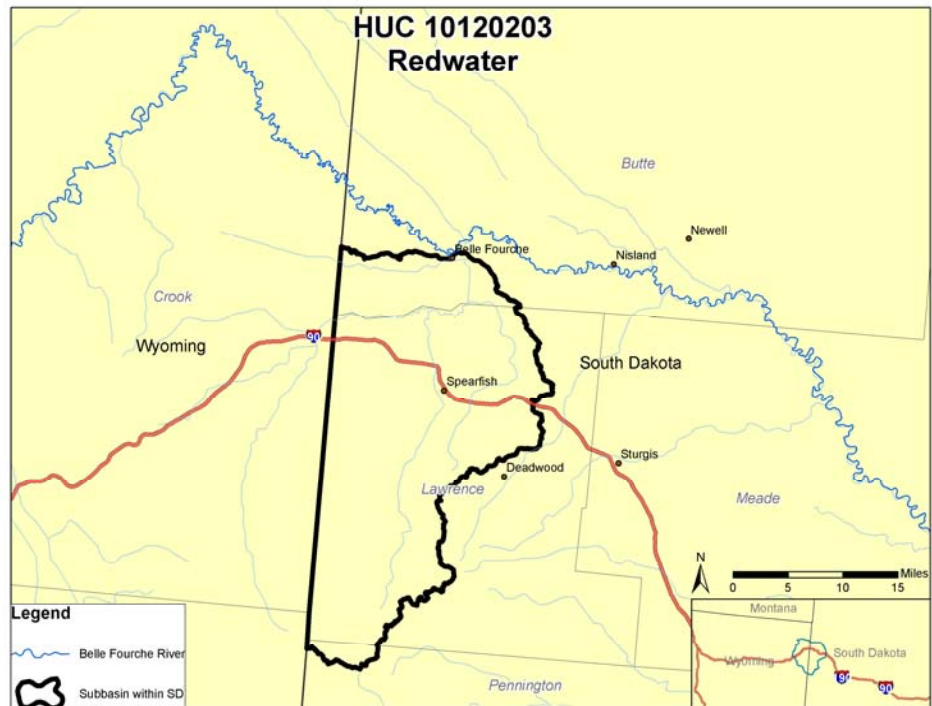


Figure 1. Redwater Overview.

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Privately owned farm/ranch operations account for approximately 55 percent of the HUC while the remaining 45 percent is public land. The land uses of the HUC consists of evergreen and deciduous forest, grasslands, and hay/pasture land and other small land uses. There are approximately 211 farms and ranches within the area. There are no large residential or commercial developments (less than one percent).

Elevations range from approximately 3,000 feet on the grasslands on the northern portion of the HUC to over 7,100 feet in the southern portion of the HUC, which lies within the Black Hills.

Conservation assistance is provided by Belle Fourche River Watershed Partnership (BFRWP), which consists of three soil and water conservation districts and the Belle Fourche Irrigation District (BFID). The resource concerns within this HUC are control of weeds and invasive species, groundwater quality, surface water quality, water quantity, need for windbreaks and shelterbelts and soil erosion.

Table 1. Broad Land Use

Broad Land Use	% of HUC
Cropland, cultivated	2
Cropland, noncultivated	4
Pastureland	8
Rangeland	31
Forest land	9
Minor land cover/uses	2
Urban and built-up area	1
Rural transportation lands	1
Water, small	0
Water, large	0
Federal land	41
CRP	0

PHYSICAL DESCRIPTION

Land Cover/Land Use and Ownership

The land cover/land use represents categories of land cover such as vegetation or other type of material to cover the land surface, and categories of land use, which represent the purpose of human activity on the land. The National Resources Inventory (NRI) uses the term “land cover/land use” to identify categories that account for the surface areas of the United States. The NRI is a statistical survey of land use and natural resource conditions and trends on nonfederal lands. The 12 NRI Broad Land Cover/Land Use categories are cultivated cropland, noncultivated cropland, Conservation Reserve Program (CRP) land, pastureland, rangeland, forest land, other rural lands (minor lands), rural transportation, urban lands, small water, large water, and federal land. The CRP is a federal program established under the Food Security Act of 1985 to assist private landowners to convert highly erodible cropland to vegetative cover for 10 years.

According to the NRI information received from the NRCS, the HUC consists of 41 percent federal land and 31 percent rangeland [Natural Resources Conservation Service, 1997]. Table 1 summarizes all broad land use within the HUC.

A more detailed breakdown of land cover/land use was completed by using the National Land Cover Dataset (NLCD). The NLCD is a 21-category land cover classification method that is applied across the United States. The NLCD uses data derived from Landsat thematic mapper imagery and

supplemental data [U.S. Geological Survey, 1992]. The predominant land cover/land use of the HUC mainly consists of evergreen forest and grasslands for livestock grazing with the remaining areas consisting of deciduous forest, pasture and hayland, and other small land uses. There are approximately 336,970 acres in the HUC. Of those acres, approximately 180 acres are categorized as water, leaving approximately 336,790 acres of land in the HUC (Figure 2). Table 2 represents the type of property ownership by NLCD category. Only the categories with greater than 1 percent are listed in the table. Approximately 55 percent of the HUC is privately owned while the remaining 45 percent is public land (Figure 3) [U.S. Geological Survey, 1992, and U.S. Geological Survey, 2006a].

**Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007**

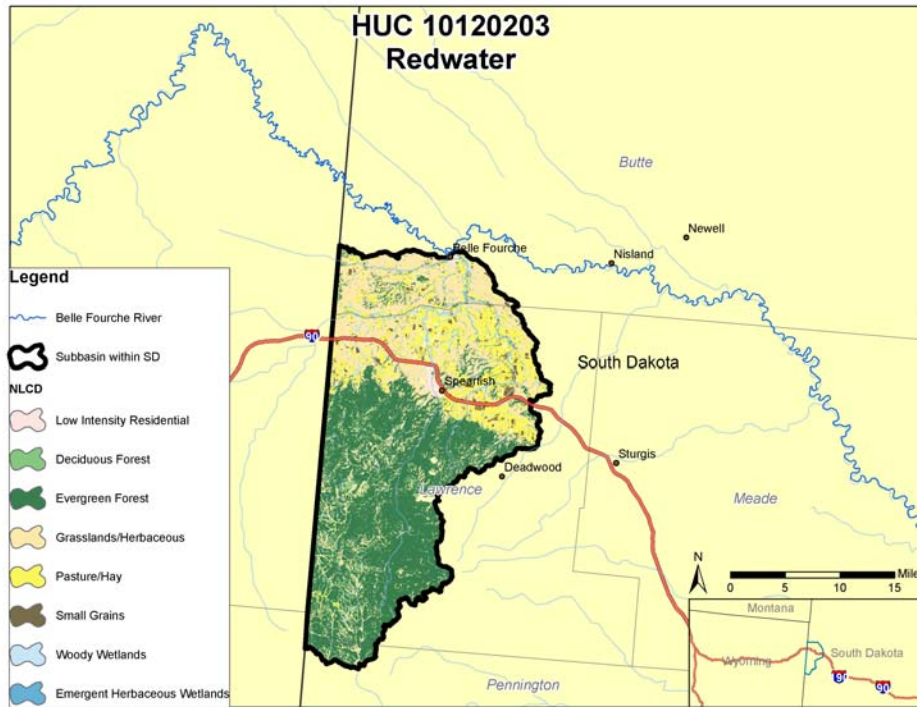


Figure 2. Predominant Land Cover/Land Use.

Table 2. Ownership by National Land Cover Dataset Category

NLCD Category	Ownership							
	Private		Public		Tribal		Total	
	Acres	%	Acres	%	Acres	%	Acres	%
Deciduous Forest	0	0	8,153	3	0	0	8,153	3
Emergent Herbaceous Wetlands	4,781	1	0	0	0	0	4,781	1
Evergreen Forest	33,008	10	118,596	35	0	0	151,604	45
Grasslands/Herbaceous	74,203	22	21,477	6	0	0	95,680	28
Pasture/Hay	49,147	15	0	0	0	0	49,147	15
Small Grains	6,926	2	0	0	0	0	6,926	2
Woody Wetland	7,877	2	0	0	0	0	7,877	2
Other ^(a)	9,297	3	3,325	1	0	0	12,622	4
Total^(b)	185,239	55	151,551	45	0	0	336,790	100

(a) "Other" consists of very small areas of various land use categories.

(b) Totals are approximate due to rounding.

There are 180 acres of water, which is less than 1 percent of the HUC.

**Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007**

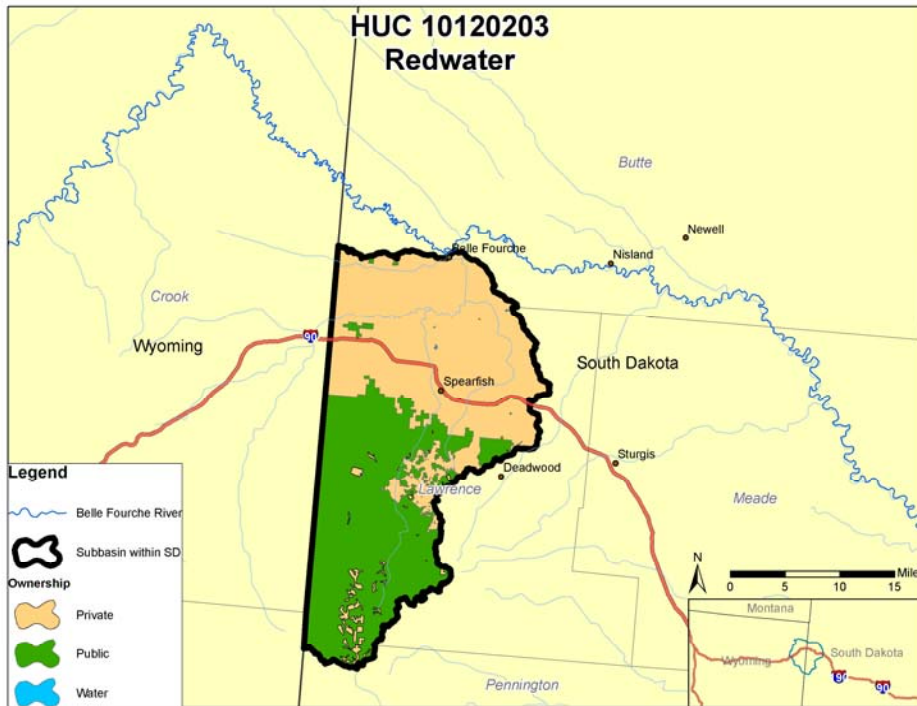


Figure 3. Ownership Distribution.

Relief

Elevations range from approximately 3,000 feet on the northern grasslands portion of the HUC to over 7,100 feet on the southern portion of the HUC, which lies within the Black Hills (Figure 4) [U.S. Geological Survey, 2006b]. Generally, the drainage flows from the south to the north. At the north central portion of the HUC, the Redwater River flows into the Belle Fourche River.

Geology

The geology of the HUC consists mainly of the Madison Formation and the Minnelusa Formation with 25 percent and 14 percent, respectively (Figure 5, Table 3) [South Dakota Geological Survey, 2004]. Only the geologic units within HUC with greater than two percent of the area are listed in the table.

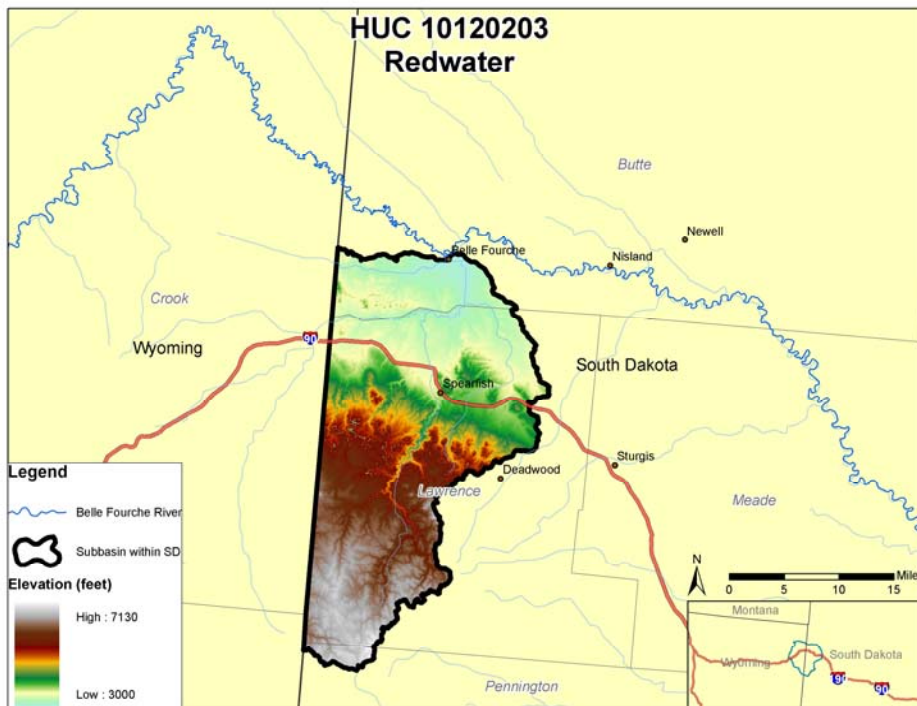


Figure 4. Relief.

Slope

The average slope within the HUC is nearly 18 percent (Figure 6) [U.S. Geological Survey, 2006b]. The slopes are highest in the Black Hills portion of the HUC.

Annual Precipitation

The amount of annual precipitation generally corresponds with the change in elevation (Figure 7). The average annual precipitation is approximately 28 inches with higher elevations receiving higher annual precipitation [Prism Group, 1990].

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007

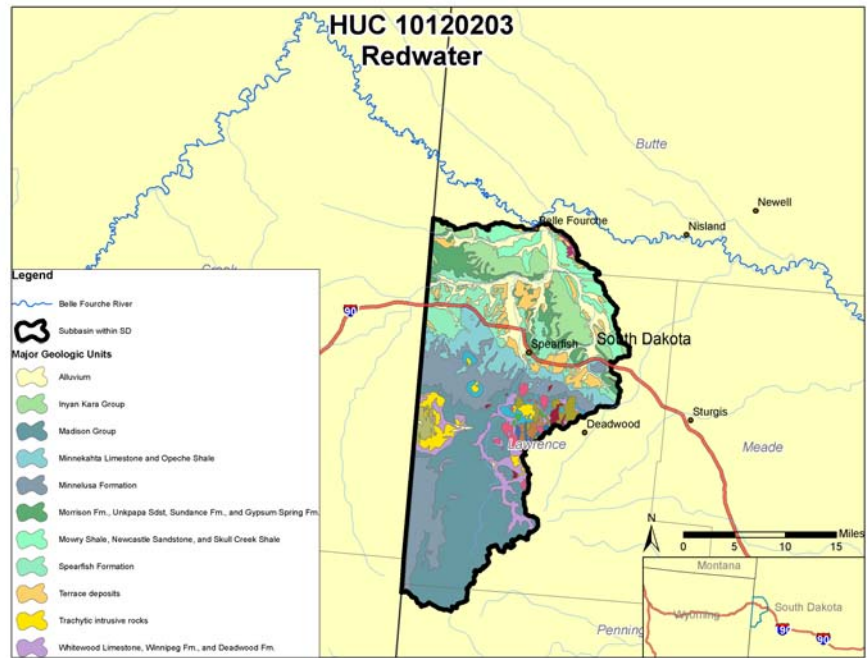


Figure 5. Geologic Units.

Table 3. Geology

Code	Description	Area	
		Acres	%
MDpe	Madison Group	84,479	25
PPm	Minnelusa Formation	48,550	14
Qal	Alluvium	30,929	9
Kfl	Inyan Kara Group	26,826	8
TrPs	Spearfish Formation	25,838	8
Pmo	Minnekahta Limestone and Opeche Shale	21,322	6
Kms	Mowry Shale, Newcastle Sandstone, and Skull Creek Shale	18,418	6
Qt	Terrace deposits	17,742	5
Jms	Morrison Formation, Unkpapa Sandstone, Sundance Formation, and Gypsum Spring Formation	17,635	5
OCwd	Whitewood Limestone, Winnipeg Formation, and Deadwood Formation	15,878	5
Tt	Trachytic intrusive rocks	7,833	2
Other ^(a)		21,414	7
Total^(b)		336,864	100

(a) "Other" consists of various geologic units with less than 1 percent of the total HUC area.
 (b) Total is approximate due to rounding.

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007

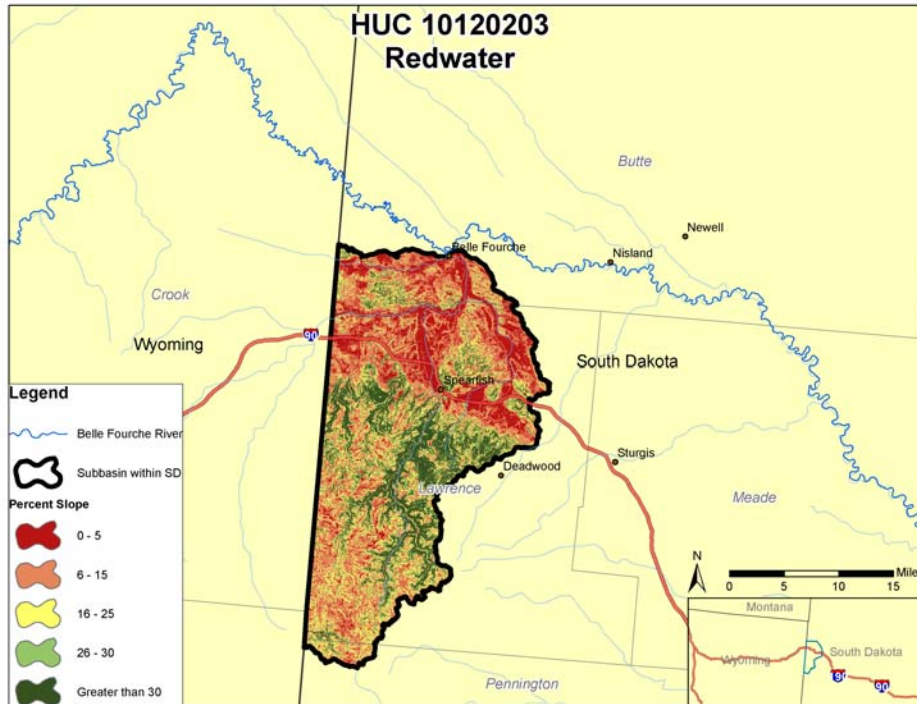


Figure 6. Slope.

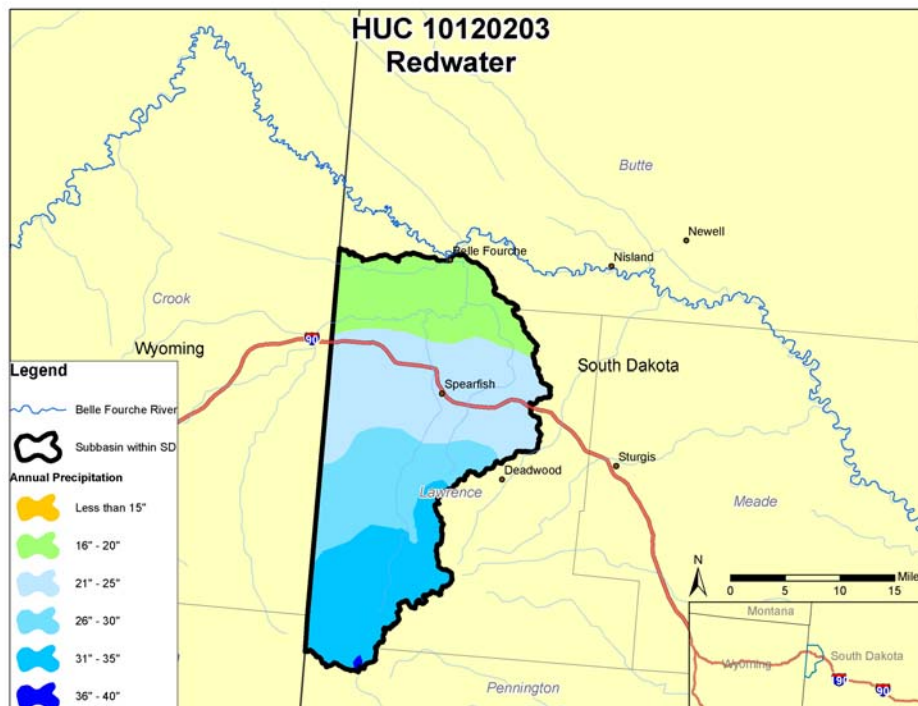


Figure 7. Annual Precipitation.

**Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007**



Streamflow Summary

All the streams in the National Hydrography Dataset (NHD) 100K flowlines layer [U.S. Geological Survey, 2006c] were buffered by 100 feet on each side of the stream. The land cover/land use and the ownership within this buffered area were tabulated. The land cover/land use within the buffered area on each side of the streams is mainly evergreen forest or grasslands. Approximately 65 percent of the buffered area on each side of the stream is privately owned (Table 4).

Table 4. Ownership by National Land Cover Dataset Category Within 100 Feet of Streams

Land Cover/ Land Use	Ownership							
	Private		Public		Private		Public	
	Acres	%	Acres	%	Acres	%	Acres	%
Evergreen Forest	1,622	8	4,212	22	0	0	5,834	30
Grasslands/Herbaceous	3,405	18	1,090	6	0	0	4,495	24
Pasture/Hay	2,768	14	0	0	0	0	2,768	14
Small Grains	306	2	0	0	0	0	306	2
Woody Wetlands	2,174	11	0	0	0	0	2,174	11
Emergent Herbaceous Wetlands	1,977	10	907	5	0	0	2,884	15
Other ^(a)	384	2	296	2	0	0	680	4
Total^(b)	12,636	65	6,505	35	0	0	19,141	100

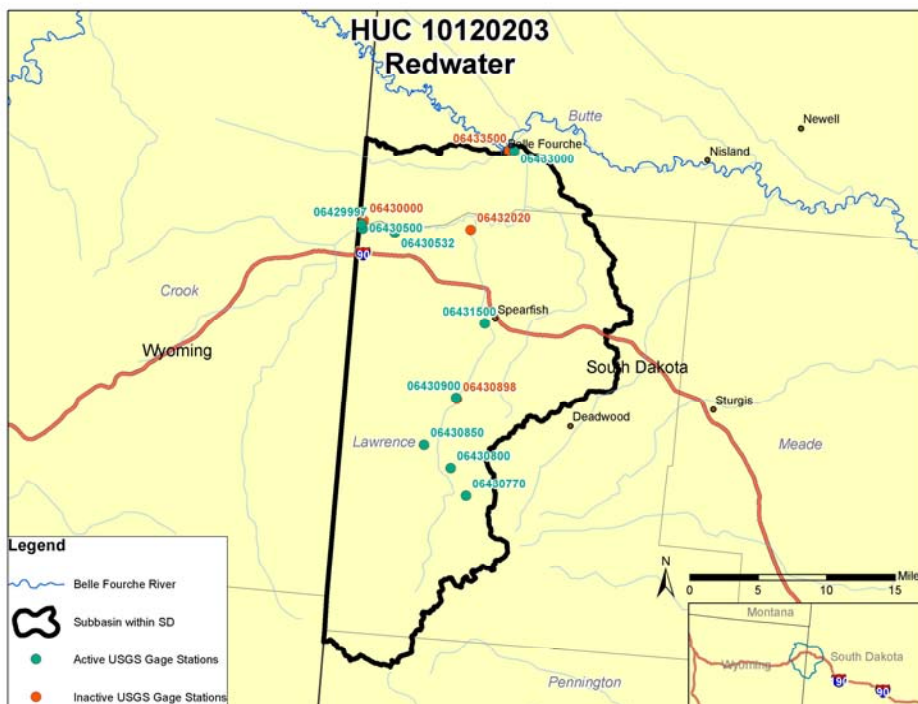


Figure 8. Active and Inactive USGS Stations.

The average annual runoff measured within the HUC is five inches per year and ranges from 0 to 13 inches per year. There are 13 gage stations (maintained by the United States Geological Survey (USGS)) located within the HUC; however, only nine stations remain active (Figure 8, Table 5) [U.S. Geological Survey, 2006d]. There are approximately 796 stream miles in the HUC, of which about 167 miles are considered perennial streams [U.S. Geological Survey, 2006c].

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Table 5. Gage Stations Data

Site No.	Station Name	Drainage Area (acres)	Status	Average Flow (cfs)	Percentile ^(a)			Yield (acre-ft/yr)	Runoff (in/yr)
					10 th (cfs)	50 th (cfs)	90 th (cfs)		
06430770	Spearfish Creek near Lead, SD	40,640	Active	29.24	13	27	47	21,170	6
06430800	Annie Creek near Lead, SD	2,272	Active	1.48	0.1	0.5	3.6	1,073	6
06430850	Little Spearfish Creek near Lead, SD	16,512	Active	16.75	12	15	23	12,124	0
06430898	Squaw Creek near Spearfish, SD	4,448	Inactive	3.76	0.4	1.2	8.9	2,720	7
06430900	Spearfish Creek above Spearfish, SD	88,960	Active	63.12	37	54	97	45,699	6
06431500	Spearfish Creek at Spearfish, SD	107,520	Active	55.63	32	47	86	40,275	4
06430532	Crow Creek near Beulah, WY	26,112	Active	38.93	32	36	46	28,181	13
06430500	Redwater Creek at WY-SD State Line	301,440	Active	34.85	16	31	52	25,227	1
06429997	Murray Ditch Above Headgate at WY-SD State Line	NA ^(b)	Active	3.54	0	0	12	2,565	* ^(c)
06432020	Spearfish Creek below Spearfish, SD	130,560	Inactive	63.76	21	55	103	46,161	4
06430000	Murray Ditch at WY-SD State Line	NA	Inactive	3.79	0	0	13	2,744	*
06433500	Hay Creek at Belle Fourche, SD	77,440	Inactive	1.74	0	0.04	2.6	1,263	0
06433000	Redwater River above Belle Fourche, SD	588,800	Active	140.04	23	131	219	101,381	2

- (a) The numbers in the 10th, 50th, and 90th percentile column indicate the percent of flow less than the value in column.
- (b) NA denotes drainage area was not available through the United States Geological Society (USGS).
- (c) * denotes drainage area was not available through the USGS and runoff could not be calculated.

Aquifers

Several major and minor aquifers of varying depth and quality are utilized within the HUC. Shallow aquifers tend to be smaller and generally have good water quality but can be 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 with variable water quality. As a result of the restrictive soil layers protecting these aquifers and the depth at which they occur, these aquifers are less susceptible to leaching and other surface activities and impacts.

The aquifers that utilized within the HUC are within the following formations: Spearfish, Minnekahta, Madison, Inyan Kara, Deadwood, Opeche, Minnelusa and Alluvium [Gestring, 2007].

Public Water Supply Systems

The South Dakota Department of Environment and Natural Resources (SD DENR) Drinking Water Program enforces the Federal Safe Drinking Water Act and the South Dakota Drinking Water Regulations that apply to the approximately 760 public water systems in South Dakota. Approximately 88 percent of the public water systems (PWS) utilize water from groundwater sources while the remaining 22 percent utilize surface water sources [South Dakota Department of Environment and Natural Resources, 2007a].

To prevent contamination of the public water systems, the SD DENR Source Water Assessment and Protection Program performs an assessment of each PWS to determine the land area contributing water to the PWS and the potential source of contaminates within that land area. Based on the assessment information, a source water protection area is defined for each PWS [South Dakota Department of Environment and Natural Resources, 2007a].

There are 33 active PWS within the HUC that utilize the aquifers identified above [Gestring, 2007]. One of the PWS utilized surface water sources including springs.

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Irrigated Lands

Irrigated land consists of approximately 16 percent of the HUC [Natural Resources Conservation Service, 1997]. Most of the irrigation occurs on pastureland and uncultivated cropland, which includes hayland (Table 6). The primary source of the irrigation is from wells, which is delivered to the irrigated land mainly by canals or ditches [Natural Resources Conservation Service, 1997].

Table 6. Irrigated Lands

Land Use	Acres	% of Irrigated Land	% of HUC
Cultivated Cropland	6,500	12	2
Uncultivated Cropland	16,200	31	5
Pastureland	30,200	57	9
Conservation Reserve Program	0	0	0
Total Irrigated Land	52,900	100	16

The SD DENR is responsible for managing the appropriation and use of the state’s water resources. All water uses in South Dakota except for certain domestic uses require a permit to appropriate water. The majority of the water appropriated for irrigation comes from surface water sources (Table 7) [Buhler, 2007].

Table 7. Irrigation Water Rights

Source	No. of Appropriations	Flow Rate (cfs)	Irrigated Area (acres)	Annual Appropriations (acre-ft)
Groundwater	137 ^(a)	91	4,368	11,396
Surface Water	90	901 ^(b)	11,736	23,884
Both	4	11	819	1,707

(a) Future use permit reserves 1,238 ac-ft/yr from the Spearfish Creek Alluvium and 620 ac-ft/yr from the Minnelusa aquifer and 620 ac-ft/yr from the Madison aquifer.

(b) One permit appropriates 200 cfs.

The information on water source for irrigation obtained from the two sources above are contradictory. Based on knowledge of irrigation practices within the HUC, it is more likely the majority of the irrigation water comes from surface water sources.

Common Resource Areas

National Coordinated Common Resource Areas (CRAs) are geographical areas where resource concerns, problems, or treatments are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a CRA [Natural Resources Conservation Service, 2002]. The predominant CRA is the Black Hills, which consists of 53 percent of the HUC (Figure 9, Table 8).

Land Capability Classification

Land capability classification (LCC) is a system of grouping soils primarily based on their capability to produce common cultivated crops and pasture plants without deteriorating over a long period. The majority of the HUC falls within severe to very severe limitations, which restrict land use (Table 9) [Natural Resources Conservation Service, 1997].

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007

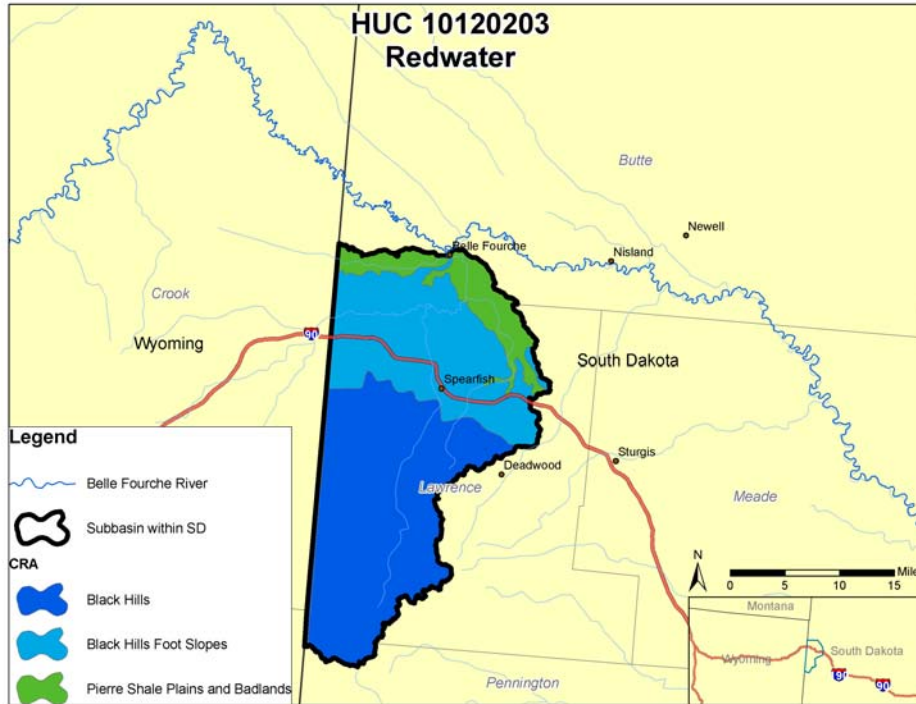


Figure 9. Common Resource Areas.

Table 8. Common Resource Area Codes and Descriptions

CRA Code	% of HUC	CRA Name	Description
60A.SD1	11	Pierre Shale Plains and Badlands	These smooth shale plains are mostly gently sloping to strongly sloping. Along drainages and streams, slopes are moderately steep to steep. Badlands are scattered throughout. Soils are mostly fine textured and have a frigid temperature regime. Most of this area is used for grazing livestock. Some small nearly level to moderately sloping tracts are farmed to winter wheat. Average annual precipitation is 11 to 14 inches. Average annual temperature is 38 to 39°F. Average frost-free period is 110 to 120 days. This area supports natural mixed prairie vegetation.
61.SD1	35	Black Hills Foothills	The Black Hills Foothills slopes are mostly hilly to steep. The soils are mostly deep to shallow and fine textured to medium textured and have a mesic temperature regime. Most of this area is native grass and used mainly for livestock grazing. Some of the less sloping parts are farmed mainly for alfalfa and small grains for livestock feed. Average annual precipitation is 15 to 18 inches. Average annual temperature is 38 to 41°F. Average frost-free period is 90 to 100 days. This area supports grassland and Ponderosa pine forest.
62.SD1	53	Black Hills	Black Hills slopes are moderate on some high plateaus to very steep along drainageways and on peaks and ridges. Narrow valleys are gently sloping to strongly sloping. The soils have montmorillonitic mineralogy. Most of the area is used for mining, recreation, and hunting. Small farms, ranches, and rural homes are on small acreages scattered throughout. Average annual precipitation is 18 to 26 inches. Average annual temperature is 35 to 39°F. Average frost-free period is 60 to 90 days. This area supports open to dense Ponderosa pine and Black Hills spruce forests.

**Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007**



Table 9. Land Capability Class

LCC	Description	Acres	%
I	Slight limitations	1,200	0
II	Moderate limitations that reduce the choice of plants or require moderate conservation practices	10,800	3
III	Severe limitations reduce the choice of plants or require special conservation practices, or both	42,800	11
IV	Very severe limitations restrict the choice of plants, require very careful management, or both	28,300	8
V	No erosion hazard, but other limitations impractical to remove that limit their use largely to pasture, range, woodland, or wildlife food and cover	—	0
VI	Severe limitations, unsuited to cultivation, limited to pasture or range, woodland, or wildlife food and cover	63,400	17
VII	Very severe limitations, unsuited for cultivation, restricted largely to grazing, woodland, or wildlife	58,200	15
VIII	Miscellaneous areas have limitations, limited to recreation, wildlife, water supply or to esthetic purposes	9,200	2
Other	Federal land, water, and unassigned barren lands	165,900	44
Total		379,800^(a)	100

(a) This total area was obtained from the NRI tables but it differs from most other sources for total area. NRCS staff indicated that there may have been a change in the extent of the HUC since the 1997 NRI data or it was possible there may be an error in the data.

RESOURCE CONCERNS

Erosion Estimates

The NRI soil and water erosion data from 1982, 1987, 1992, and 1997 (most current available) were reviewed to determine the extent and potential trends of erosion for cropland, pasture, and CRP land within the HUC [Natural Resources Conservation Service, 1997]. Total soil erosion generally decreased from 1982 to 1992 with an increase from 1992 to 1997. Water erosion had been nearly the same from 1982 through 1992 but there was an increase (approximately 45 percent) from 1992 to 1997. Soil erosion from wind had been steadily decreasing from 1982 to 1992 but there was a significant (700 percent) increase from 1992 to 1997 (Figure 10).

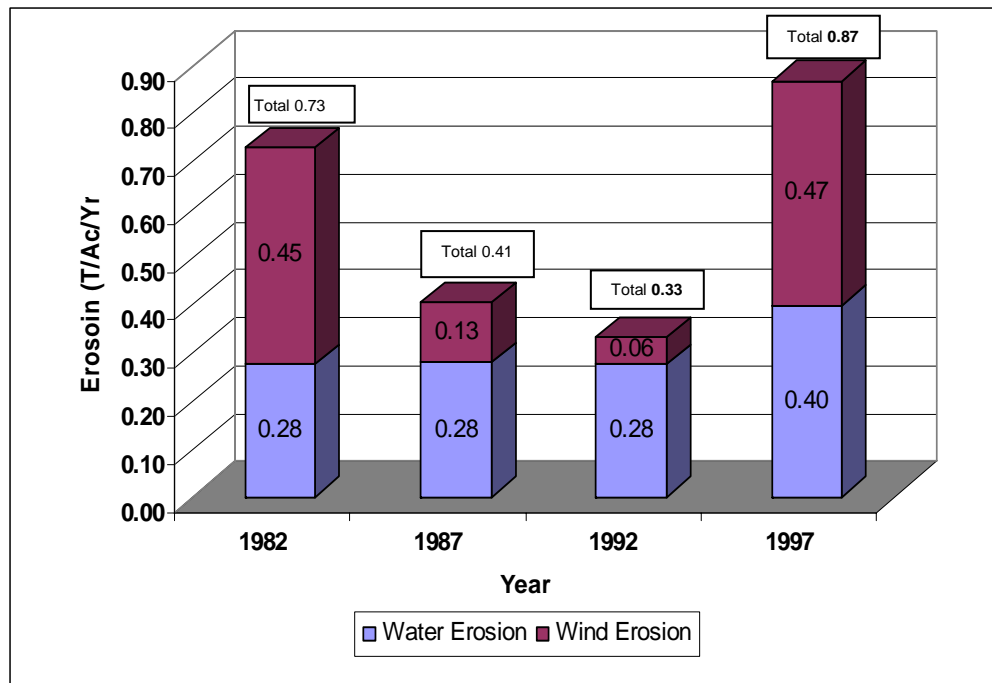


Figure 10. Soil Erosion by Water and Wind for Cropland, Pasture and CRP.

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Concentrated Animal Feeding Operation

The SD DENR requires permits for concentrated animal feeding operations (CAFOs) in South Dakota to protect waters from improper waste disposal practices. The facilities are permitted as small, medium, or large based on the number and type of animals at the facility. There are two CAFOs within the HUC [Woodmansey, 2006] with 8,000 animals (Table 10). One facility has been permitted and the other has been approved but their permit has been completed at this time.

Table 10. Concentrated Animal Feeding Operations

No. of Facilities	No. of Animals	Beef Cattle	Dairy Cattle	Horses	Other
2	9,000	8,000	0	1,000	0

Livestock Distribution

The livestock within the HUC consists mainly of beef cattle and sheep [National Agriculture Statistics Service, 2002]. The number of animals in each county was obtained by adjusting the total number of animals in the county by the percent of the HUC within the county (Table 11).

Table 11. Livestock Distribution

Cattle and Calves Inventory	Beef Cows	Dairy Cows	Hogs and Pigs Inventory	Sheep and Lambs Inventory
9,383	5,631	267	20	2,340

Impaired Waterbodies

Section 303(d) of the Clean Water Act states that waterbodies that are not meeting their designated uses because of pollutants must be placed on an impaired water list. The SD DENR maintains a list of impaired waterbodies in South Dakota [Brich, 2006]. The SD DENR is required to develop Total Maximum Daily Loads (TMDLs) for waterbodies on this list. Currently, there are approximately eight impaired stream miles and one impaired lake within the HUC. Approximately one percent of the total stream miles within the HUC are impaired. The potential causes of impairment are from natural sources and unknown sources. Figure 11 shows the locations of the impaired waterbodies. Table 12 summarizes the impaired stream segment, including the length of impairment, its designated use, the TMDL status, and the criteria violated. The impaired lake information is also included on Table 12.

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007

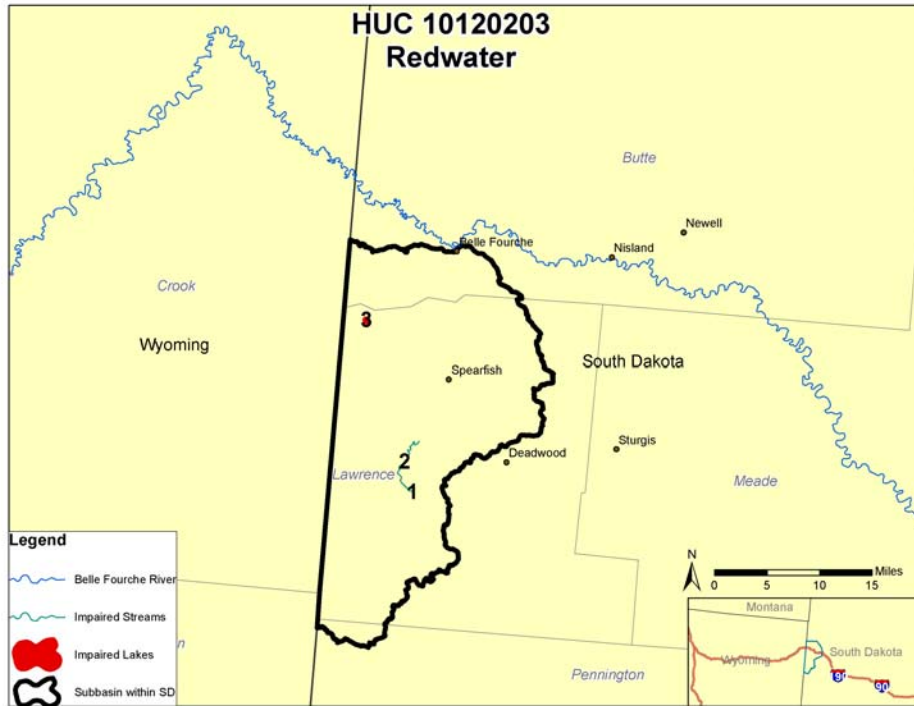


Figure 11. Impaired Waterbodies.

Table 12. Impaired Waterbodies

Figure ID ^(a)	Impaired Streams	Miles	Use Description	TMDL Status	Criteria Violated
1	Spearfish Creek	0.53	Coldwater Permanent Fish Life Propagation Waters	Impaired Without Approved TMDL	pH
2	Spearfish Creek	7.53	Coldwater Permanent Fish Life Propagation Waters	Impaired Without Approved TMDL	pH
3	Mirror Lake East	–	Coldwater Permanent Fish Life Propagation Waters	Impaired Without Approved TMDL	Temperature, Water
Total Impaired Miles		8.06			
% of Total Miles		1			

(a) Figure ID number is used to reference stream segment on Figure 11.

**Belle Fourche River Watershed Partnership and RESPEC
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December 2007**



Groundwater Leaching

Soils with shallow aquifers are considered vulnerable for contaminate leaching. The saturated hydraulic conductivity (Ksat, micrometers per second) refers to the ease with which pores in a saturated soil transmit water. Soils with a Ksat value of greater than 10 micrometers per second [Natural Resource Conservation Service, 2007a] with slopes less than 6 percent are considered to have a high leaching risk [Natural Resource Conservation Service, 2007b]. These are areas of high leaching potential within the HUC (Figure 12).

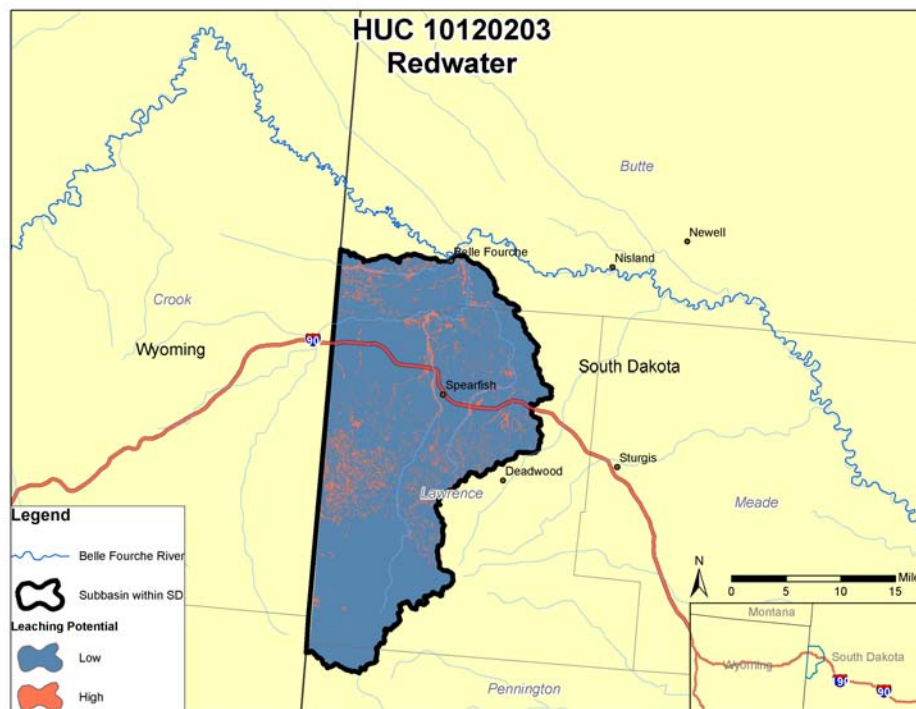


Figure 12. Leaching Potential.

Soil, Water, Air, Plants, and Animals

Seventy-three resource concern surveys (approximately 400 sent within the area) were returned by landowners within the HUC [Butte County Conservation District, 2007]. Results of the resource concerns survey indicate the highest priority resource concerns are control of weeds and invasive species, groundwater quality, surface water quality, water quantity, need for windbreaks and shelterbelts and soil erosion (Table 13). As part of the landowner survey, there was an “Other” category where additional concerns were listed. Some other resource concerns listed were urbanization of productive land, forest thinning operations, wildlife control, irrigation systems upgrades, and irrigation impacts to personal water supply. Table 14 summarizes the results of the resource concern by land use survey completed by the local district conservationist [Quinn, 2007]. An “X” indicates a resource concern in Table 14.

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Table 13. Landowner Resource Concerns Survey Result

Conservation Practice	Rank ^(a)
Need to Control Weeds and Invasive Species	1
Groundwater Quality	1
Surface Water Quality	2
Water Quantity for Livestock, Wildlife and Recreation	3
Windbreaks and Shelterbelts	3
Soil Erosion	4
Forest Management	4
Riparian Area and Stream Bank Stabilization	5
Loss of Wetlands and Wildlife Habitat	5
Proper Nutrient Management	5
Air Quality	5
Need for Rotational Grazing Systems	6
Prairie Dog Infringement	7
Loss of Conservation Reserve Program Acres Returned to Cropland/Grazing	8

(a) Rank of resource concern in order of importance.

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Table 14. Resource Concerns/Issues by Land Use (Page 1 of 2)

SWAPA + H Concerns	Specific Resource Concerns/Issues	Pasture	Hayland	Dry Crops	Surface Irrigated Crops	Sprinkler Irrigated Crops	Rangeland	Grazed and Ungrazed Forest	Wildlife	Urban
Soil Erosion	Sheet and rill			X	X	X				X
	Ephemeral gully			X	X	X				X
	Classic gully	X	X	X	X	X	X	X	X	X
	Wind	X		X	X	X	X			X
	Streambank	X		X	X	X	X			X
	Irrigation induced				X	X				
Soil Condition	Organic matter depletion	X	X	X	X	X	X	X	X	X
	Compaction		X	X	X	X				X
	Rangeland site stability						X			
Water Quantity	Inefficient use on irrigated lands				X	X				
Water Quality, Surface	Excessive suspended sediments and turbidity	X					X	X	X	X
	Excessive nutrients and organics			X	X	X				X
	Harmful levels of pesticides			X	X	X				X
Water Quality, Ground	Excessive nutrients and organics			X	X	X			X	X
	Harmful levels of pesticides			X	X	X			X	X
Air Quality	Particulate matter			X	X	X				X
	Odor									X
Plant Condition	Productivity, health, and vigor	X	X	X	X	X	X	X	X	X
	Noxious and invasive plants	X	X	X	X	X	X	X	X	X
	Wildfire hazard	X					X	X	X	X
	Forage quality and palatability	X	X				X	X		

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Table 14. Resource Concerns/Issues by Land Use (Page 2 of 2)

SWAPA + H Concerns	Specific Resource Concerns/Issues	Pasture	Hayland	Dry Crops	Surface Irrigated Crops	Sprinkler Irrigated Crops	Rangeland	Grazed and Ungrazed Forest	Wildlife	Urban
Animals, Fish and Wildlife	Inadequate water						X	X	X	
	Inadequate food						X	X	X	
	Inadequate cover/shelter						X	X	X	X
	Inadequate space						X	X	X	X
	Plant community fragmentation						X	X	X	X
Animals, Domestic	Inadequate quantity of quality of feed and forage	X	X				X	X	X	X
	Inadequate stock water	X					X	X	X	X
	Inadequate shelter	X								
Human Economics	High risk and uncertainty									
	High capital/financial costs									
	Low or unreliable profitability									

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Threatened, Endangered, and Candidate Species

Table 15 summarizes the threatened and endangered species that are located throughout the HUC [Natural Resources Conservation Service, 2007c]. Not all species are in all portions of the HUC.

Table 15. Threatened and Endangered Species

Name	Scientific Name	Federal Status	State Status
<i>Fishes</i>			
Finescale dace	<i>Phoxinus neogaeus</i>		State Endangered
Longnose sucker	<i>Catostomus catostomus</i>		State Threatened
Sturgeon chub	<i>Macrhybopsis gelida</i>		State Threatened
<i>Birds</i>			
American dipper	<i>Cinclus mexicanus</i>		State Threatened
Bald eagle	<i>Haliaeetus leucocephalus</i>	Federal Threatened	State Threatened
Interior least tern	<i>Sterna antillarum athalassos</i>	Federal Endangered	State Endangered
Osprey	<i>Pandion haliaetus</i>		State Threatened
Peregrine falcon ^(a)	<i>Falco peregrinus</i>		State Endangered
Whooping crane	<i>Grus Americana</i>	Federal Endangered	State Endangered
<i>Mammals</i>			
Black bear ^(b)	<i>Ursus americanus</i>		State Threatened
Black-footed ferret	<i>Mustela nigripes</i>	Federal Endangered	State Endangered
Gray wolf ^(b)	<i>Canis lupus</i>	Federal Endangered	
River otter	<i>Lontra canadensis</i>		State Threatened
Swift fox	<i>Vulpes velox</i>		State Threatened

(a) Peregrine falcons are occasional migrants through South Dakota.

(b) Black bear and gray wolves are rare transients in South Dakota

Wildlife Habitat Quality Rating

The wildlife habitat quality rating is a guide designed to evaluate the quality of habitat for a variety of wildlife species. The rating system is not species specific and is designed to evaluate habitat in general terms. The rating system is used to determine if an area meets the quality criteria established for wildlife. To meet the criteria for the Resource Management System (RMS) for wildlife habitat, the assessment area must receive a habitat quality rating of 0.5 or greater [Natural Resources Conservation Service, 2007d]. The Redwater HUC received a wildlife habitat quality rating of 0.49.

Other Watershed Project, Assessments, Studies, and Plans

The United States Geological Society (USGS) has conducted numerous surface and groundwater resources studies within the HUC [U.S. Geological Survey, 2007]. The SD DENR has conducted Total Maximum Daily Load (TMDL) projects within the HUC [South Dakota Department of Environment and Natural Resources, 2007b].

**Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007**



CENSUS AND SOCIAL DATA

Based on the 2000 Census Data scaled to the percent of the area within the HUC, the population of the HUC is approximately 19,000. Urban population consists of approximately 71 percent of the HUC population (Figure 13). The population distribution by census block group, and population per square mile within the HUC are shown on Figure 14 and Figure 15, respectively. There are approximately 7,618 households within the HUC with the majority of the households earning between \$25,000 and \$49,999 per year (Figure 16). Population and income statistics were obtained from the 2000 Census data [U.S. Census Bureau, 2000].

There are 211 farms in the HUC with 116 primary operators and 81 part time operators. The majority of the farms are greater than 50 acres in size [National Agriculture Statistics Service, 2002]. Figure 17 shows the farm size distribution.

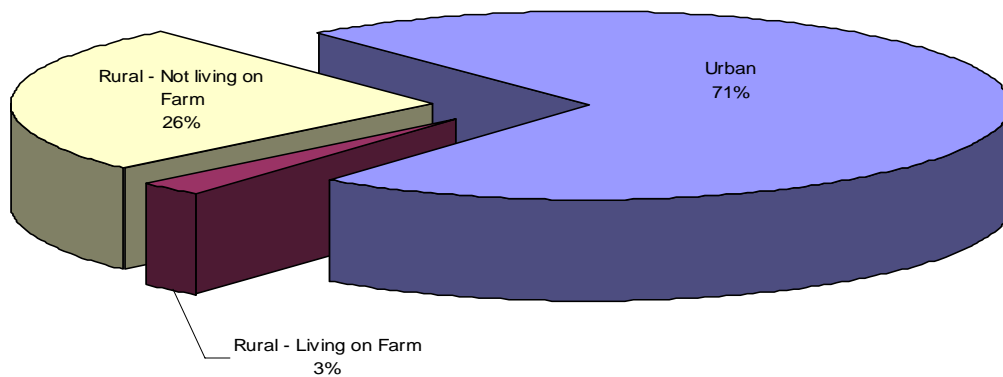


Figure 13. Urban and Rural Population.

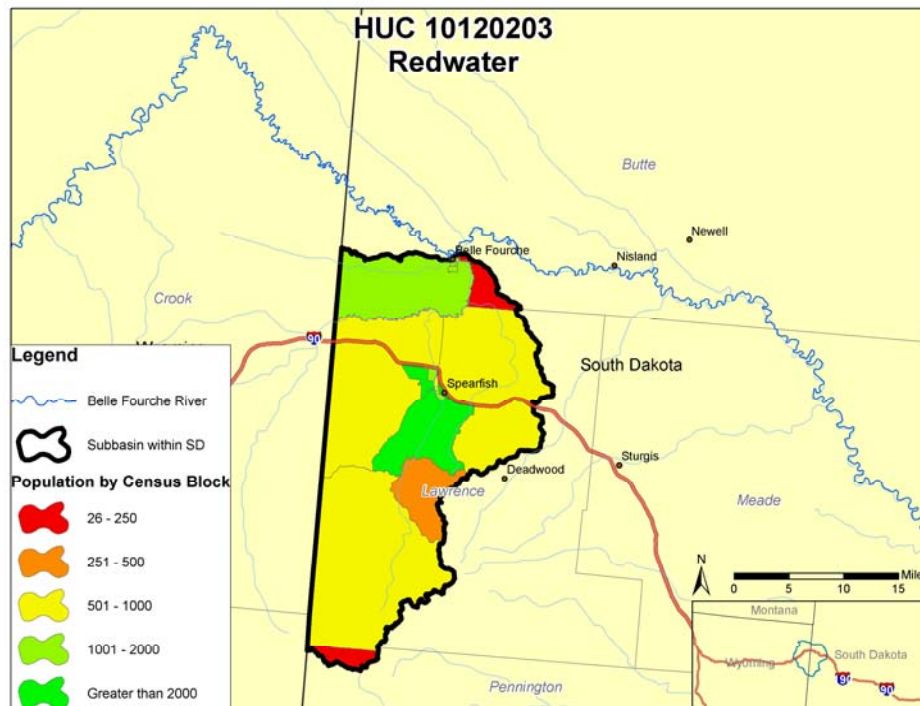


Figure 14. Population Distribution by Census Block.

**Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007**

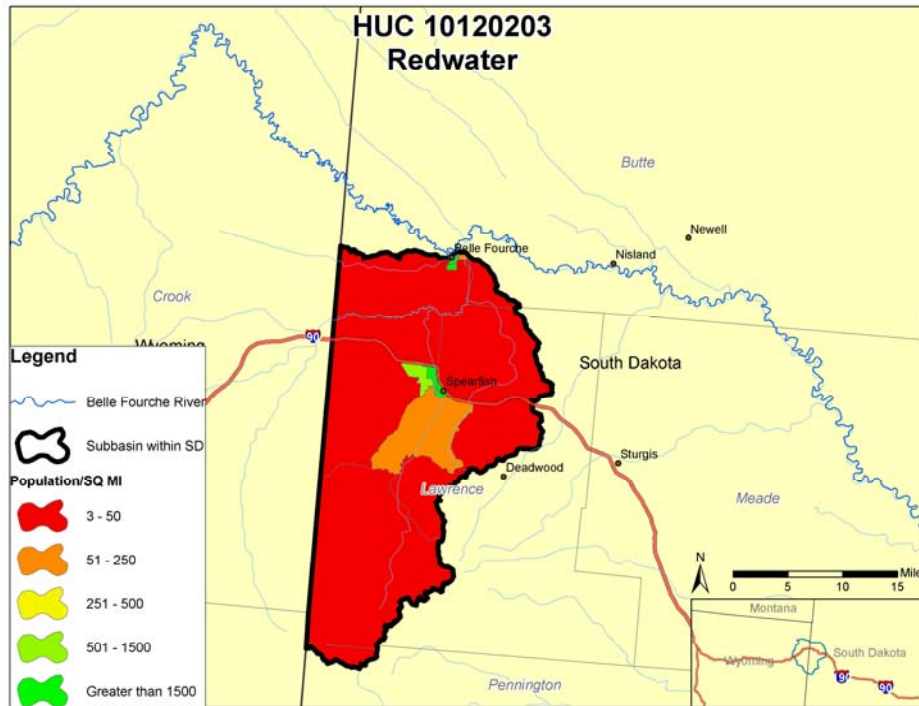


Figure 15. Population per Square Mile.

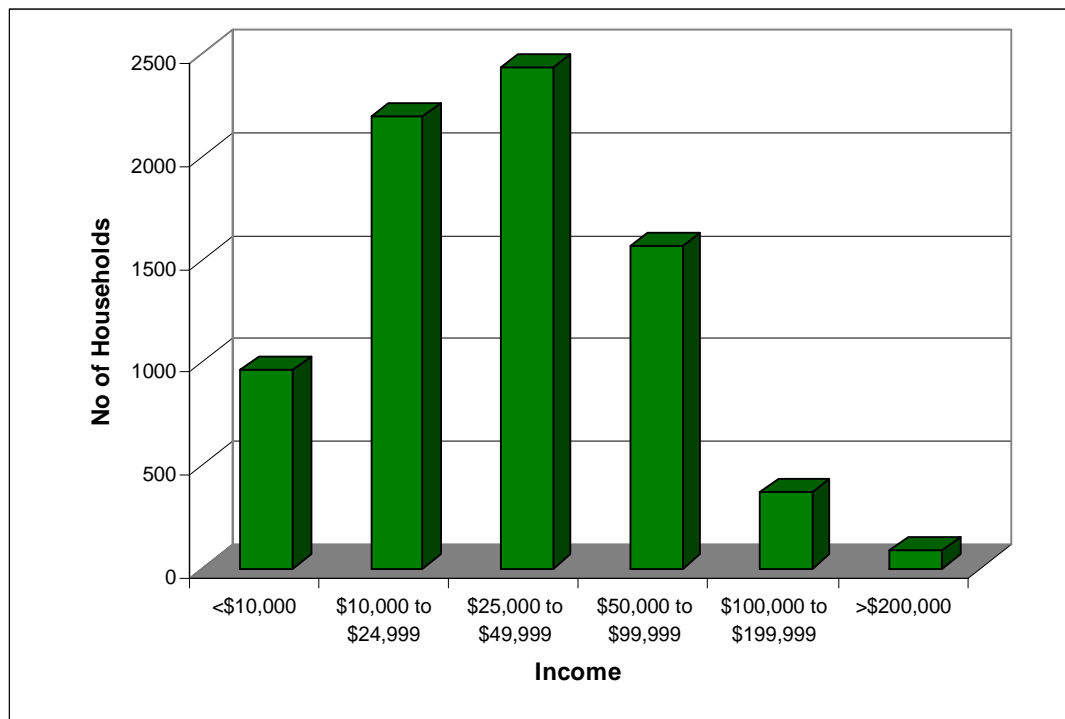


Figure 16. Income Distribution.

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007

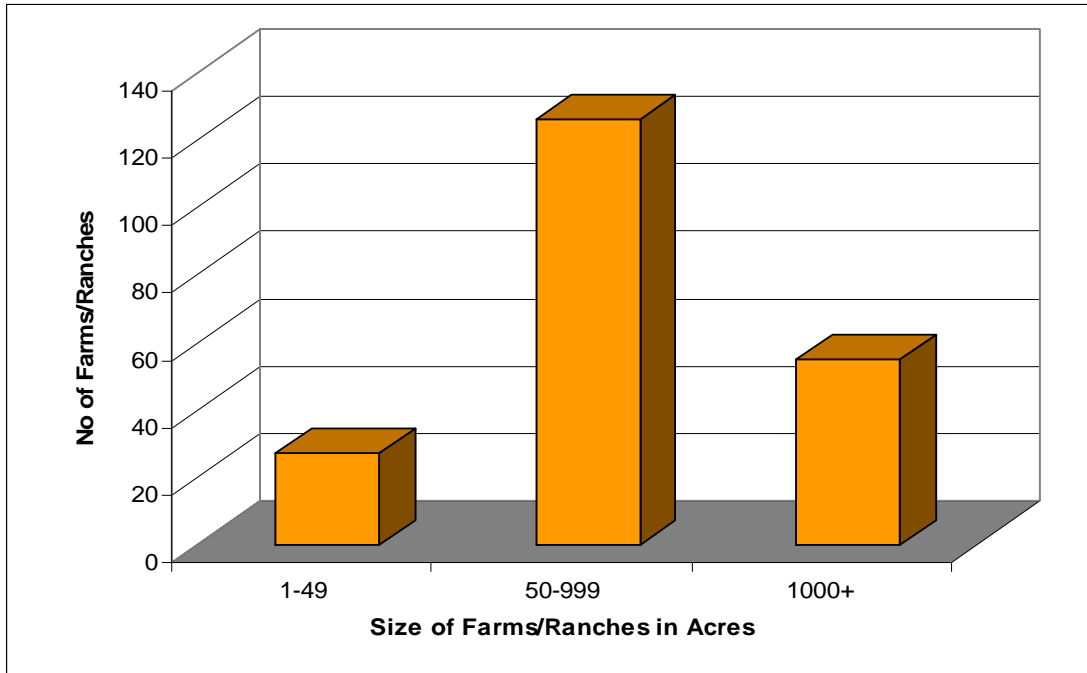


Figure 17. Farm/Ranch Size Distribution.

CONSERVATION PROGRESS

Reported Conservation Progress

The NRCS Performance Results Systems (PRS) tracks conservation progress on addressing resource issues. The data are from the National Conservation Planning Database [Natural Resources Conservation Service, 2007e].

The conservation systems that are planned or applied are attributed to the NRCS, Conservation Districts, Resource Conservation and Development (RC&D) councils, state agencies, or other (other individual or joint partnerships) agencies. Table 16 summarizes the conservation systems acres (planned and applied) submitted to PRS for all land uses and all resource concerns. Approximately 80 percent of the planned conservation systems were applied from 2002 through the first quarter of 2007. Table 17 summarizes the implementation accomplishments for all conservation practices for all land uses and resource concerns. The fiscal year shown on Tables 16 and 17 starts October 1.

Based on the applied conservation practices summary, the most progress was made by installation of fences to control the movement of animals; installation of pipelines to convey water from a source to points of use for livestock, wildlife, or recreation; and the establishment of windbreaks/ shelterbelts to reduce erosion and to provide shelter for livestock and wildlife.

Lands Removed From Production Through Farm Bill Programs

None of the land within the HUC has been removed from production through farm bill programs.

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Table 16. Conservation Systems Summary

	Fiscal Year						Total
	2002	2003	2004 ^(a)	2005	2006	2007 ^(b)	
Total Conservation Systems Planned (acres)	5,222	2,834	13,696	7,413	5,677	2,418	37,260
Total Conservation Systems Applied (acres)	2,457	3,456	16,075	3,526	3,654	796	29,964

- (a) The report from 2004 was presented by county rather than by HUC. Therefore, the numbers were adjusted by the percentage of the county within the HUC.
- (b) The report from 2007 is for the first quarter only.

Table 17. Applied Conservation Practices Summary (Page 1 of 2)

Conservation Practices	Code	Fiscal Year						Total
		2002	2003	2004	2005	2006	2007 ^(a)	
Total Erosion Control (acres)	* ^(b)	490	286	0	0	0	0	776
Total Irrigation Management (acres)	*	282	201	0	0	0	0	483
Total Wetlands Created/Restored/Enhanced (acres)	*	0	7	0	0	0	0	7
Total Wildlife Habitat (acres)	*	510	12	0	0	0	0	522
Conservation Nutrient Management Plan (no)	100	0	0	0	0	1	0	1
Fence (ft)	382	0	0	0	856	6,164	0	7,020
Forage Harvest Management (acres)	511	0	0	0	0	160	0	160
Irrigation System, Sprinkler (number) ^(d)	442	0	0	0	0	1	0	1
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic (ft)	430DD	0	0	0	0	200	0	200
Irrigation Water Management (acres)	449	0	0	0	0	160	0	160
Pasture and Hay Planting (acres)	512	0	0	0	14	14	46	74
Pest Management (acres)	595	0	0	0	0	160	0	160
Pest Management (acres)	595A	165	839	0	0	0	0	1,004
Pipeline (ft)	516	0	0	17,945	22,142	15,378	1,982	57,447
Prescribed Grazing (acres)	528A	1,337	332	0	0	0	0	1,669
Pumping Plant (number)	533	0	0	0	0	2	0	2

Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



Table 17. Applied Conservation Practices Summary (Page 2 of 2)

Conservation Practices	Code	Fiscal Year						Total
		2002	2003	2004	2005	2006	2007 ^(a)	
Upland Wildlife Habitat Management (acres)	645	0	0	0	0	1	0	1
Waste Storage Facility (number)	313	0	0	1	1	0	0	2
Water Well (number)	642	0	0	2	4	3	1	10
Watering Facility (number)	614	0	0	7	11	17	2	37
Windbreak/Shelterbelt Establishment (ft)	380	0	0	1,510	0	2,667	0	4,177

(a) The report from 2007 is for the first quarter only.

(b) * denotes that these conservation practices were listed on the 2002 and 2003 reports only and no codes were listed.

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Redwater – 10120203 South Dakota Portion of 8 Digit Hydrologic Unit Profile



Belle Fourche River Watershed Partnership and RESPEC
In cooperation with the Natural Resource Conservation Service
December 2007



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