Little Bighorn

Geographic Area Assessment

Picture of North end, Dry Fork Canyon
Dry Fork Ridge in Background

Bighorn National Forest Plan Revision
Existing Condition Assessment

Little Bighorn Geographic Area Existing Condition Assessment for Forest Plan Revision

Appendix: Maps

Click on map name for full page view of map

I. Preface

This is one of nine geographic area existing condition assessments that will be used in the Bighorn Forest Plan Revision to describe resources at the geographic area scale and how they relate to the existing Forest Plan. A map of the Forest Plan revision geographic areas is in the appendix. A similar assessment will be done at the Forest-wide scale, and will include numerous resources/topics:

- that are not amenable to analysis at the geographic area scale. For example, most wildlife species are not bound by geographic area boundaries, and to avoid needless repetition in the assessments, such topics will only be discussed at the Forest scale.
- where data bases are not complete or where analysis is still on going at the time the geographic area scale assessments are completed. Examples in this category are fire condition classes and timber suitability, which are expected to be completed by early 2002.

This existing condition geographic area assessment includes the portion of the Little Bighorn watershed that occurs on the Bighorn National Forest, unless noted otherwise.

There is very little information in this assessment concerning other than National Forest System land. This information will be gathered and analyzed, where appropriate, in the draft and final environmental impact statements' effects analyses.

These existing condition assessments focus on the physical and biological resources, and in some cases, human uses and resources, such as timber harvest, grazing and recreation. There will be a social and economic section in the Forest-wide existing condition assessment, and the draft and final environmental impact statements will also include the work of the social and economic analyses, which are currently being compiled by the University of Wyoming.

Despite the fact that these assessments primarily focus on the environmental effects of human uses, it must be remembered that National Forests are managed *to be used* by people. This is implicit in the laws governing National Forest management[1]. Human use of the National Forests has been directed administratively since the earliest days of the Forest Service, "This force has two chief duties: to protect the reserves against fire, and to assist the people in their use."[2] That tradition continues to this day in the "Caring for the land and serving people" mission. While these assessments focus on the environmental effects that people are having on the resource, the point is to make sure that the uses we enjoy today are sustainable so that our children and grandchildren can continue to use and enjoy the Bighorn National Forest.

Disclaimer for GIS generated data: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created, may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify or replace GIS products without notification. The GIS data in these documents were generated using ArcInfo 7.2.1, operating on a Unix platform, with analysis occurring between August of 2001 and January of 2002. For more information, contact the Bighorn National Forest.

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[1] The Multiple Use Sustained Yield Act of 1960, the Renewable Resources Planning Act, and the National Forest Management Act, just to name a few.

[2] Forest Service "Use Book" of 1905.

II. Forest Plan

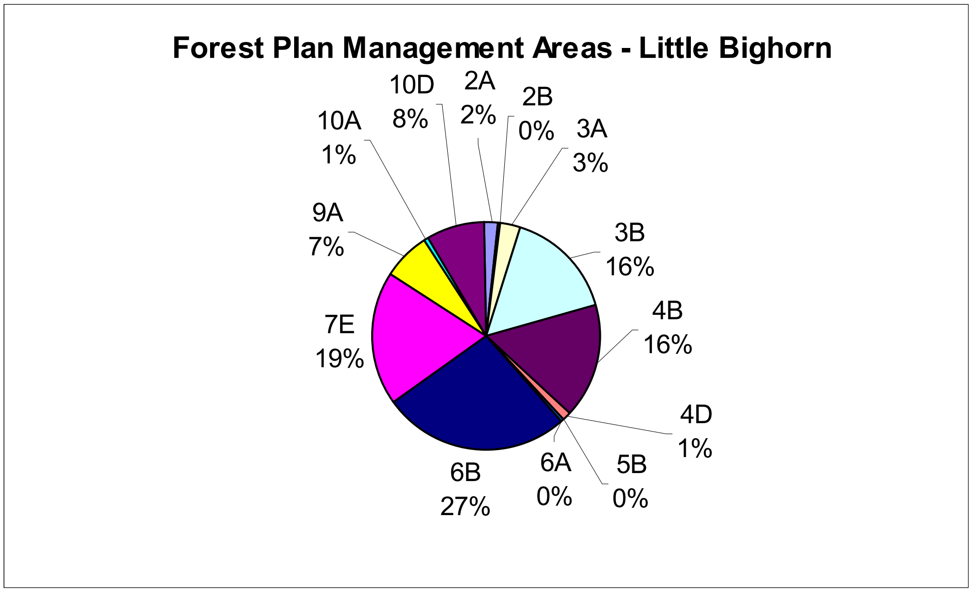
Table 1. Existing Forest Plan Management Area Allocations

Forest Plan Prescriptions	Prescription Description	GIS Acres with 9A Riparian Applied	
		Acres	%
2A	Semi-Primitive Motorized Recreation Opportunities	2929	2%
2B	Rural and Roaded Natural Recreation Opportunities	261	0%
3A	Semi-Primitive Nonmotorized Recreation Opportunities	4331	3%
3B	Primitive Recreation in Unroaded Areas	22,083	16%
4B	Wildlife Habitat Management for Management Indicator Species	22,744	16%
4D	Aspen Stand Management	1760	1%
5B	Wildlife Winter Range in Forested Areas	391	0%
6A	Livestock Grazing, Improve Forage Condition	156	0%
6B	Livestock Grazing, Maintain Forage Condition	36,967	27%
7E	Wood Fiber Production	27,374	19%
9A	Riparian and Aquatic Ecosystem Management	9843	7%
10A	Research Natural Area	1042	1%
10D	Wild and Scenic River Corridor	11,932	8%
Total		141,815	
Non-FS		0	

Some interpretations from Table 1 include:

- Commodity emphasis prescriptions of 6* and 7E account for 46% of the geographic area.
- Next high is 16% for 3B and 4B. (The only other geographic areas with measurable amounts of 3B are Devil's Canyon at 8% and Tongue at 2%.)
- These four prescriptions account for 78% of this geographic area.

Figure 1. Existing Forest Plan Management Area Allocations



Comparison of existing condition to FP goals and objectives and standards and guidelines

What is broken and needs to be fixed in the Forest Plan?

- Suited land in “inaccessible” areas such as Dry Fork Ridge.
- MIS species selection, modeling (elk habitat), and monitoring provisions.
- Riparian and Aspen communities forage utilization standards and guidelines.
- Road Density standards/guidelines need incorporated for elk security habitat.
- Revise the standard/guideline regarding old growth.
- Vacant allotments need consideration for bighorn sheep reintroduction.
- Fences rebuilt/constructed need to have wildlife passage considered.

What are the issues in this geographic area?

- Wild and Scenic Recommendation in Dry Fork and Little Bighorn.
- Unique moss community in Dry Fork. Species are not rare, but water pouring out of Madison Limestone appears to be “cause”.
- Yellowstone cutthroat trout exist in Pumpkin/Mann Creeks and in Lodgegrass Creek.
- Roads 149 and 125 are level 2 roads that have a high number of stream crossings, and may be carried forward into the Forest wide Roads Analysis.
- Little Bighorn geographic area is relatively intact ecologically, especially the northern and eastern ¾ of the geographic area. The southwest portion of the geographic area has had more human impacts.
- Riparian and Aspen impacts (past and present) may be affecting wildlife habitat quality. Less beaver than previously thought to exist, consider this species as possible MIS/Focal. There is a concern over the lack of potential habitat for water voles (sensitive species).
- This area has a low road density and is relatively undeveloped, and thus provides some of the better elk security cover remaining as compared to other geographic areas. Only the southern 1/5 of the geographic area has a high road density area.
- Aspen management has been conducted successfully in the geographic area, with several areas treated and fenced and responding. Additional areas occur that need management.
- The strong representation of Douglas-fir in the geographic area has resulted in the identification of likely old growth in the Lake Cr. and Lick Cr. areas.
- Ponderosa pine is also represented in the geographic area and appears outside the natural range of variability due to understory conditions.

III. <u>Disturbance Factors</u>

Riparian

Disturbance influences upon riparian areas and riparian vegetation are discussed in the Forest-wide assessment.

Fire

Over the long term, fire is the most dominant disturbance factor in this landscape, from the perspective of total number of acres affected. A very small percentage of fires affect a majority of the acre burned.

- Fires role is different among the major forest cover types of ponderosa pine, Douglas fir, limber pine, lodgepole pine and Engelmann spruce/subalpine fir. These are described in more detail in Knight, 2001, and will be summarized in the forest-wide assessment.
- Known fires over 1000 acres in the Little Bighorn geographic area:
    - 1898: Little Horn River, Lodge Grass Creek, north into Montana. "…charged to the Indians." (Town, 1898) 10,000 to 12,000 acres on the Reserve.
    - 1921: Crow Reservation, 18,321 acres, most in Montana.
    - 1930: Unknown name, 5963 acres.
    - 1970: Pumpkin Creek, 4556 acres.
    - 1978: Half Ounce, 1145 acres.
- The recent Little Bighorn Burn plan may result in up to 13,465 acres to be burned. This burn plan prioritizes fire restoration in the ecosystems that had the most frequent fire regime historically, and thus have been most impacted by human fire suppression efforts this century. Sagebrush, grassland, Douglas-fir, ponderosa pine and limber pine ecosystems are prioritized for treatment.

Insect and Disease

- Insect and disease are the second most dominant disturbance factor in this geographic area.
- Disturbance caused by insects and disease differs among the cover types present in the geographic area.

Wind

Wind has played an important disturbance role in this geographic area, as evidenced by the 1993 blowdown event. Approximately 2000 acres were affected in the Little Bighorn geographic area. The area affected was a strip approximately ¼ to ¾ of a mile wide, and several miles long. The affect was intermittent, in that grasslands and timbered areas that were not affected disconnected the blowdown areas. The blowdown ranged from all trees blown over, to only a few blown over. In some cases, the trees were broken off 10 to 30 feet above the ground, leaving limbless snags standing. Most of the area affected was Englemann spruce-subalpine fir forests, and surveys have indicated that spruce beetle are present in the blown down trees.

These wind events have occurred periodically in the Big Horn Mountains. They are caused by "collapsing thunderstorms" that originate over the Big Horn Basin. As they move to the east and hit the abrupt rise of the Big Horn Mountains, they cool dramatically and "collapse" with violent downbursts. The southwest to northeast orientation of the path of these storms is typical of the prevailing summer time airflow.

Timber Harvest

Table 2 shows the amount of timber harvest and fire since the 1940s. The timber harvests are from the RIS tables, and the fire acreages are from the historic fire database.

Table 2. Timber Harvest and Fires in the Little Bighorn Analysis Area

Harvest Type	1940's	1950's	1960's	1970's	1980's	1990's	2000
Clearcut			215	686	1205	336	42
Shelterwood: Prep Cut				640	1112		
Shelterwood: Seed Cut				196	1664	767	
Shelterwood: Overstory Removal					68	162	
Seed Tree						9	
Selection							
Commercial Thin				28	5		
Sanitation/Salvage				312	468	1159	
Pre-commercial Thin					44	36	
Aspen Clearcut					25		
Fire	399	172		5876		942	
Blowdown					8	1800	
Acres CC + SW + ST + S + S/S[3]			215	1834	4517	2433	42

Some of the insights from table 2 are:

- The rate of harvest has decline from the 1980s to the current rate of harvest.

Tinker, et al, 1998 quantifies fragmentation caused by timber harvest and roads on the Bighorn National Forest. That analysis and conclusions are presented in the Forest wide portion of the Forest Plan Revision existing condition assessment, rather than in each geographic area discussion.

Figure 2 shows the relative amounts of suited timber by geographic area. About 23% of the Little Bighorn forested area is currently classified as suitable for timber harvest. This table could be considered an indicator of the relative amount of forested area that is *available* for timber production purposes.

[3] CC = Clearcut, SW = Shelterwood, ST = Seed Tree, S = Selection, S/S = Sanitation/Salvage. These were summed to portray the amount of sawlog harvest that has occurred.

Figure 2. Amount of Forested Area Available That is Suited Timber, by Geographic Area

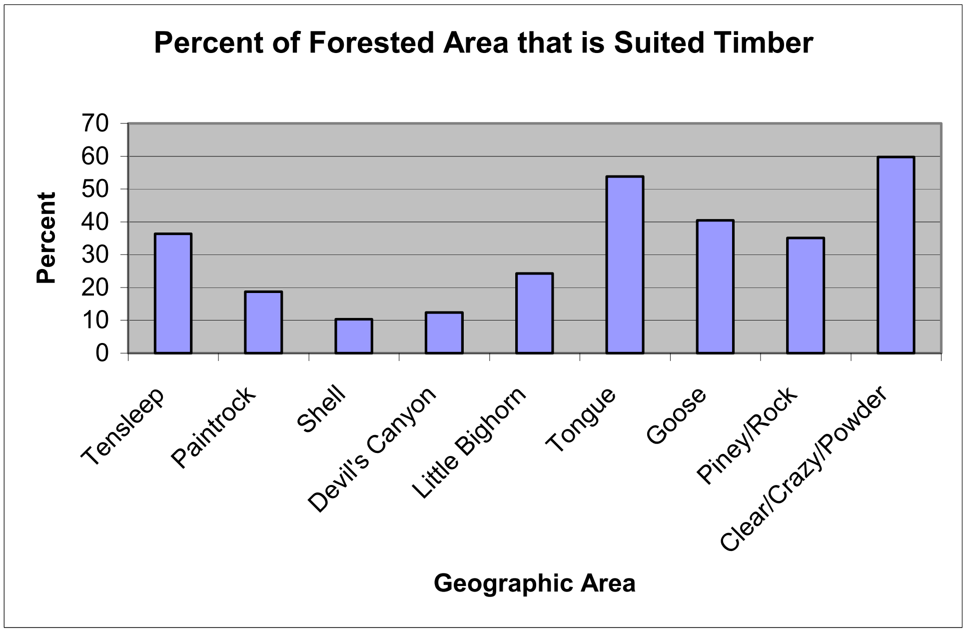


Figure 3 shows the percentage of the suited timber area that has received a final harvest (clearcut, shelterwood removal or seed cut, selection harvests) or stand-replacing fire or blowdown between 1960 and 2000. This is an indicator of the *intensity* of forest successional change, as it indicates how much of the suited land has actually had a stand replacing event between 1960 and 2000. This is from the RIS activity database and includes the time between January 1, 1960 and February 1, 2000. Each bar is divided into “fire and blowdown” and “timber harvest” to show the relative amounts of each type of disturbance.

Figure 4 shows the percentage of all forested lands that has received a final harvest (clearcut, shelterwood removal or seed cut, selection harvests) or stand-replacing fire or blowdown between 1960 and 2000. This is an indicator of the *intensity* of forest successional change, as it indicates how much of the forested area has actually had a stand replacing event between 1960 and 2000. This is from the RIS activity database and includes the time between January 1, 1960 and February 1, 2000. Each bar is divided into “fire and blowdown” and “timber harvest” to show the relative amounts of each type of disturbance.

Figure 3. Percent of Suited Timber that Received a Stand Replacing Event, 1960-2000

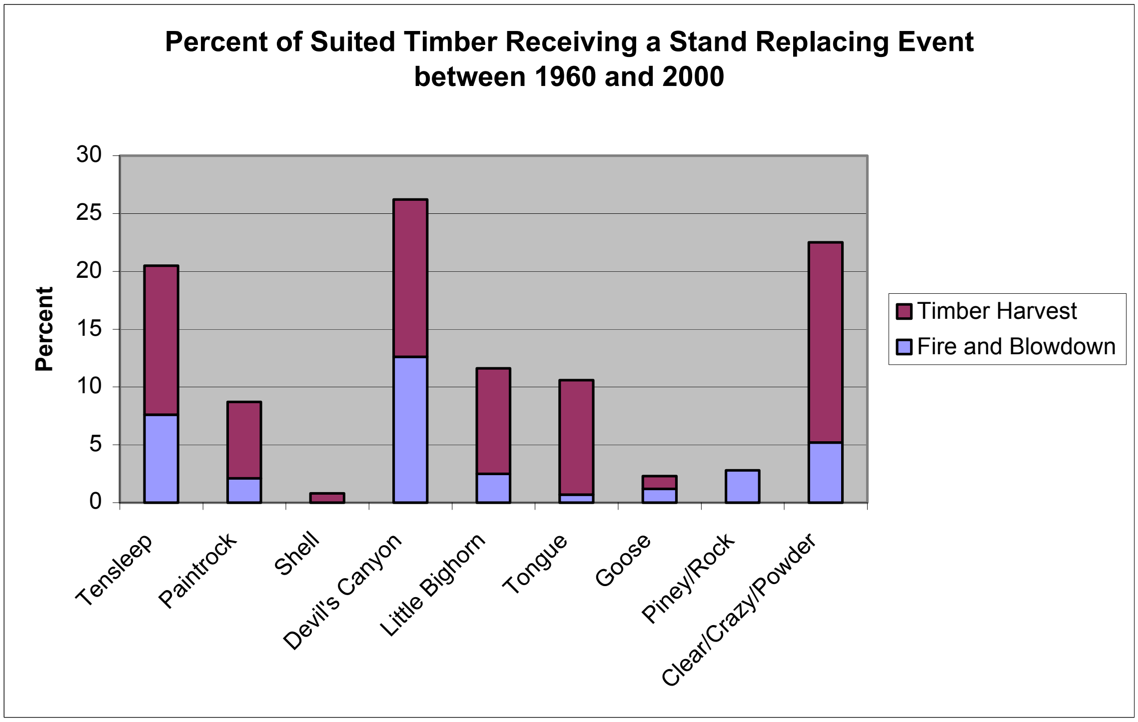
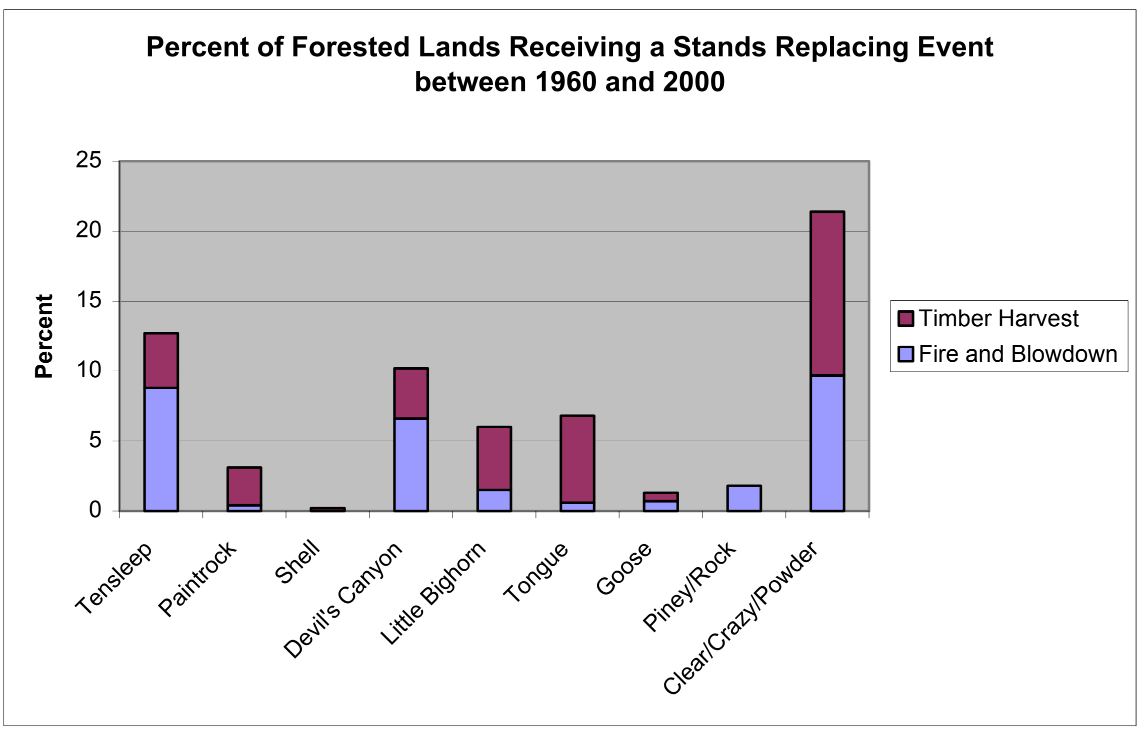


Figure 4. Percent of All Forested Lands that Received a Stand Replacing Event, 1960-2000



Exotic Species

- Forest-wide issue of non-native grass/forb seed mix for revegetation and erosion control.
- Fish: Eastern Brook trout, brown trout, golden trout, and rainbow trout are popular fishing species, but are not native to the Bighorn NF. Yellowstone cutthroat trout exists in this geographic area, and faces non-native competition.
- Canadian thistle, musk thistle and houndstongue are among the noxious weeds known to occur in this geographic area.

IV. Geology and Geomorphology

Table 3 shows the Landtype Associations (LTAs) within the assessment area. Landtype associations are general descriptions of local geology and topography[4]. A map of the LTAs is in the appendix.

Table 3. Acres of Landtypes within Little Bighorn Geographic Area

Landtype Description	Acres	% of total
Glacial cirquelands	0	0%
Alpine mountain slopes and ridges	0	0%
Glacial/tertiary terrace deposits	0	0%
Granitic mountain slopes, gentle	3174	2%
Granitic mountain slopes, steep	0	0%
Granitic breaklands	760	1%
Sedimentary breaklands	48,552	34%
Sedimentary mountain slopes, limestone/dolomite	40,636	29%
Sedimentary mountain slopes, shale/sandstone	39,332	28%
Landslide/Colluvial Deposits	9091	6%
Unclassified	271	0%

The terrain and topography within and adjacent to the Little Bighorn River and its tributaries is varied. Sheer canyon walls approximately 1,000 feet high are present throughout much of the corridor along the river. Extremely steep talus slopes extend from the canyon walls to the riverbanks. The terrain along the river corridor becomes gentler, and the lower cliffs are interspersed with small river gorges upstream of the confluence of Wagon Box Creek and the Little Bighorn River. The topography of the Dry Fork portion of the geographic area is similar to that of the Little Bighorn canyon but is broader and is rimmed by wide, flat benches below steep canyon walls to the east and steep timbered slopes to the west.

The northern Bighorn Mountains were formed 40 to 70 million years ago. Granite older than 570 million years is exposed in the geographic area along the Little Bighorn River. Shale and limestone overlie most of the granite in this portion of the Forest. In the Dry Fork, limestone, dolomite, shale, and sandstone beds overly the thick carbonate formations (dolomite and limestone) that predominate in this area. Shale, sandstone, conglomerate and limestone beds underlie the carbonate formations. Faulting has occurred throughout the corridor.

Geologic Hazards

The landslide map used in this analysis was created from 1:24,000 scale maps obtained from the Wyoming State Geological Survey office in Laramie, WY. Within the Little Bighorn geographic area there are 19,137 acres of soils prone to landslides. The areas subject to slides are widely distributed in small units throughout the geographic area.

[4] Landtype associations are groupings of landtypes or subdivisions of subsections based upon similarities in geomorphic process, geologic rock types, soil complexes, stream types, lakes, wetlands, and plant association vegetation communities. Names are often derived from geomorphic history and vegetation community. Avers, et al, 1993. See also Table 3, Chapter 1, for hierarchical location of landtype associations.

Table 4. Landslide Prone Acres

Geographic Area Name	**Acres of Soils Prone to Landslides**
Little Bighorn Geographic Area	19,137

Erodibility

There are approximately 18,955 acres of soils within the Little Bighorn geographic area classified as having a severe risk for erosion, Table 5. Ground disturbing activities on these soils would increase the risk of generating erosion.

Table 5. Acres of Erodible Geology

Geographic Area Name	**Acres of Erodible Geology**
Little Bighorn Geographic Area	18,955

Mineral resources

A minerals report prepared for the Little Bighorn Wild and Scenic River Study Report and Final EIS revealed a low potential for locatable minerals (gold, silver, etc.) and leaseable minerals (oil and gas) within and around the geographic area. Seven mining claims currently are held in the upper end of the Little Bighorn River near its confluence with Wagon Box Creek and Half Ounce Creek. There are no current permits or operating plans for minerals exploration within the corridor. The nearest known petroleum fields are approximately 30 miles east and 15 miles west of the Forest. The closest exploratory well was drilled about 35 miles southeast of the river corridor, outside of the Forest.

Salable minerals such as limestone and dolomite are present within the geographic area and could potentially be used for construction, chemical, and metallurgical purposes. Granite within the geographic area could be used by the construction industry. Because of the inaccessibility of these reserves, they have not been utilized to any extent in the past.

Placer gold mining has occurred sporadically as far north as the Bald Mountain area south of the geographic area since the late 1800's and continues today. Placer deposits of monazite (with 8.8 percent ThO_2), ilmenite, zircon, and magnetite also have been found in the Bald Mountain area. Rare earth elements have been found in the Cookstove Basin area and may also be found in placer deposits in the geographic area. Although placer deposits migrate downstream, there is a low potential for these mineral resources in this part of the Forest.

There is a potential for uranium mineralization within the corridor in deposits at unconformities at the base of Pennsylvanian rocks and also at the Cambrian-Precambrian contact. Small, high-grade uranium deposits are found in the Little Mountain area, approximately 25 miles west of the river corridor. The deposits occur in ancient caves that were formed approximately 320 million years ago between the Mississippian and Pennsylvanian periods. Similar terrain for the same geologic unit that contains the Little Mountain deposits is exposed within the corridor.

Hydrologic Disturbance factors

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

V. Soils and Topography

Soils on this part of the Forest are predominately formed in colluvial material resulting from erosion. Because carbonate rock is the most common rock exposed in the geographic area, most of the soils are basic and high in nutrients. Some granite and shale derived soils, with less fertility, occur in certain areas. Rock outcrops, including escarpments, canyon wall, and mountain peaks in the geographic area, are exposed to the effects of weathering, which causes fragments of rock to break from the outcrops. These fragments generally move down slope at a slow rate that is occasionally punctuated by a sudden downward movement, a landslide. Results of a soil survey of the Forest reveals a variety of soils types associated with colluvial material derived from rock outcrops. Interpretation of aerial photographs has reveled a number of potential landslide areas within both the Little Bighorn and Dry Fork canyons.

Soils derived from interbedded shale, sandstone, and limestone on mountain slopes and landslide deposits occur in three separate areas of the study area: both banks of the Little Bighorn River below its confluence with the Dry Fork; the west bank of the Little Bighorn River approximately 2 miles upstream of its confluence with the Dry Fork to the southernmost extent of the river corridor; and the east bank of the Dry Fork south of its confluence with Lick Creek. The hazard for water erosion in these rock-soil assemblages is slight to moderate, and the limitations for unsurfaced roads range from moderate to severe.

Table 6 shows the soil types that occur in the Little Bighorn geographic area and the amount of the analysis area comprised of each soil type. A description of each soil type can be found in the Project File. Forage production is displayed in Table 6 as a way to display the natural range of soil productivity within the analysis area (Nesser, 1976).

Table 6. Acres of Soils within Geographic Area

Soil Identification Number	Acres	Productivity as Measured by Forage Production (#/acre)
10	2320	500-700
11	0	500-700
12	0	600-800
13	0	Na
14	45,740	500-700
15	7676	500-1,800
16	261	3,000-3,500
17	1,336	1500-1800
18	0	1,500-1,800
19 A and B	0	500-700
21	296	1,500-1,800
22	5635	1,200-1,700
23	785	1,500-1,800
24	1115	1,600-2,400
25	1027	1,500-1,800
26	0	600-1700
27	10,792	1,600-2,400
28	1,595	1200-1700
29	9032	1,600-2,400
30	7071	1,600-2,400
31	330	500-700
32	12,928	500-700
33	0	600-800
36	0	500-800
37	0	Na
38	0	500-700
39	0	600-1,700
40	0	500-700
41 A and B	0	1,500-1,800
43	0	500-700
Water	0	Na

Erosional processes

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

Range of variability in soil conditions

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

Risk to soil resources including soil loss or compaction

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

VI. Hydrology and Water Quality

Within the geographic area, the average stream gradients of the Little Bighorn River and the Dry fork are steep. The gradients, expressed in vertical drop over a horizontal distance, form the southern boundary of the corridor to the northern corridor boundary are 281 feet per mile (3,710 feet over 13.2 miles) for the Little Bighorn River and 153 feet per mile (920 feet over 6.0 miles) for the Dry Fork. Water passes over cobble-sized to boulder-sized rocks within the narrow streambeds at peak discharges that exceed 100 cubic feet per second (cfs). The major tributaries of the Little Bighorn River include Taylor Creek, Wagon Box Creek, and Dayton Gulch. Bear Trap Creek, Lick Creek, and Lake Creek are the major tributaries of the Dry Fork.

Table 7. Major 6th Field Watershed Data within Planning Area

6th Field Watershed Name	6th Field Watershed Number	Perennial Stream Miles	Intermittent Stream Miles	FS WS Acres	Other WS Acres	Total WS Acres
Dry Fork	100800100313	55	146	46304	0	46304
Little Bighorn	100800160102	34	83	35060	0	35060
West Fork Little Bighorn	100800160103	39	101	33419	0	33419
E and W Pass Creek	100800160104	21	28	12189	0	12189
Lodge Grass Creek	100800160108	11	39	14056	0	14056
Totals:		**160**	**397**	**141028**	**0**	**141028**

Water Quality and Water Uses

Water from the Little Bighorn River has not been developed to any great extent. Upon leaving the Forest, about 45,000 acre-feet per year of Little Bighorn water has been appropriated by the State of Montana, primarily for irrigation purposes downriver. United States Geological Survey (USGS) gauging stations on the Little Bighorn River and the Dry Fork within the geographic area and on the Little Bighorn River below the Forest boundary have recorded flow rates for periods ranging 4 to 46 years.

Table 8 shows flow rates and annual yields monitored at the stations between 1983 and 1986.

Table 8. Flow Rates of the Little Bighorn and Dry Fork at USGS Stations

Station	Water Year[5]	Annual Flow Rate (cfs) Mean	Low	High	Annual Water Yield (acre-feet)
Little Bighorn below Dayton Gulch[6]	1983	18.5	2.7	206	13,380
	1984	21.8	3.0	232	15,820
	1985	11.5	2.3	81	8,300
	1986	20.3	2.7	319	14,720

[5] A water year extends from October 1 to September 30.
[6] This station is located on the Little Bighorn River below Dayton Gulch near Burgess Junction. Elevation of gauge is 8,240 feet.

Station	Water Year[5]	Annual Flow Rate (cfs) Mean	Low	High	Annual Water Yield (acre-feet)
Dry Fork below Lick Creek[7]	1983	48.1	16.0	261	34,850
	1984	60.6	14.0	338	43,980
	1985	31.3	18.0	79	22,630
	1986	44.7	16.0	276	32,370
Little Bighorn at State Line[8]	1983	148.0	45.0	1,030	106,800
	1984	189.0	25.0	1,270	137,000
	1985	99.9	40.0	376	72,360
	1986	140.0	29.0	1,320	101,200

Although a number of applications are on file with the State of Wyoming for water resource projects originating within the geographic area, only one permit has been approved. This permit is for diversion of 150 cfs from the Little Bighorn River approximately 2 miles upstream from the Forest boundary. Proposed projects within the geographic area that are on file with the State are outlined in Table 9.

Table 9. Water Projects Proposed to State of Wyoming within Little Bighorn Geographic Area (1987)

Permit Number	Date Received	Project Name	Current Permit Holder	Status
Temporary Filing Number 21 2/141 and Permit Number 23955	08/25/72	Little Bighorn-East Twin Creek Pipeline	Little Horn Energy	Approved. The facility may not be completed because all notices have not been filed.
Temporary Filing Number 22 5/157	03/29/76	Little Bighorn Tunnel and Canal	Little Horn Energy	Application on file but not yet approved.
Temporary Filing Number 23 1/258	02/08/80	Little Bighorn Pipeline	Fuller Ranch Company	Application on file but not yet approved.
Temporary Filing Number 23 6/257	02/08/80	West Fork Pipeline	Fuller Ranch Company	Application on file but not yet approved.
Temporary Filing Number 23 2/364	10/24/80	Dry Fork Reservoir	Little Horn Energy	Application on file but not yet approved.
Temporary Filing Number 23 3/364	10/24/80	Half-Ounce Reservoir	Little Horn Energy	Application on file but not yet approved.

[7] This station is located on the Dry Fork below Lick Creek near Burgess Junction. The elevation of gauge is 6,100 feet.
[8] This station is located on the Little Bighorn River near the Wyoming-Montana state line. The elevation of gauge is 4,450 feet.

Any water project occurring on National Forest System Lands is subject to the Forest Service permitting process. No Forest Service permits have been issued for any of the projects listed in Table 9. Further, no water rights will be issued in the geographic area until Congress makes a decision on the designation of the area into the Wild and Scenic Rivers System.

Water quality of the drainage is considered to be very good. Water quality has been monitored for a number of years at the USGS station located on the Little Bighorn River approximately 2 miles downstream from the Forest boundary (Table 10). The river has the highest dissolved salts content of all major streams within the Bighorn Mountains because of the limestone geology and ground-water percolation through the limestone and its discharge into the river. Although suspended sediment concentrations average approximately 10 percent more than the Bighorn National Forest-wide averages, these concentrations are not considered detrimental to trout fisheries.

Other sites sampled in the geographic area have indicated similar results. Sampling by the Forest in conjunction with potential timber sales at Dayton Gulch, near its junction with the Little Bighorn River, revealed alkalinity and turbidity levels somewhat lower than those recorded at the state-line USGS station (120 to 140 micrograms per liter and 0.5 to 2.2 Jackson turbidity units, respectively). The maximum recorded alkalinity and turbidity in the Little Bighorn River just below Dayton Gulch was even lower than that recorded at the Dayton Gulch site. The pH values for all sites sampled averaged about 8.5.

Table 10. Select water quality data for Little Bighorn River (1970-1977)

Station	Water Year	Water Temperature (d C)			Turbidity (JTU)[9]			Conductivity (Micro mhos)			Dissolved Oxygen (mg/l)			Alkalinity[10] (mg/l CaCO3)		
		Mean	Max	Low	Mean	Max	Low	Mean	Max	Low	Mean	Max	Low	Mean	Max	Low
Little Bighorn at State Line	1970	6.7	8.3	5.0	45.0	45.0	45.0	-	-	-	6.0	6.0	6.0	152	160	144
	1971	10.0	12.2	7.8	2.8	5.0	1.0	-	-	-	10.0	10.0	10.0	174	185	156
	1972	8.8	12.2	6.7	3.0	9.0	0.0	230	300	130	10.1	11.0	9.5	130	200	60
	1973	9.8	13.3	6.1	11.1	34.5	0.0	338	370	305	-	-	-	140	170	100
	1974	7.2	8.9	5.0	-	-	-	273	300	230	-	-	-	123	150	100
	1975	7.8	10.0	4.4	8.0	15.0	2.0	306	325	290	10.6	12.0	9.5	160	180	140
	1976	10.1	13.3	8.3	1.3	5.0	0.0	150	274	30	1.1	1.1	1.1	173	200	150
	1977	8.7	13.3	4.4	7.4	45.0	0.0	251	370	30	9.2	12.0	1.1	153	200	60

Water quality criteria is established and monitored by the State of Wyoming. Surface water quality classes are a hierarchical categorization of waters according to existing and designated uses. There are four major classes of surface water in Wyoming with various subcategories within each class. Table 11 gives a listing of water quality classes for streams within the analysis area.

Table 11. Wyoming Surface Water Quality Classifications (1998) and Domestic Water Users

Watershed	Wyoming Surface Water Quality Class	Tributaries	Wyoming Surface Water Quality Class	Community Water System being Served
Little Bighorn	2AB			None identified
		Twin Creek	2C	
		WF Little Bighorn	2AB	
		Dry Fork	2AB	

[9] JTU=Jackson Turbidity Unit, measures relative opaqueness to light
[10] EPA recommended instream concentration for fish is greater than 20mg/l

Watershed	Wyoming Surface Water Quality Class	Tributaries	Wyoming Surface Water Quality Class	Community Water System being Served
		Wagon Box Creek	2AB	
		W Pass Creek	2AB	
		East Pass Creek	2AB	
		Lodgegrass Creek	2AB	
		Gold Creek	2AB	
		Half Ounce Creek	2AB	
		Elkhorn Creek	2AB	

All streams within the analysis area (except Twin Creek which is 2C) are classified as 2AB. Class 2 waters are waters that are known to support fish or drinking water supplies or where those uses are attainable. Class 2 waters may be perennial, intermittent or ephemeral and are protected for the uses indicated in each sub-category. There are four sub-categories of Class 2 waters.

Class 2AB waters are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable.

Class 2C waters are those known to support or have the potential to support only non-game fish populations or spawning and nursery areas at least seasonally including their perennial tributaries and adjacent wetlands.

In 2000, the State conducted a review of all watersheds within the State to determine whether or not they are meeting the designated beneficial uses (i.e., fisheries, recreational use, etc.). The results of that review can be found in the document titled, "Wyoming 2000 305(b) State Water Quality Assessment Report". Table 12 summarizes the watersheds within this analysis area listed in the State 305(b) report.

Table 12. Water Quality Impaired Watersheds (2000)

Watershed	Listed on 2000 State 305(b) Report?	Type of Listing (Impaired or Threatened)	Reason for Listing and Location of Impairment
Little Bighorn River	No	None	

Human Impacts Upon Water Quality

Influence of Timber Harvesting upon Water Quality

Timber harvest activities are one of the major land management activities within the analysis area. The mechanical processes involved in timber harvest and associated road construction, in conjunction with natural conditions, influence the level of disturbance within watersheds. Negative effects tend to increase when activities occur on environmentally sensitive terrain with steep slopes composed of highly erodible soils that are subject to high climatic stresses.

Soil and site disturbance that inevitably occur during timber harvest activities are often responsible for increased rates of erosion and sedimentation, modification and destruction of terrestrial and aquatic habitats, changes in water quality and quantity, and perturbation of nutrient cycles within aquatic ecosystems. Physical changes affect runoff events, bank stability, sediment supply, large woody debris retention, and energy relationships involving temperature. All of these changes can eventually culminate in the loss of biodiversity within a watershed.

Increased delivery of sediments, especially fine sediments, is usually associated with timber harvesting and road construction. As the deposition of fine sediments in salmonid spawning habitat increase, mortality of embryos, alevens, and fry rises. Erosion potential is greatly increased by reduction in vegetation, compaction of soils, and disruption of natural surface and subsurface drainage patterns. Generally, logged slopes contribute sediment to streams based on the amount of bare compacted soils that are exposed to rainfall and runoff. Slope steepness and proximity to channels determine the rate of sediment delivery.

Research by Troendle, et al (1998), shows that when approximately 24% or more of the basal area of a watershed is removed, peak flows (instantaneous maximum flow or maximum mean daily flow) were not significantly increased. However, the duration of the higher, near bankfull discharges were extended.

Table 13 gives the acres of treatment followed by the equivalent clearcut acres for that treatment. An equivalent clearcut acre is roughly equal to the basal area removal for a given harvest type. For example, a shelterwood prep-cut removes approximately 33% of the basal area in a treated stand. The ECA for that prescription is 0.33.

Table 13. Equivalent Clearcut Acres for the Little Bighorn Geographic Area

Harvest Type	Equivalent Clearcut Multiplier	1950's	1960's	1970's	1980's	1990's	2000	Totals
Clearcut (acres) (ECA)	1.00		215 215	686 686	1205 1205	336 336	42 42	2484 **2484**
Shelterwood: Prep Cut (acres) (ECA)	0.33			640 211	1112 367			1752 **578**
Shelterwood: Seed Cut (acres) (ECA)	0.33			196 65	1664 549	767 253		2627 **286**
Shelterwood: Overstory Removal (acres) (ECA)	1.00				68 68	162 162		230 **230**
Seed Tree (acres) (ECA)	0.85					9 8		9 **8**
Selection (acres) (ECA)	0.35							

Harvest Type	Equivalent Clearcut Multiplier	1950's	1960's	1970's	1980's	1990's	2000	Totals
Commercial Thin								
(acres)	0.35			28	5			33
(ECA)				10	2			**12**
Sanitation/Salvage								
(acres)	0.35			312	468	1159		1939
(ECA)				109	164	406		**679**
Pre-commercial Thin								
(acres)	0.20				44	36		80
(ECA)					9	7		**16**
Aspen Clearcut								
(acres)	1.00				25			25
(ECA)					25			**25**
Fire								
(acres)	1.00	172		5876		942		6990
(ECA)		172		5876		942		**6990**
Blowdown								
(acres)	1.00				8	1800		1808
(ECA)					8	1800		**1808**
TOTAL ECA								**12,437**
% of Area[11]								**8.7**

As shown in Table 13, approximately 9% of the geographic area is in an ECA condition. In reality, this number would be somewhat less than 9% due to vegetation recovery following fire or timber removal. However, given this worst-case scenario, timber management combined with natural wildfire has probably not exceeded the range of variability in vegetation removal in this geographic area.

Influence of Roads upon Water Quality

Roads contribute more sediment to streams than any other land management activity, but most land management activities such as mining, timber harvest, grazing, recreation, and water diversions are dependant on roads. The majority of sediment from timber harvest activities is related to roads and road construction and associated increased erosion rates. Serious degradation of fish habitat has been shown to result from poorly planned, designed, located, constructed, or maintained roads.

Road/stream crossings can also be a major source of sediment to streams resulting from channel fill around culverts and subsequent road crossing failures. Plugged culverts and fill slope failures are frequent and often lead to catastrophic increases in stream channel sediment, especially on old abandoned or unmaintained roads. Unnatural channel widths, slope, and streambed form occur upstream and downstream of stream crossings, and these alterations in channel morphology may persist for long periods of time. Channelized stream sections resulting from rip-rapping of roads adjacent to stream channels are directly affected by sediment from side casting, snow removal, and road grading; such activities can trigger fill slope erosions and failure. Because improper culverts can reduce or eliminate fish passage, road crossings are a common migration barrier to fishes.

[11] This number does not account for vegetation recovery over time. Following fire or timber harvest, trees will reestablish themselves on a site and the ECA for that activity will approach zero. Therefore, the ECA's for this watershed will probably be somewhat less than suggested by this table. Also, roads were not included in this table at this time. Roads add approximately 4 acres of ECA per mile.

Table 14. Number of Stream Crossings in Planning Area

Watershed	No. of Stream Crossings	No. of Stream Crossings/Square Mile
Little Bighorn	165	0.74

Roads in the analysis area directly affect natural sediment and hydrologic regimes by altering stream flow, sediment loading, sediment transport and deposition, channel morphology, channel stability, substrate composition, stream temperatures, water quality, and riparian conditions within a watershed. Road related mass movements can continue for decades after the roads have been constructed. Such habitat alterations can adversely affect all life-stages of fishes, including migration, spawning, incubation, emergence, and rearing.

Field inventories have shown that the amount of watershed risk presented by roads in the analysis area is directly related to maintenance level. The lower maintenance level roads tend to be more susceptible to yearly input of sediment into nearby streams. Table 15 displays the existing miles of road by maintenance level in the analysis area. This number will be used to compare watersheds at highest risk for road related watershed impacts.

Table 15. Miles of Forest Service Roads in the Geographic Area

Maintenance Level	Miles of road within the Geographic Area	Overall Condition and Watershed Risk
Unclassified	53	In the geographic area, roads in this category are generally either user-created or abandoned system roads (50/50). The level of watershed risk depends upon the treatments used to reclaim them. They tend to be used seasonally to access recreation areas. No maintenance occurs on these roads. Watershed impacts can occur when these roads are near water bodies. However, limited use reduces the risk to water quality.
Level 1	87	These roads are generally not open to the public. They are closed except for administrative purposes. Watershed impacts tend to vary with the amount of use and the effectiveness of erosion control measures.
Level 2	77	These roads tend to be native surface roads with poor drainage design. During wet seasons, rutting frequently occurs. Stream crossings are generally a source of sediment. These roads pose the highest risk to water quality due to their frequent use, number of stream crossings, and low standard design. However, road maintenance is beginning to catch up on the tremendous backlog of improvement needs in this area.
Level 3	21	These roads are generally designed with good road drainage and maintained on a regular basis. These roads tend to be in-sloped with a ditch and have a gravel surface. They usually do not pose a serious threat to water quality.

Influence of General Recreational Activities upon Water Quality

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

Reservoirs and Impoundments

There are no reservoirs or impoundments within this geographic area.

Wetlands/Riparian Areas

Table 16 shows the acres of riparian area within the geographic area, and a map of the riparian areas is in the appendix. Riparian areas are defined in management prescription area 9A of the 1985 Forest Plan, page III-198:

> "The aquatic ecosystem, the riparian ecosystem (characterized by distinct vegetation), and adjacent ecosystems that remain within approximately 100 ft. measure horizontally from both edges of all perennial streams and from the shores of lakes and other still waters bodies."

Table 16. Acres of Riparian within Little Bighorn Geographic Area

6th Field Watershed Name	6th Field Watershed Number	Acres of Riparian	Miles of Road w/in Riparian
Dry Fork	100800100313	2,781	3.45
Little Bighorn	100800160102	3,654	5.54
West Fork Little Bighorn	100800160103	1,608	0.52
E and W Pass Creek	100800160104	823	0.98
Lodge Grass Creek	100800160108	764	0.09
Totals:		**9,630**	**10.58**

At the time of the 1985 Forest Plan, only a few of the larger riparian areas were mapped. Since then, the riparian mapping project defined areas of riparian vegetation, and Geographic Information Systems (GIS) were developed, making the mapping of riparian areas feasible. The riparian mapping project on the Bighorn was completed in about 1995. The project consisted of using 1992 color infrared, 1:24,000 scale, aerial photography to map riparian areas based upon a combination of the riparian vegetation and the stream course geomorphology and topography. Broad vegetation types were identified from the photography, and are discussed on page 28 of this assessment.

Riparian vegetation has a moderate influence on water yield due to evapotranspiration rates associated with riparian species. Since evapotranspiration rates are highest during periods of highest runoff, the effect of riparian vegetation on the timing of water yield is only moderate. Riparian vegetation is extremely important for control of sediment from upslope sources during high runoff/surface erosion periods. Riparian vegetation is also critical for the stability of lower gradient stream reaches.

VII. Aquatic Species and Their Habitat

Aquatic Species Habitats

Past management of fisheries and aquatic resources in the Little Bighorn River geographic area has consisted of stocking by the Wyoming Game and Fish Department (WGFD), occasional evaluations of stocked fish, a WGFD fisheries impact assessment of a proposed hydroelectric project, Forest Service fish habitat improvement projects, limited inventories of native Salmonidae, and establishment of special harvest regulations an tributaries managed for unique species. Management by WGFD has focused on segments of streams in the drainage that have high use by anglers.

The Little Bighorn drainage lies within the historic range of the Yellowstone cutthroat trout (YSC). Declines in genetic purity, population sizes, and distributions of all native inland cutthroat trout has prompted listing of many subspecies as threatened under the Endangered Species Act by the US Fish and Wildlife Service. Subsequently, the Forest Service and WGFD are evaluating the distributions of sizes of any endemic populations of YSC within the Little Bighorn watershed in order to synthesize conservation planning. Neil Stickert completed an inventory of YSC in the Little Bighorn watershed in 2000.

The variables used to describe stream channel characteristics at the watershed scale must be sensitive to land-use practices and be important indicators of habitat quality. Table 17 lists the variables suited for analysis, four of which have biological implications. This information has been collected on approximately 40% of the Bighorn National Forest. This information was collected by Stickert (2000).

Table 17. Aquatic Habitat Measurement Indicators for Little Bighorn Geographic Area

Habitat Variable	Mean	Standard Deviation	Range	Variable measurement and unit
Stream Gradient	7.4	5.4	1.0 - 25.0	Gradient of study reach (%)
Elevation (m)	2395	309	1695 - 2792	Elevation of study reach
Wetted width (m)	3.2	1.3	0.6 - 6.5	Average wetted width (m) of stream as measured perpendicular to direction flow
Pool Area (%)	16.0	13.8	0.0 - 66.0	Relative pool area (%) to total area of study reach
LWD length (m/100 m)	13.1	21.2	0.0 - 111.0	Total length (m) large woody debris within BFW>1m length, 15cm diameter
Undercut bank (m/200m)	14.2	17.1	0.0 - 123.0	Total length overhanging stream bank (both sides of channel) undercut 10cm
Eroding bank (m/200m)	18.9	26.1	0.0 - 143.0	Total length stream bank (both sides) showing erosion or slumping
Vegetation cover (m2)	6.8	9.6	0.0 - 47.5	Total area (m2) overhanging vegit ation cover within 30 cm of water

TES (species at risk) and their habitats

The Yellowstone cutthroat trout (Oncorhynchus clarki bouvieri) is the native trout of the Bighorn Mountains, although it is generally considered unlikely they were native to the Powder River geographic area. Individual populations of the Yellowstone subspecies have evolved numerous life-history characteristics in response to the diverse environments in which they have been isolated since the last glacial retreat. Anthropogenic activities have resulted in a substantial reduction in the historical distribution of this subspecies, and many unique local populations have been extirpated. As a result, the Yellowstone cutthroat trout has been designated as a species of special concern – class A by the American Fisheries Society.

Historical Distribution

The Yellowstone cutthroat trout is more abundant and inhabits a larger geographical range in the western US than any other non-anadromous subspecies of cutthroat trout. Yellowstone cutthroat trout were historically found in the Yellowstone River drainage in Montana and Wyoming and in the Snake River drainage in Wyoming, Idaho, Utah, Nevada, and Washington.

Current Status and Distribution

Stickert (2000) found two allopatric populations of genetically pure Yellowstone cutthroat trout (YSC) within the Little Bighorn geographic area. One population is in Lodgegrass Creek and the other is in Pumpkin/Mann Creeks. They appeared to be self-sustaining populations above barriers protecting them from non-native salmonids. Other creeks in the geographic area were found to contain Yellowstone cutthroat trout of recent stocking origin but no signs of natural reproduction were observed and high densities of naturally reproducing brook trout occurred sympatrically in those streams.

Lodgegrass Creek had 8 km of stream habitat occupied by salmonids upstream of the Wyoming-Montana border. A natural waterfall 3 km upstream of the state border blocked upstream movement of fish and appeared to isolate a genetically pure population of YSC above it. A series of barrier cascades 4.9 km farther upstream, limited the upstream distribution of YSC in Lodgegrass Creek. The salmonid assemblage below the downstream barrier falls was dominated by rainbow trout, but YSC and fish appearing to be hybrids were also present. In the 4.9 km reach occupied exclusively by YSC, the total number of fish greater than 100 mm ranged from 4 to 13 fish per 100 m reach or 87.5 fish per kilometer.

Pumpkin and Mann creeks are headwater streams that join to form the West Fork of the Little Bighorn River. Pumpkin and Mann creeks harbored an isolated population of genetically pure YSC at the confluence of the creeks. Total occupied habitat in this segment was estimated to be approximately 2.25 km. The YSC in Pumpkin Creek were found in less than 1.0 km of the stream and YSC in Mann Creek were confined to only 0.5 km of stream above the confluence with Pumpkin Creek. Natural reproduction of YSC was indicated in Pumpkin and Mann creeks. In the 2.25 km length of Pumpkin and Mann creeks occupied by YSC, total population size of fish greater than 100 mm was estimated to be 218 fish. Density estimates of fish greater than 100 mm ranged from 6 to 14 fish per 100 m or 96.7 fish per kilometer.

Table 18. Miles and Quality of Occupied Yellowstone Cutthroat Trout Habitat in Little Bighorn Geographic Area

Watershed	Miles of Occupied YCT Habitat in Watershed	Quality of Occupied Habitat
Lodgegrass Creek	5.0	High quality habitat. However, low population size, isolation, and vulnerability to stochastic events puts this population at high risk for extinction.
Pumpkin/Mann	1.4	High quality habitat. However, low population size, isolation, and vulnerability to stochastic events puts this population at high risk for extinction.

The identification of two genetically pure populations of Yellowstone cutthroat trout in the Little Bighorn drainage has provided useful information. However, given the small population sizes, remote locations, and lack of anthropogenic threats to they fish, few management options exist. The locations and small population sizes make translocation efforts difficult and could negatively impact the stability of these populations. Removing breeding adults for translocation purposed may further increase the risk on inbreeding among remaining trout. The Lodgegrass Creek and Pumpkin/Mann Creek populations face an uncertain future.

Natural and human causes of change affecting aquatic life

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

Influence Of Non-Native Fish Species Introductions

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

Influence of Aquatic Habitat Fragmentation and Simplification

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

VIII. Air Quality and Visibility

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

IX. Climate

This topic is relevant at the Forest-scale and is discussed in the Forest-wide assessment.

X. Vegetation

Composition, distribution, and abundance of the major vegetation types and successional stages of forest and grassland systems

Table 19 shows the major vegetation cover types that occur in the Little Bighorn geographic area. Non-vegetation includes rock and bare areas.

Table 19. Vegetation Cover Types in the Little Bighorn Geographic Area.

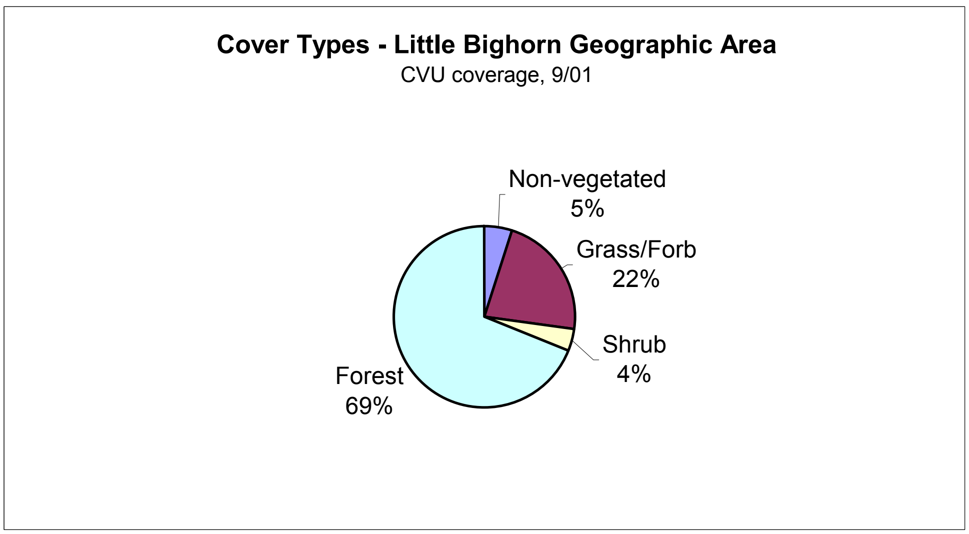
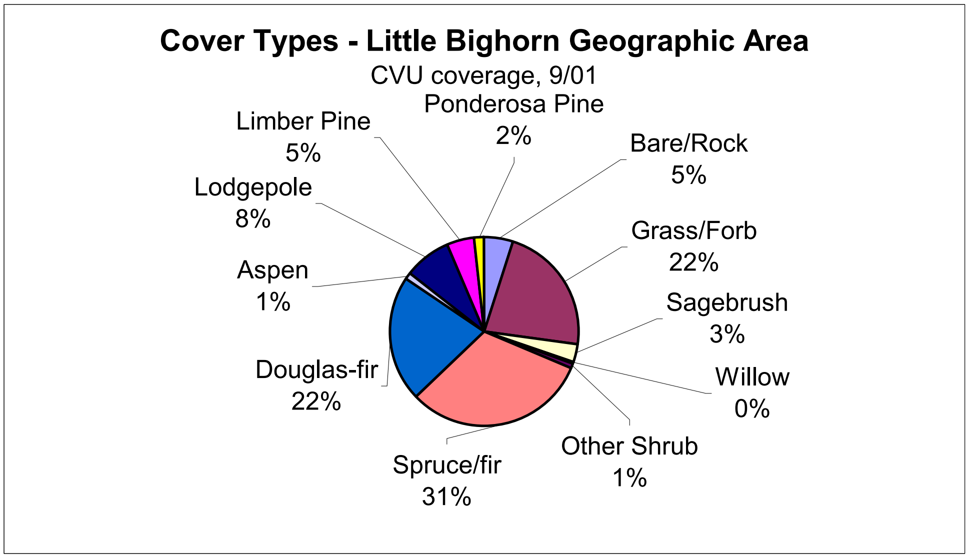


Table 20 shows the relative amounts of the dominant cover types. Other species exist in the geographic area, but were not of sufficient size and scale to be the dominant cover type in a common vegetation unit polygon. The Little Bighorn geographic area is quite diverse from a forest species stand point, with a substantial portion of Douglas fir and limber pine cover types.

Table 20. Vegetation Cover Types in the Little Bighorn area.



The origin dates chart, figure 5, shows the stand origin dates for the forested stands in the assessment area. This data is either from the Stage II point information, or origin years were assigned to stands that regenerated after harvests or fires. The spike on the right represents the Pumpkin Creek fire and timber harvest. The largest spike is wider and older than most of the other geographic areas on the Bighorn National Forest.

Figure 5. Forested Stand Origin Dates in the Little Bighorn area

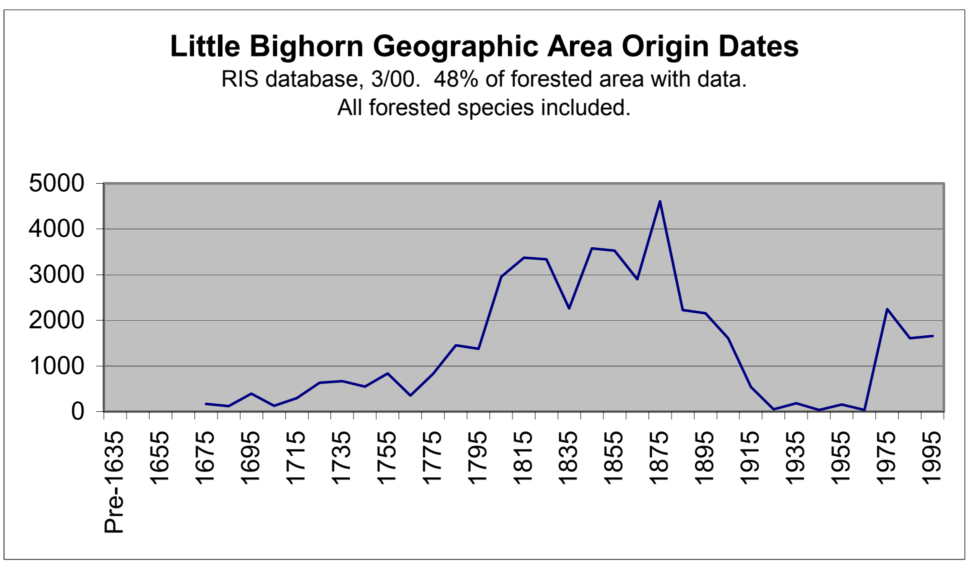


Figure 6 shows the habitat structural stages for the forests in the geographic area. Habitat structural stage provides a "coarse filter" look at habitats provided by forests in the geographic area. It gives an indication of forest size and density, which can be interpreted for wildlife habitat suitability. Forested stands provide an infinite variety of tree sizes and canopy densities, and to consider the amount, type, and spatial distribution of wildlife habitats, people need a simplified system to comprehend this variety. Many habitat considerations, such as amount and type of understory vegetation; size and amount of snags and coarse woody debris; and, the amount of hiding cover provided, can be approximately inferred from the broad habitat groupings described in the habitat structural stage model.

Habitat structural stages are defined in Hoover and Wills (1987). Structural stages describe the developmental stages of tree stands in terms of tree size and the extent of canopy closure. Structural stages can be considered a descriptor of the succession of a forested stand from regeneration, or bare ground, to maturity. For the purposes of a describing wildlife habitat, forest structural stages are divided into four categories, consisting of Stage 1, grass/forb; Stage 2, shrub/seedling; Stage 3, sapling/pole; and Stage 4, mature, Table 21.

It is important to recognize that structural stages represent succession in *forested stands* only; the grass/forb, structural stage 1, refers only to forested stands that have undergone a stand replacing event, and are temporarily in a "non-forested" condition. Structural Stage 1 does not include naturally occurring meadows. The Structural Stage 1 areas are shown on the transitory forest cover type map in the appendix. These areas do not have a forested cover type in the CVU database, but they are areas that were either recently burned or harvested and have a current cover type of grass, forb, bare, wood, etc. The letter in the structural stage naming convention (a, b, or c) refers to the crown density, Table 21.

Figure 6. Habitat Structural Stages in the Little Bighorn Geographic Area

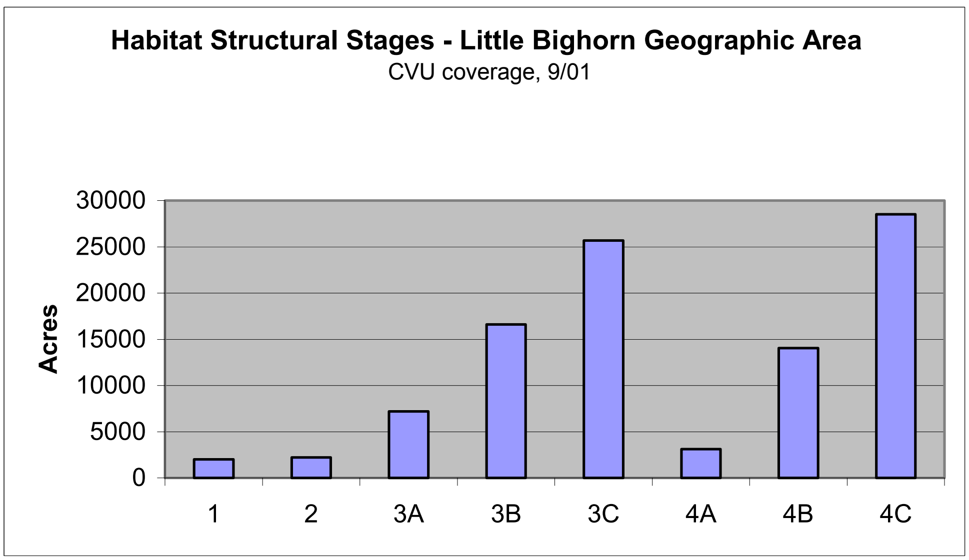


Table 21. Habitat Structural Stage Definitions, Hoover and Wills 1987

Habitat Structural Stage	Diameter	Crown Cover %	Habitat Structural Stage	Diameter	Crown Cover %
1	Not applicable	0-10%	3C	1 – 9 inches	70-100%
2	< 1 inch	10-100%	4A	9+ inches	10-40%
3A	1 – 9 inches	10-40%	4B	9+ inches	40-70%
3B	1 – 9 inches	40-70%	4C	9+ inches	70-100%

Interpretations from this table are:

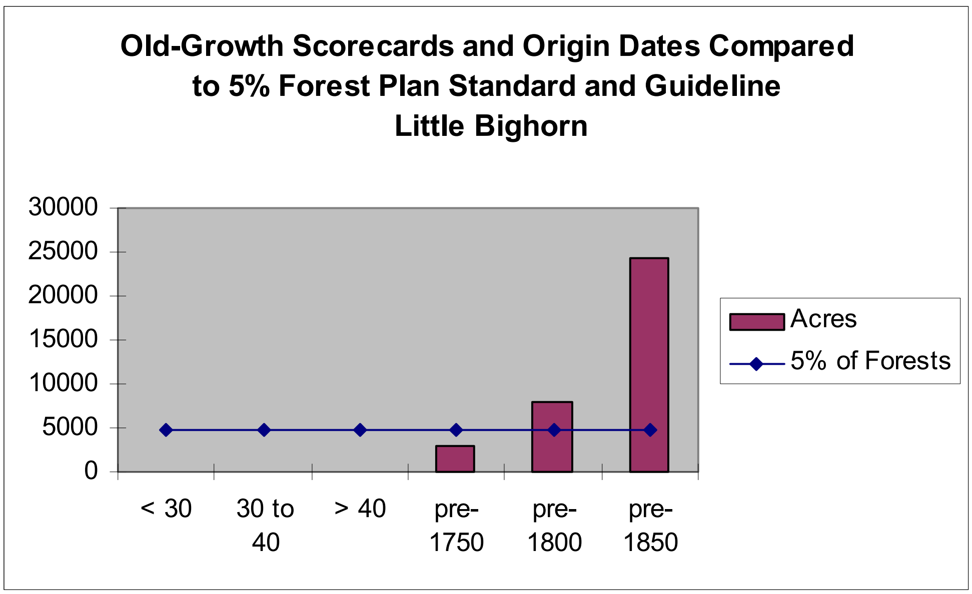
- Compared to other Bighorn geographic areas, there is a relatively high amount of 4C structural stage. This is probably due to the remoteness of many of the canyons in this geographic area, and because 56% of the area has a spruce/fir or Douglas-fir vegetation cover type, which typically grow in dense stands.

Concerning old-growth, approximately 4862 acres of old-growth are needed to represent 5% of the forested area in the Little Bighorn geographic area, which is the current Forest Plan minimum standard and guideline. Little is quantitatively known about the old-growth in the Little Bighorn geographic area. However, due to the relatively high proportion of spruce/fir and Douglas-fir, two long lived species and the remoteness of much of the geographic area, it is estimated that at least 5% of the forested area of this geographic area is old-growth. Different measures of old-growth are listed in table 22 and figure 7.

Table 22. Measures of Old Growth

Old Growth Scorecard			Acres by Cover Type over 250 years old				Acres by Cover Type over 200 years old			
Acres <30	Acres 30-40	Acres >40	Doug-fir	Lodgepole Pine	Spruce/fir	Limber Pine	Doug-fir	Lodgepole Pine	Spruce/fir	Limber Pine
0	0	0	81	156	2724	0	232	766	6749	59
			Total Acres over 250 years old: 2961				Total Acres over 200 years old: 7806			

Figure 7. Old-Growth Scorecards in the Little Bighorn Geographic Area



Estimate the Range of Variability in vegetative conditions

- The overall change in the relative amounts of forests to meadows in the subalpine habitat types[12] changes very little, due to soil conditions (Despain, 1973). Thus, the current mix of 69% forest to about 26% grassland and shrubland, fluctuates by no more than a few percent, with most of that being in the ponderosa pine forest type.
- Because of suppression of fires in the ponderosa pine forests along the east face of the Bighorns, it is probable that the amount of forested area has increased slightly since 1890. Assuming a fire frequency interval of 25-50 years in those forests, at least two fire occurrences have been missed, causing an increase in the amount of forest vs. meadow in this habitat type.

[12] Subalpine habitats include lodgepole pine and Engelmann spruce forested areas. Douglas-fir and ponderosa pine forests are not included in this generalization.

- Riparian areas may fluctuate as large, catastrophically burned areas return to a forested condition, and more water is lost to transpiration and sublimation off of the forested canopy in the winter. This would only occur in watersheds and subwatersheds that have a large percentage of the watershed burned in the same event.
- Aspen is declining for three factors:
  - Long term climatic warming since the little ice age about 10,000 years ago. There was also a relative drying of the climate since that time until the last 100 years, at which point, the climate became relatively wetter. (Knight, 1994)
  - Effects on seedling survival due to wildlife and domestic livestock grazing.
  - While the subalpine fire cycle has only marginally been affected (since this type has a fire frequency interval of 100-300 years and European man has only been suppressing fires for about 100 years), continued fire suppression will decrease the amount of aspen in the geographic area, since stand replacing fire events are regeneration events for aspen.

Effects from air quality

There have been no studies to date on the Bighorn concerning air quality effects on plants. An applicable study from Yellowstone National Park concluded that ozone levels are suspected to be well below the level that would affect human health or vegetation.

Risks to ecological sustainability

- The cumulative effects of human intervention in the ecosystem. This includes:
  - People as vectors of exotic species. This includes plant and animal species.
  - Roads
  - Livestock and wildlife grazing and browsing
  - Timber harvest
  - Fire suppression
  - Recreation use

Describe reference conditions (landscapes)

Bull Elk Park is one of two Research Natural Areas on the Bighorn National Forest. This 719 acre RNA was established in 1952 to protect Bull Elk Park, a 200 acre park that is the easternmost disjunct of the palouse prairie. Part of the lodgepole forest that surrounds the park was burned in 1947, but the fire stopped at the meadow boundary. There have been no published studies conducted on this RNA (Ryan, et al, 1994).

Two areas in this geographic area were considered as potential Research Natural Areas (pRNAs):
- Dry Fork: This has essentially the same cover types as Mann Creek. However, up to 15% of the grassland area is affected by exotic plant species. The moss community on the west side of the Dry Fork is unique in the Bighorn NF, but does not contain rare species. It is unique for the vast extent and depth of the moss, which appears to be related to water flowing through the Madison limestone that "surfaces" where that layer is exposed.
- Mann Creek: This 7000+ acre pRNA has good representations of Douglas-fir, ponderosa and limber pine, and grassland and shrubland cover types. It is quite defensible, little impacted by humans, and a good representative of a variety of habitats of sedimentary canyon habitats. Yellowstone cutthroat trout are found in several of the creeks. Pumpkin Creek, the upper portion of the pRNA as currently mapped, would have to be excluded from the final area due to heavy presence of exotic plant species.

In the Fine Filter Analysis (Welp, et al., 2000), three areas within the geographic area were considered areas "…that contain a high concentration of important taxa or representative vegetation communities." (For a complete discussion of ranking criteria, codes and descriptions, see pages 1192 to 1230 of Welp, et al., 2000):

- Boyd Ridge, B3 rank (high significance): Contains five plant species tracked by Wyoming Natural Diversity Database (WYNDD); site captures the open meadows and ridgetops and a small portion of the steep slope of Little Bighorn Canyon, complementing the deep canyons of Mann Creek pRNA.
- Dry Fork, B3 rank (high significance): Contains three plant species tracked by WYNDD; approximately the same as Dry Fork pRNA; long relatively inaccessible calcareous ridge habitats and limestone canyon habitats.

Mann Creek, B3 rank: contains high quality occurrences of six plant species tracked by WYNDD; Yellowstone cutthroat and rubber boa; site includes Mann Creek pRNA.

XI. Terrestrial Species and their Habitat

Most of the wildlife existing condition information will be presented at the Forest wide scale, since terrestrial species are rarely bounded by geographic areas. Topics included in the forest wide scale assessment include population viability, species categories (species of local concern, species at risk, etc.), and species habitats.

General Theme/Vegetation

Wildlife species composition, distribution, and abundance are determined primarily by the distribution, structure, and composition of vegetative and non-vegetative habitat components. It is assumed that managing the vegetative components within the Historic Range of Variability (HRV) would be the most beneficial for the most wildlife species. Refer to the vegetation section description of current vegetation distribution and relevance to HRV. The vegetation is diverse in this geographic area, and has a large component of Douglas-fir as compared with other geographic areas.

The moss-rock community may possess unique wildlife characteristics for invertebrates or other species. Of concern in this area were the riparian areas and aspen stands. Aspen are at risk from a lack of disturbance and from ungulate browsing levels. Riparian areas may be at risk from livestock and wildlife grazing, dispersed recreation use, noxious weeds, and past road construction within these areas. It is assumed that priority geographic areas will be identified through this process at the Forest level to prioritize any treatment or restoration activities needed relative to HRV. There is a smaller representation of potential cave and karst resources as compared with other geographic areas on the Forest.

Old growth conifer, particularly Douglas-fir, likely exists within the geographic area, though inventories are lacking. Data available on 50% of the geographic area indicates that Douglas-fir has the best potential for old growth based on origin dates. Spruce and lodgepole stands for which data exists are primarily after 1850, indicating younger conditions than what provide old growth.

Viability/Species At Risk

All information relative to these species and viability concerns will be handled from a Forest wide compilation of species, recommended conservation measures, and viability assessments. Primary information for this analysis will be derived from the Wyoming Natural Diversity Database (WYNDD) database and existing literature reviews.

WYNDD Biological Areas

There is an existing Research Natural Area (RNA) (Bull Elk park) and two potential RNAs within this geographic area. The Mann Creek potential RNA is one of the best likely should additional areas be desired as RNAs. One additional site is the Boyd Ridge Biological Area, noted for rare plant occurrences. There are no other Biological Areas as described by WYNDD in this geographic area.

Wildlife Species Information/Recommendations

Historically, *beaver* were likely more present in the geographic area than presently occur. The species is important for shaping and maintaining riparian communities. The link to deteriorated quality and reduced presence of aspen was also noted as an important consideration for this area. Beaver frequently use Aspen habitats for dam construction when they occur in riparian areas.

- Consider beaver as a potential focal species for this geographic area area due to the habitat potential and previous use.

Elk habitat use in the geographic area would be similar to that described in the Clear/Crazy assessment. This geographic area has a large component of elk security habitat due to its unroaded condition. The geographic area also has large areas identified for road closures in the spring due to elk calving areas and winter range. In addition, there are likely conflicts with livestock occurring in this geographic area due to combined use of vegetative resources. Issues of wildlife winter range and motorized vehicle access persist in this area, as described in the Clear/Crazy assessment. However, road access is generally less available in this area and reduces potential conflicts. The adjoining Kerns Big Game Winter Range is one of three such areas abutting the Forest on the east side of the range.

XII. Cultural, Human Uses, Land Use Patterns

Recreation and Travel Management

Summary:

- The Little Bighorn area is one of the most primitive areas on the Bighorn National Forest outside of wilderness.
- Participation in outdoor recreation has grown in most activities on the Bighorn National Forest including camping, hiking, horseback riding, atvs, motorcycles, fishing, snowmobiling and cross country skiing.
- Access is associated with almost every activity that takes place on the forest.

Summer travel: The geographic area is popular with a wide variety of recreation users. Activities in the area provide various opportunities including hunting, fishing, horseback riding, hiking, camping and sight-seeing. Hunting season is one of the highest use seasons between September and November for archery and rifle hunting.

There are only a few developed sites within the project area including recreation residences at the mouth of the Little Bighorn River canyon and Burgess overlook on FDR 15. There are no current plans to develop additional recreation sites within this geographic area.

During June, the Bighorn Mountain Wild and Scenic Run is a recreation event that occurs on the Little Bighorn and Little Horn trails with 300 runners. There are motorized trails and four-wheel drive roads in the area that provide opportunity for atvs. There are two cow camps in the project area.

The Little Bighorn River is rarely floatable because of the low flows and boulder-sized rocks. The area is also important for wildlife viewing and opportunities for solitude. Portions of the Little Bighorn drainage, particularly the West Fork drainage, are in pristine condition. Some areas are accessible only by hiking or horseback.

Fishing: Access to the Little Bighorn River in Wyoming is mostly by trail from access points at the lower end near the Montana line, from the top end of the drainage in the Dayton Gulch area or by trail from the top of the Dry Fork. The upper portion of the Little Bighorn drainage has the heaviest fishing pressure due to the relatively good vehicle access from US Highway 14A. From Dayton Gulch Creek to the Montana State Line, fishing pressure is considered light; the greatest pressure occurring along the lower reaches where cabin development and public access is concentrated.

Fishing access and pressure in the West Fork drainage is extremely light and most of the drainage has been relatively unaffected by livestock grazing and timber harvesting, although increased use of the drainage could impact the small, isolated populations of cutthroat trout. Access to the drainage is more limited due to a short stretch of private land at the mouth and a deep, steep canyon environment for most of the drainage. Lick and Lake Creek near their headwaters support the bulk of the fishing pressure for the Dry Fork drainage.

The “Little Bighorn River Drainage Basin Management Plan” (Wyoming Game and Fish, 1996) reports there are 7,039 anglers per year in the Little Bighorn drainage.

Hunting: Within the geographic area are portions of big game Hunt Areas 38 for elk, 25 for mule deer, 23 for mountain lion and 2 for bear. During 1998, there were 11,175 hunter days for Hunt

Area 38, part of which is within the analysis area. There were 7,600 hunter days in Hunt Area 25 for deer.

The area also supports ruffed grouse, which is limited in scope on the forest, and blue grouse, which are found forestwide and small game. During 1997, there were 947 hunter days of ruffed grouse, 2,955 of blue grouse and 756 of small game on the forest.

A number of outfitters organize occasional hunting trips in the area for big game, such as elk, moose, black bear and mountain lion.

Trails: There are several motorized and nonmotorized trails within the project area with portions of those trails traversing the geographic area.

Winter travel: Part of the area is closed to snowmobiles on the travel map. Another portion near the Kerns Big Game Winter Range is open until March 30 and the remainder of the analysis area is open until May 15. Trail J on the Wyoming State snowmobile map borders the area with approximately eight miles of trail and there are approximately twelve miles of Trail H, the Dayton Gulch Road, crosses the southern portion of this geographic area.

Relationship between supply and demand of opportunities: The relatively remote location provides more supply of backcountry dispersed recreation opportunities than demand. Access to the area is from FDR 149 off of FDR 168, the Freeze Out Road.

Recreation Opportunities: There are many recreation opportunities within the Little Bighorn geographic area. The Forest Service describes different recreation experiences using the setting, activities and the experience. These experiences are separated in recreation opportunity spectrum (ROS) classes. The following ROS classes and acres are found within the analysis area.

Table 23. Recreation Opportunity Spectrum (ROS) Classes within the Little Bighorn Analysis Area

ROS class	Acres in analysis area	Percent
Primitive	17,680	12
Semi-primitive nonmotorized	41,166	29
Semi-primitive motorized	47,033	33
Roaded natural	13,718	10
Roaded modified	20,867	15
Rural	842	1

As displayed in table 23, the area has forty-one percent of the geographic area in primitive and semi-primitive nonmotorized classes. However, because of the remoteness of the area, it remains relatively undeveloped.

Primitive – 17,680 acres
These areas are characterized by an unmodified environment and have a very high probability of experiencing solitude, freedom, closeness to nature, tranquility, self-reliance, challenge and risk. There is very low interaction between recreation users. Access and travel is nonmotorized on trails or cross-country.

Semi-primitive nonmotorized – 41,166 acres
Areas in a semi-primitive nonmotorized class are in a natural appearing environment with a high probability of experiencing solitude, closeness to nature, tranquility, self-reliance, challenge and

risk. There is low interaction between users. Access and travel is nonmotorized on trails, some primitive roads or cross-country.

Semi-primitive motorized – 47,033 acres
There is a moderate probability of experiencing solitude, closeness to nature and tranquility. The setting is in a predominantly natural appearing environment. There is a low concentration of users, but often evidence of others on trails. Motorized vehicles are allowed for travel.

Roaded natural – 13,718 acres
Self-reliance on outdoor skill is of only moderate importance to the recreation user with little challenge and risk. The environment is mostly natural appearing. Access and travel is motorized including sedan and trailers.

Roaded modified – 20,867 acres
In a roaded modified setting, there is opportunity to get away from others, but with easy access. There is moderate evidence of other users on roads and little evidence of others or interaction at campsites. Conventional motorized access includes sedan, trailer, atv and motorcycle travel.

Rural – 842 acres
The opportunity to observe and affiliate with other users is important, as is convenience of facilities and recreation opportunities. There is little challenge and risk. Interaction between users may be high as is evidence of other users.

Special Areas: The Little Bighorn River was found suitable for wild and scenic river designation in the *Wild and Scenic River Study Report and Final Environmental Impact Statement on the Little Bighorn River, June 1989.* Since Congress has never acted on the recommendation, the Bighorn National Forest will continue to protect the entire corridor for its wild and scenic river values. The preferred alternative recommended 19.2 miles of the river for designation. Segments A and D, 13.2 miles, were found suitable for designation under a wild classification. Segment B, 6 miles, was found suitable under a scenic classification.

The area is characterized by outstanding scenic resources and contains fairly rugged topography with a mixture of forest cover and grasslands. The topography of the upper drainage is mountainous, with deeply incised canyons, coniferous forest, and open, alpine meadows. Sheer canyon walls approximately 1,000 feet high are present throughout much of the corridor. At lower elevations along the north face of the Bighorns, the topography is rolling hills and valleys.

Scenic resources within the Little Bighorn River corridor are considered outstandingly remarkable as chacterized by the towering, colorful cliffs rising above the river, the river gorges and the many series of rapids. Leaky Mountain is visible from the Little Bighorn trail and Hidden Spring is also within the confines of the corridor.

In 1998, the Federal Energy Regulatory Commission requested the process continue for study of the Dry Fork hydroelectric project. Little Horn Energy failed to comply with additional information requests and studies. FERC dismissed the project on January 6, 2000.

The forest will continue to protect those segments of the Little Bighorn River that were found suitable for wild and scenic river designation.

Grazing

In 1995 the Bighorn National Forest in conjunction with the University of Wyoming Department of Renewable Resources, University of Wyoming Extension Service, and Bighorn National Forest Grazing Permittees Association developed the ***Bighorn National Forest Vegetation Grazing Guidelines.*** These guidelines were revised in 1996 and finalized on April 9, 1997.

The Guidelines outline vegetation-monitoring requirements for riparian areas on the Forest. This monitoring is mandatory for all allotments on the Forest with penalties established if the monitoring is not completed. The Forest rangeland management personnel spot check permittee monitoring and if discrepancies are found they are resolved on the ground or Forest Service data is used as the baseline for that season. Upland vegetative standards are outlined in the 1985 Bighorn National Forest Plan and still apply to all upland use.

Bighorn National Forest staff are in the process of completing geographic area level Allotment Management Plans (AMPs). Until the geographic area level AMPs are complete, existing AMPs will remain in affect and Annual Operating Instructions will be used to adjust the Plans to fit current resource objectives and assure management meets existing on the ground needs.

To assure objectives are being met annually the Forest Service, permittees or both complete riparian and upland monitoring. If problems occur adjustments in grazing use (changes in season of use, livestock numbers, rest periods, or deferment of on-dates) are made to allow the herbaceous vegetation to recover.

Table 24 shows selected information for the grazing allotments in the Little Bighorn analysis area.

Table 24. Select Information for Grazing Allotments in the Little Bighorn Analysis Area

Allotment	Livestock Permitted	Number Permitees	Total Acres	Capable Acres	Current AMP	Scheduled AMP Update	Permitted Season
Fisher Mtn. C&H	10 H	1	1485	390		2009	5/1 –10/31
Red Springs C&H	46 C/C	2	21039	5696		2009	7/1-10/5
Sage Basin C&H	200 C/C	1	5489	1630		2009	6/26-9/20
Little Horn C&H	819 C/C	4	12567	5866		2009	6/28-10/14
Wyoming Gulch C&H	225 C/C	1	8285	5238		2009	7/6-9/30
Antelope Ridge S&G	1000 S	1	3212	1972		2009	7/1 – 9/10
Dry Fork Ridge C&H	173 C/C	1	8024	913		2010	8/1 –9/30
West Pass C&H	300 C/C	1	4415	1432		2010	8/10 – 9/30
Lower Dry Fork C&H	150 C/C	2	9457	3227		2010	6/21 – 9/30
Little Horn S&G	1200 S	1	5243	2684		2010	6/27 – 9/20
Lake Creek C&H	470 C/C	4	29751	3543		2010	7/1-10/10
Devils Canyon C&H/Little Mountain C&H	959 C/C	1	40,143	18850		9/2002	7/01 - 10/09
Medicine Mountain C&H	1373 C/C	7	17775	9611		9/2002	7/1 - 10/15
Lodge Grass C&H	119 C/C	1	4965	1649		9/2002	7/1-10/15
Freezeout C&H	1269 C/C 258 Y	8	27,200	9589	1980	2002	6/16 - 10/10 6/1 to 9/10

Allotment	Livestock Permitted	Number Permitees	Total Acres	Capable Acres	Current AMP	Scheduled AMP Update	Permitted Season
Pass Creek C&H	310 C/C 100 Y	1	15425	2,883	1982.	2002	6/26 to 10/5 7/20 to 10/5
Fool Creek S&G	1200 S	*	7502	1,858	1982	2002	7/6 to 9/18
Lookout Mtn. S&G	0	Vacant	8,317	4,248	Vacant	2002	

The geographic area is scheduled for analysis in 2009 and 2010. This scheduled may be adjusted if current geographic areas being analyzed are delayed and target dates for completion are missed. Current delays are primarily based on the complexity of allotments in the Tongue geographic area, potential controversy of management decisions, cultural resource impacts and Forest Plan specialist needs.

The Lodge Grass C&H Allotment that is scheduled for completion with the Devils Canyon geographic area in 2002 is one of several exceptions to this schedule. The Upper Dry Fork C&H, Fool Creek S&G, Pass Creek C&H, and Freezeout C&H are also being analyzed with the Tongue Drainage. The reason for the difference is the Upper Dry Fork Allotment is managed with the Copper Creek Allotment in the Tongue Drainage. Fool Creek S&G is managed with Fishhook S&G which lies in the Tongue Drainage. Pass Creek C&H and Freezeout C&H Allotments fall into both the Little Bighorn and Tongue Drainages. Due to the resource impacts occurring and the fact that a majority of the allotments acreage are in the Tongue drainage, the decision was made to complete the analysis and allotment management plan updates with the Tongue Analysis.

Overall the herbaceous vegetation in the geographic area is in good condition with static to upward trends on most allotments. Isolated areas occur where vegetation use exceeds standards and guides but corrective action is normally taken the following year to allow these areas to recover. All allotments with the exception of those being analyzed with the Tongue Drainage are considered to be moving toward 1985 Forest Plan objectives. The rate of movement varies by allotment with the vegetation improving faster on some allotments than others.

Historic and cultural sites

This topic will only be briefly discussed in this document, as the management of heritage resources on the Bighorn National Forest is primarily at the project-level. Management area allocation, specifically special area designation, would be the most likely Forest Plan decision that could affect heritage resources. Based on monitoring and the analysis to date, it appears that the heritage resources in the Little Bighorn area can be adequately managed under the project-level protections currently in place, without Forest Plan special area designation.

XIII. Transportation System (Roads and Trails)

Roads

There are currently approximately 256 miles of roads in the Little Bighorn Analysis Area. This system of roads accesses an area of approximately 222 square miles, including wilderness and private lands. The road system in this analysis area varies from high standard US Highways to primitive, abandoned wheel tracks. Table 25 gives a breakdown of roads within the analysis area

Table 25. Miles of Road by Jurisdiction

Jurisdiction	Length (miles)
Forest Service	202.39
Unclassified	53.27
Total	**255.66**

Those roads within the analysis area under Forest Service jurisdiction are divided into categories called maintenance levels. Maintenance levels range from 1-5, with 5 being the highest standard, and 1 being the lowest standard. There may also be additional roads no longer required for management purposes, or which have been created by off road vehicle use, but there still exists a road 'footprint.' These roads are called unclassified, and the mileage of these unclassified roads is an approximation. A description of maintenance levels is given below in table 26

Table 26. Description of Road Maintenance Levels

Maintenance Level	Description
1	Closed to public travel – can be used intermittently for management purposes.
2	Maintained for use by high clearance vehicles.
3	Maintained for use by a prudent driver in a passenger car.
4	Maintained for use by passenger cars with a moderate degree of user comfort. Usually double lane, gravel roads.
5	Maintained for a high degree of user comfort, double lane, often paved.

Figure 8 shows a breakdown of Forest Service roads within the analysis area by maintenance level, as well as other roads within the analysis area by jurisdiction.

Figure 8. Roads by Forest Service Maintenance Level and Roads by Other Jurisdiction

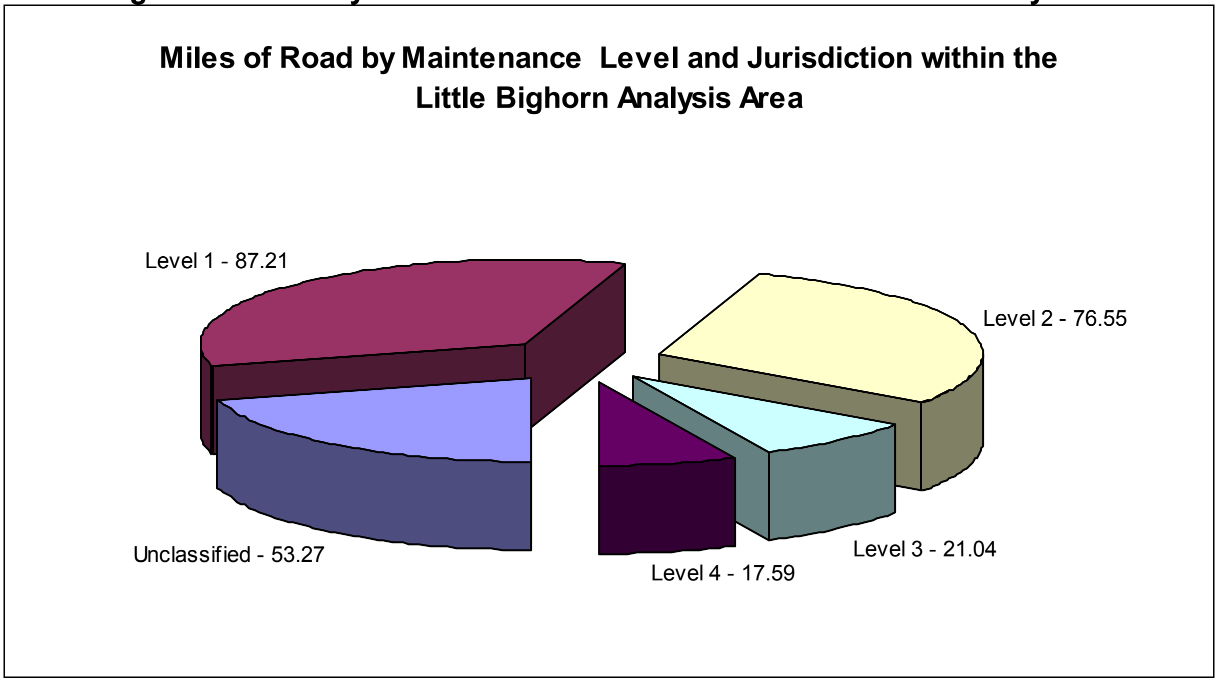


Table 27 lists the road density in the Little Bighorn analysis area. These figures do not include wilderness and private land. The open road density does not include unclassified roads.

Table 27. Road Density in Little Bighorn Analysis Area (National Forest System, Non-wilderness land only)

Total Road Density	1.15 miles per square mile
Open Road Density	0.52 miles per square mile

Various structures and components are needed to manage and operate those roads under Forest Service jurisdiction. These structures include bridges, culverts, cattleguards, waterbars, rolling dips, gates, and signs. These structures along with the roads themselves represent a great investment in the transportation system, as well as a great cost for annual maintenance and, over the years, a resulting backlog of maintenance needs, referred to as *deferred maintenance*. Table 28 shows the breakdown of annual and deferred maintenance needs by maintenance level[13].

Table 28. Annual and Deferred Maintenance Needs by Maintenance Level

Maintenance Level	Miles	Annual Cost/Mile	Deferred Cost/Mile
1	87	$683	$886
2	77	$920	$2,316
3	21	$6,561	$8,109
4	18	$5,991	$14,730
Total needs for annual maintenance in Little Bighorn = $373,416			
Total needs for deferred maintenance in Little Bighorn = $ 684,272			

[13] Costs arrived from performing condition surveys on each level 3, 4, and 5 road on the Bighorn National Forest in 1999, and from a random sample of level 1 and 2 roads in 2000. Costs per mile were interpolated from these surveys. Also, these costs do not reflect annual and deferred costs for bridges. Those costs are not yet readily available.

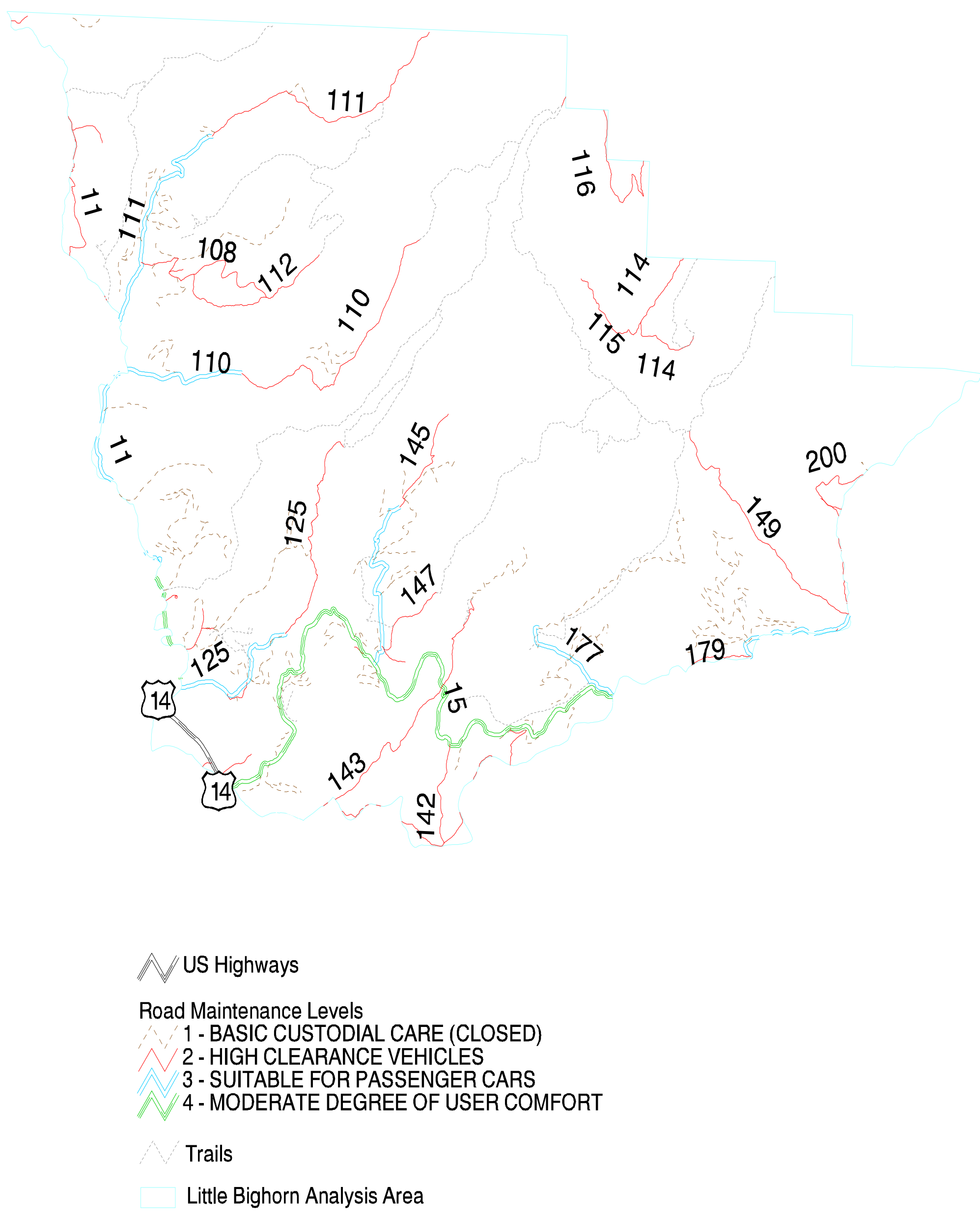
Current funding levels for road maintenance over the past 3 years have remained fairly constant, with an approximate allocation of $ 460,000. This amount is far below the level needed for full implementation of the current transportation system forest wide, however the current trend for road maintenance shows more funding becoming available in the future to reduce deferred maintenance costs. Current forest plan standard for full maintenance is also not being met under current allocations. Currently, general plan direction states to keep roads open to public use unless financing is not available to maintain the facility, or use is causing unacceptable damage to soil and water resources. Based on current deferred maintenance and annual maintenance needs, plan direction is not being met.

Forest Plan Goals/Desired Conditions

Forest Plan direction for road management and operations are primarily based on resource needs rather than the road systems as a separate entity. In other words, the driving force behind road management decisions are primarily based on the management directions resource needs for an area. The Forest Plan does, however, give direction that roads may be closed if financing is not available to maintain the facility, if use is causing unacceptable resource damage, if they are unsafe, or if their use conflicts with the management objectives for an area. The Forest Plan also states that arterial and collector roads shall be maintained to a minimum maintenance level of 3, and all open local roads shall be maintained to a minimum maintenance level of 2. In contrast, forest plan goals to provide additional road and trail access to the National Forest boundary are being met.

The map on page 43 shows the current Forest Service Road system by maintenance level in the Little Bighorn analysis area.

Road Display by Maintenance Level for Little Bighorn Analysis Area



Trails

There are currently approximately 96 miles of trail in the Little Bighorn Analysis Area. This trail system accesses an area of approximately 222 square miles. The trail system in the analysis area varies from high standard ATV trails to primitive single-track trails. The majority of the trails within the analysis area are constructed and maintained by the forest service. However, there is also a small length of trails in the analysis that are user created, or are abandoned trails that still have an existing footprint. These trails are referred to as unclassified. The following table shows the breakdown of classified and unclassified trails within the analysis area

Table 29. Miles of Trail by Status in Little Bighorn

Trail Status	Length (Miles)
Forest Service	95.8

Forest Plan Goals/Desired Conditions

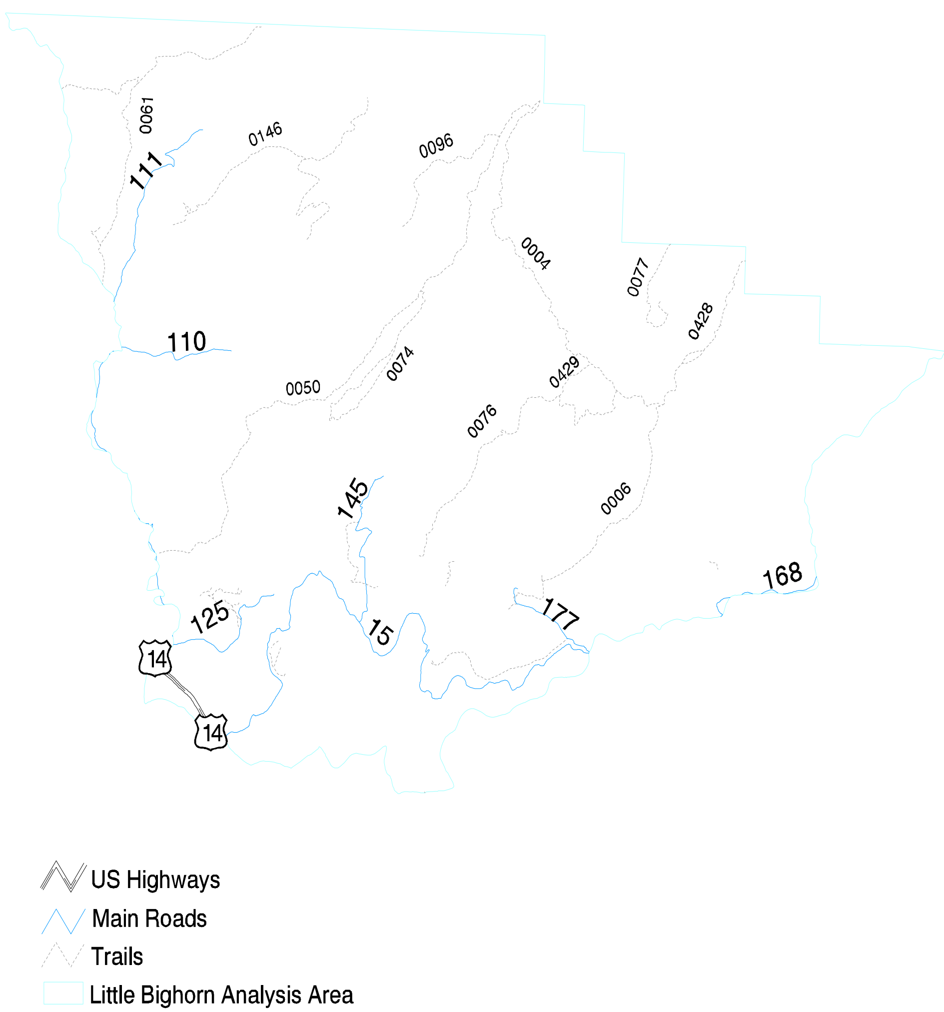
Forest Plan direction for transportation facilities are primarily based on resource needs rather than the transportation systems as a separate entity. Currently, general plan direction states to maintain all trails to certain minimum requirements, including maintaining drainage structures to prevent unacceptable resource damage, and to remove all hazards from trails to allow safe passage for specified classes of users. For the most part, this direction of the plan is being met, however, deferred maintenance surveys have revealed that a lack of a steady budget in trail maintenance has caused some degradation of the trail system that is not consistent with current plan direction. In contrast, plan direction for providing a full range of trails opportunities in coordination with other state, federal and county municipal jurisdictions and private industries are generally being met.

The current annual trail maintenance need is estimated to be $1,217 per mile and deferred maintenance costs are estimated to be $13,125 per mile[14]. Total trail maintenance needs in the Little Bighorn analysis area are estimated to be $116,589 annually maintenance, with a $1,257,375 deferred maintenance backlog.

The map on page 45 shows the current trail system within the Little Bighorn analysis area.

[14] These costs are interpolated from the forest wide condition survey assessments done in 2000 and 2001.

Trail Display for Little Bighorn Analysis Area



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