Bighorn National Forest Plan Revision
Existing Condition Assessment

Piney Creek
Rock Creek

Geographic Area Assessment

Picture of Rock Creek Geographic Area

Piney/Rock Geographic Area Existing Condition Assessment for Forest Plan Revision

Appendix: Maps

Click on map name for full page view of map

Vicinity of Piney/Rock Geographic Area on Bighorn National Forest

Existing Vegetation Cover Types

Forest Habitat Structural Stages

Landtype Associations

Riparian Areas

Road Locations relative to Riparian Areas

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Recreation Opportunity Spectrum

Suited Timber

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 portions of the Piney Creek, and Rock Creek watersheds that occur 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.

[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

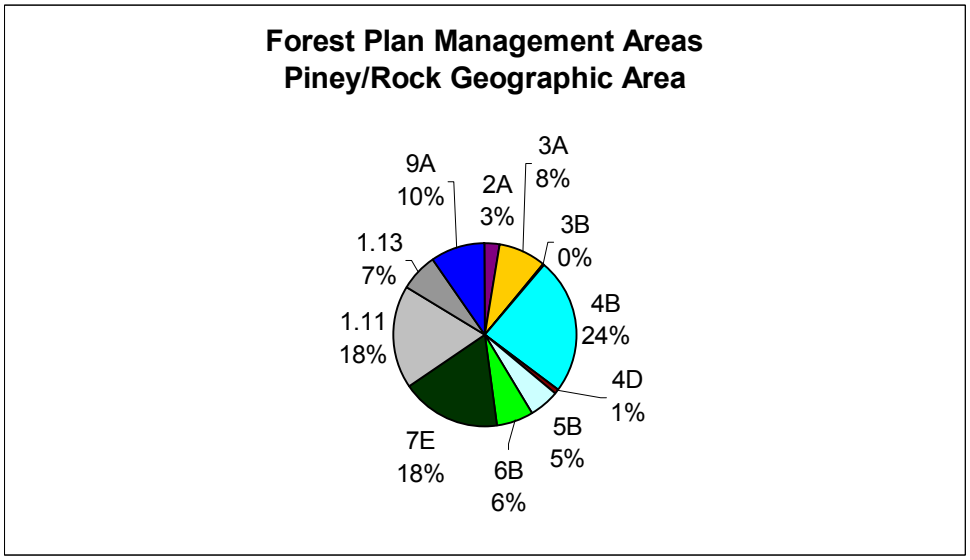
Table 1. Existing Forest Plan Management Area Allocations

Forest Plan Prescriptions	Prescription Description	GIS Acres with 9A Riparian Applied	
		Acres	%
2A	Semi-Primitive Motorized Recreation Opportunities	2931	3%
3A	Semi-Primitive Nonmotorized Recreation Opportunities	9210	8%
3B	Primitive Recreation in Unroaded Areas	326	0%
4B	Wildlife Habitat Management for Management Indicator Species	26,348	24%
4D	Aspen Stand Management	970	1%
5B	Wildlife Winter Range in Forested Areas	5795	5%
6B	Livestock Grazing, Maintain Forage Condition	7101	6%
7E	Wood Fiber Production	19,345	18%
1.11	Pristine Wilderness (21,919 including the 9A)	20,035	18%
1.13	Semi-Primitive Wilderness (8830 including the 9A)	7492	7%
9A	Riparian and Aquatic Ecosystem Management	10,703	10%
Total		110,255	
Non-FS		0	

Some interpretations from Table 1 include:

- Wilderness is the largest allocation in this geographic area at 25%. Without 9A deducted, Wilderness would account for 28% of this geographic area.
- Next high is 24% for 4B, followed by 7E at 18%.
- Wilderness, wildlife and timber prescriptions account for 67% of this geographic area.
- Livestock grazing, 6B, is only 6% of this geographic area. This amount is comparable to Piney/Rock. This amount compares to Devil's Canyon and Shell, which have 6* allocations of 44% and 38%, respectively.

Figure 1. Existing Forest Plan Management Area Allocations



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

- This geographic area is tied for 4th in the amount of suited land (Figure 2), while the only recorded timber harvest since the 1960's is 11 acres of aspen clearfelling. Revision should address this discrepancy between the Forest Plan goals and objectives for suited land and 7E management area allocations, and the unroaded, unlogged nature of this area.

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

- See above, the discrepancy between the large percentages of suited land in an unmanaged geographic area.
- 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?

- Rock Creek was seriously considered as Wilderness in 1984, and remains unroaded.
- This geographic area has the least amount of human disturbance on the Bighorn NF.
- There is a lack of Forest Service presence in this geographic area, owing to the remoteness and difficulty of access, and relatively small amount of management activities.
- Motorized access is quite limited, and in some cases, requires private landowner permission.
- Riparian and aspen impacts (past and present) may be affecting wildlife habitat quality, with amphibian populations of particular concern. Less beaver than previously thought to exist, consider this species as possible MIS/Focal.
- High road density has lowered the amount of elk security habitat. This type of habitat can be an indicator for other species benefiting from less disturbance (e.g. marten).
- Protection of cave/karst resources from recreational impact.

III. Disturbance Factors

Riparian

Disturbance influences upon riparian areas 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 Piney/Rock geographic area:
    - 1996. Stockwell. About 1600 acres of this 2594 acre fire was in the Piney Creek geographic area.
    - 1919. Rock Creek, 930 acres. 1919 was one of the most active fire years this century.
    - F.E.Town reported a 30,000 acre fire in this geographic area in 1898.

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.
    - Ponderosa Pine on the face of the mountain has mountain pine beetles. The condition of the ponderosa pine forests on the face are prime for mountain pine beetles: high density, 8" + diameter, 80 to 100 years old. This condition is outside the historic range of variability (HRV) due to fire suppression this century (Knight, 2001).
    - Limber pine throughout the forest is being affected by white pine blister rust. A non-native species, white pine blister rust attacks 5 needle pines, and has two hosts during its life cycle, Ribes sp. and limber pine. This is considered to be one of the most significant potential ecological impacts currently occurring on the Bighorn (Knight, 2001), as the potential is for near eradication of this species on the Forest.

Wind

Wind is an important disturbance event on the Bighorn, but there are no recent large occurrences in the Piney/Rock geographic area. This topic is discussed in the Little Bighorn and Tongue geographic area assessments, and in the Forest-wide assessment.

Timber Harvest

The Piney/Rock geographic area has never been logged with the possible exception of early homesteaders logging the face of the mountain.

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 Piney/Rock Analysis Area

Harvest Type	1940's	1950's	1960's	1970's	1980's	1990's	2000
Clearcut							
Shelterwood: Prep Cut							
Shelterwood: Seed Cut							
Shelterwood: Overstory Removal							
Seed Tree							
Selection							
Commercial Thin							
Sanitation/Salvage							
Pre-commercial Thin							
Aspen Clearcut					11		
Fire					80	1876	
Blowdown							
Acres CC + SW + ST + S + S/S[3]							

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 35% of the Piney/Rock 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. This is the second highest percentage, and reflects the long history of timber management emphasis in this geographic area.

[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

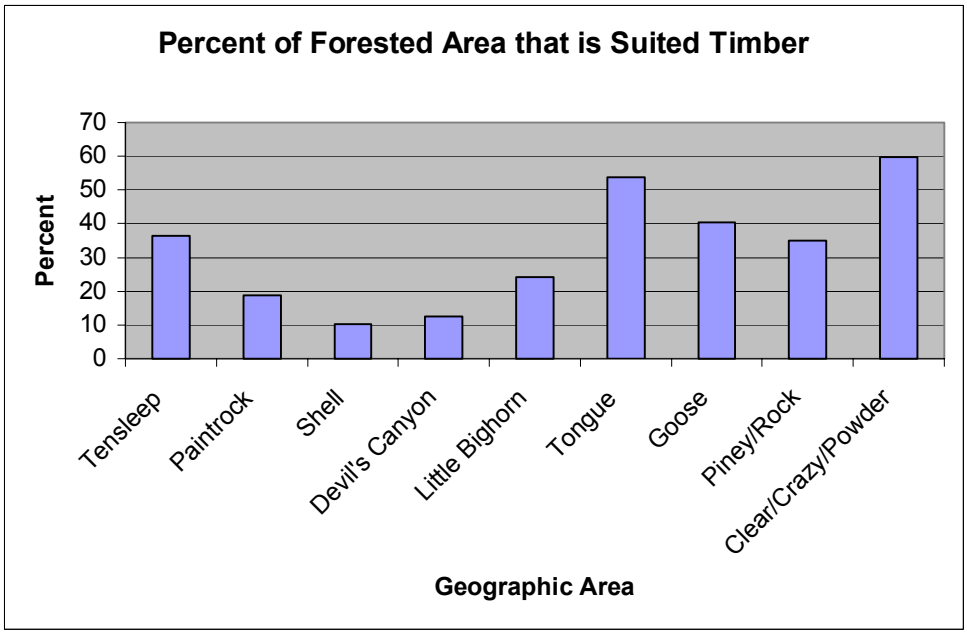


Figure 3 shows the percentage of the suited timber area that has received a final harvest (clearcut, shelterwood removal or seed cut, selection harvests) or stand-replacing fire or blowdown between 1960 and 2000. This is an indicator of the *intensity* of forest successional change, as it indicates how 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

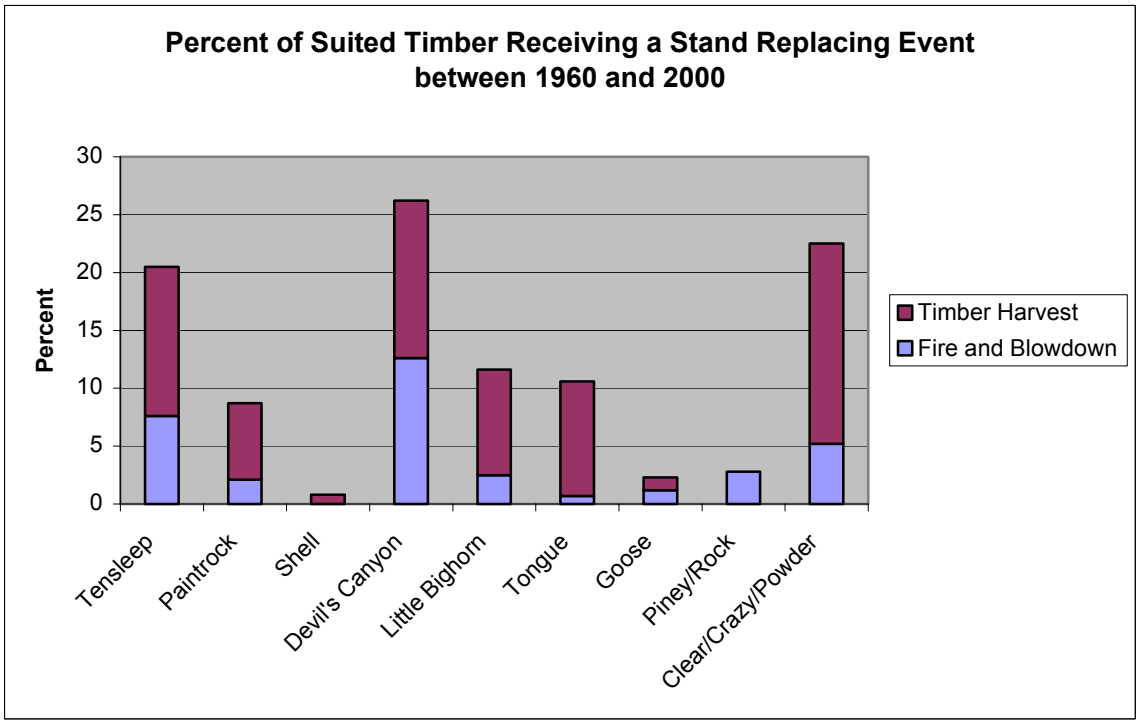
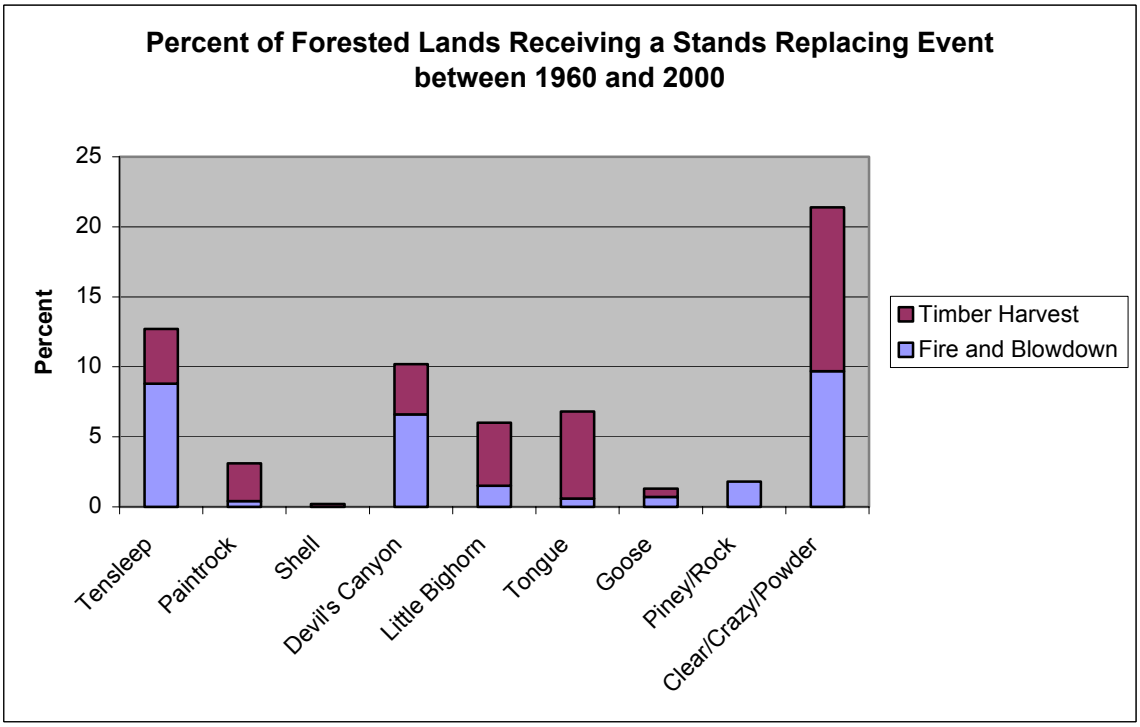


Figure 4. Percent of All Forested Lands that Received a Stand Replacing Event, 1960-2000



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. Mountain sucker and longnose dace are the only fish species thought to be native to the Powder River geographic area.
- There are four identified areas in our GIS database of Canadian thistle in this geographic area. There are more sites, primarily along roads and timber harvest landings, throughout the 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 Landtype within the Piney/Rock Creek Geographic Area

Landtype Description	Acres	% of total
Glacial cirquelands	13,274	12
Alpine mountain slopes and ridges	17,194	16
Glacial/tertiary terrace deposits	16,085	15
Granitic mountain slopes, gentle	33,460	30
Granitic mountain slopes, steep	15,383	14
Granitic breaklands	12,657	11
Sedimentary breaklands	1,802	2
Sedimentary mountain slopes, limestone/dolomite	0	0
Sedimentary mountain slopes, shale/sandstone	400	0
Landslide colluvial deposits	0	0
Unclassified	0	0
Totals:	**110,255**	**100%**

The Bighorn Mountains were formed by diastrophism sometime during the Mesozoic period. They are folded mountains that have eroded on top to form what some geologists refer to as a partial peneplain.

The area around Moncreiff Cliffs is much younger in age than is the main North-South Bighorn chain. The portion of the Bighorns south of the town of Big Horn, Wyoming was formed by faulting, the Moncreiff Cliffs then being a fault scarp and the uplifted side of the fault.

Erosion has exposed the uplifted beds on the east and west faces of the Bighorn Mountains. There are five major formations on the flanks of the mountains. However, the formations are not as extensive as they are on either the north or south end of the Bighorn chain.

- The Tensleep formation of the Pennsylvanian age forms steep dip slopes along most of the mountain flank. The formation is dominantly a resistant cross-bedded sandstone with minor amounts of dolomite. It is probably conformable with the Amsden formation.

- The Amsden formation of the Pennsylvanian age consists of cherty dolomite, red sandstone, and red and purple shale. The formation was deposited upon the eroded surface of rocks of the Mississippian age. The formation weathers to form the red slopes between resistant Tensleep and Madison formations.

- The Madison formation is of early and Late Mississippian age and is exposed as a series of ledges formed by resistant beds. Caverns are typical especially in the upper part of the formation. The formation is composed of dolomitic limestone, limestone and dolomite.

[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.

- The Bighorn dolomite of late Ordovician age is about 500 feet thick which is divided into three units. The basal sandstone is about 30 feet thick in Sheridan County, consisting of cross-bedded fiable white sandstone. The middle unit is about 280 feet thick is a massive dolomite that weathers to a characteristically rough pitted surface. The upper unit consists of a thin-bedded dolomite, limestone, and dolomitic limestone. The core is of igneous origin from Ordovician to Precambrian age.

The Piney/Rock Creek geographic area has been extensively glaciated. The Wisconsin glaciation period has markedly influenced over half of the geographic area. Terminal moraines, potholes, cirques, lateral moraines, recessional moraines, and rock striations are common. All man-made reservoirs are located in the glaciated portion of the geographic area.

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 Piney/Rock geographic area there are 375 acres of soils prone to landslides. The areas subject to slides are widely distributed in small units throughout the geographic area. Most of the landslide prone lands are located on limestone geologies.

Table 4. Landslide Prone Acres in the Piney/Rock Creek Geographic Area

Geographic Area Name	Acres of Soils Prone to Landslides
Piney/Rock Geographic Area	375

Erodibility

There are approximately 573 acres of soils within the Piney/Rock geographic area classified as having a severe risk for erosion. Ground disturbing activities on these soils would increase the risk of generating erosion from these areas.

Table 5. Acres of Erodible Geology within the Piney/Rock Creek Geographic Area

Geographic Area Name	Acres of Erodible Geology
Piney/Rock Geographic Area	573

Mineral Resources

A detailed minerals report for this area does not exist at this time. Minerals information for this area will be incorporated into the Forest-wide assessment.

Hydrologic Disturbance factors

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

V. Soils and Topography

Soils in the geographic area are shallow in depth; in many areas they are less than 12 inches thick. The sedimentary parent material produces a soil that is heavier in texture than the granitic soils. The soil pH ranges from 6.0 to 7.5 in this area. Rooting has occurred throughout all horizons on the granitic soils. Texture on the non-glaciated granitic portion of the geographic area is sandy loam to loam. The pH varies from 5.6 to 6.5, the majority of the soil having a pH of 6.0. The residual soil has a depth of approximately 25 inches, with the B-horizon having a coarser texture than the A-horizon.

Table 6 shows the soil types that occur in the Piney/Rock 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 Various Soil Types within the Piney/Rock Geographic Area

Soil Identification Number[5]	Acres	Productivity as Measured by Forage Production (#/acre)
10	37,910	500-700
11	7,731	500-700
12	0	600-800
13	6,105	Na
14	0	500-700
15	1,282	500-1,800
16	1,197	3,000-3,500
17	0	
18	585	1,500-1,800
19 A and B	14,668	500-700
21	0	1,500-1,800
22	2	1,200-1,700
23	0	1,500-1,800
24	0	1,600-2,400
25	913	1,500-1,800
26	1,627	600-1700
27	0	1,600-2,400
29	175	1,600-2,400
30	0	1,600-2,400
31	14,620	500-700
32	0	500-700
33	5,842	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	1,144	Na

[5] Descriptions of soil types and their management interpretations can be found in "Soil Survey of Bighorn National Forest, Wyoming". U.S.D.A. Forest Service, 1986.

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

The Piney and Rock Creek watersheds flow east off the forest and are tributary to the Powder River. The two watersheds join several miles below the forest boundary. Table 7 lists the major watersheds within the planning area.

Table 7. Major 6th field watershed data within the Piney/Rock Geographic Area

6th Field Watershed Name	6th Field Watershed Number	Perennial Stream Miles	Intermittent Stream Miles	FS WS Acres	Other WS Acres	Total WS Acres
South Piney Ck above Willow Park	100902060101	12	12	35,319	0	35,319
South Piney Ck above Story, WY	100902060102	25	37	33,398	0	33,398
North Piney Ck near Story, WY	100902060103	25	35	22,218	0	22,218
Piney Ck near Lake De Smet	100902060104	4	24	5,750	0	5,750
North, Middle, South Rock Ck	100902060201	39	91	35,460	0	35,460
Rock Ck near Buffalo, WY	100902060202	8	16	5,416	0	5,416
Totals:		**113**	**215**	**137,561**	**0**	**137,561**

Irrigation and Diversions

Water is diverted from the Piney Creek watershed at Willow Park reservoir and placed into the Rock Creek and South Piney diversion ditch to place water into Rock Creek.

Water Quality and Water Uses

Historically, the water quality in the Piney and Rock Creek geographic areas (within the forest boundary) has been good. Personal communication with the conservation district shows that there are currently no water quality standards being violated within the Piney/Rock geographic area in the forest boundary.

Table 8. Wyoming Surface Water Quality Classifications (2001) and Domestic Water Users

Watershed	Wyoming Surface Water Quality Class	Tributaries	Wyoming Surface Water Quality Class	Community Water System being Served
Piney Creek	2AB			
		S Piney Creek	2AB	
		N Piney Creek	2AB	
Rock Creek	2AB			
		S Rock Creek	2AB	
		N Rock Creek	2AB	

All streams within the analysis area are classified as Class 2AB.

Class 2, Fisheries and Drinking Waters. 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.

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 9 summarizes the watersheds within this analysis area listed in the State 2000 305(b) report.

Table 9. 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
Rock Creek	Y	Threatened	Below forest boundary to Clear Creek, there is physical degradation to the stream channel.

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 10 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 10. Equivalent Clearcut Acres for Piney/Rock Geographic Area

Harvest Type	Equivalent Clearcut Multiplier	1950's	1960's	1970's	1980's	1990's	2000	Totals
Clearcut (acres) (ECA)	1.00							
Shelterwood: Prep Cut (acres) (ECA)	0.33							
Shelterwood: Seed Cut (acres) (ECA)	0.33							
Shelterwood: Overstory Removal (acres) (ECA)	1.00							
Seed Tree (acres) (ECA)	0.85							
Selection (acres) (ECA)	0.35							
Commercial Thin (acres) (ECA)	0.35							
Sanitation/Salvage (acres) (ECA)	0.35							
Pre-commercial Thin (acres) (ECA)	0.20							
Aspen Clearcut (acres) (ECA)	1.00				11 11			**11** **11**
Fire (acres) (ECA)	1.00				80 80	1876 1876		**1956** **1956**
Blowdown (acres) (ECA)	1.00							
TOTAL ECA **% of Area**[6]								**1967** **1%**

[6] 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.

As shown in Table 10, approximately 1% of the geographic area is in an ECA condition. In reality, this number would be somewhat less than 1% 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.

Table 11. Number of Stream Crossings in Piney/Rock Geographic Area

Watershed	No. of Stream Crossings	No. of Stream Crossings/Square Mile
South Piney Creek above Willow Park reservoir	0	0
South Piney Creek near Story, WY	1	0.05
North Piney Creek near Story, WY	1	0.04
Piney Creek near Lake DeSmet	2	0.22
North, Middle, South Rock Creek near Buffalo, WY	12	0.24
Rock Creek near Buffalo	1	0.12

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 12 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 12. Miles of Forest Service Road by Maintenance Level in the Piney/Rock Creek Geographic Area.

Maintenance Level	Miles of road within the Geographic Area	Overall Condition and Watershed Risk
Unclassified	1	In the watershed, 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	0	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	27	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	0	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

The following reservoirs are operated by the State Engineer in the Piney and Rock Creek geographic areas:

- Kearney Lake Reservoir (located in the Piney Creek watershed)
- Willow Park Reservoir (water diverted from Piney Creek via Willow Park reservoir and placed into Rock Creek watershed)
- Cloud Peak Reservoir (located in the Piney Creek watershed)

Wetlands/Riparian Areas

Table 13 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 13. Acres of Riparian within the Piney/Rock Geographic Area

6th Field Watershed Name	6th Field Watershed Number	Acres of Riparian	Miles of Road within Riparian
South Piney Creek above Willow Park reservoir	100902060101	2873	0.25
South Piney Creek near Story, WY	100902060102	2769	0.19
North Piney Creek near Story, WY	100902060103	1758	0.29
Piney Creek near Lake DeSmet	100902060104	473	0.11
North, Middle, South Rock Creek	100902060201	2361	1.20
Rock Creek near Buffalo, WY	100902060202	470	0.09
Totals:		**10,704**	**2**

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.

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

Streams in the analysis area support a diverse assemblage of fish species. Based on electro-fishing evaluations, conducted by the Wyoming Game and Fish Department (WGFD) and BNF personnel, between 1983 and 2000, brook trout (BKT) is the dominant species within the forest boundary in these watersheds. Brown trout (BNT), and rainbow trout (RBT) occur lower in the drainages and below the forest boundary. There is limited information on the distribution and concentration of fish in the analysis area.

Sensitive Species

The Powder River basin (of which the Piney and Rock Creek geographic areas are a part of) is outside of the historic eastern edge of pre - Columbian Yellowstone Cutthroat trout distribution (Behnke 1992). Now, the vast majority of fish species within the analysis area are introduced Salmonid species.

Habitat Information

The Forest has not completed an aquatic inventory on the Piney/Rock Creek geographic area. This information will be collected within the next several years.

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

Figure 5 shows the major vegetation cover types that occur in the Piney/Rock geographic area area. Non-vegetation includes rock and bare areas. This geographic area has very little vegetative diversity. The vegetated areas are predominantly forested, and while rock dominates the higher elevations.

Figure 5. Vegetation Cover Types in the Piney/Rock Geographic Area.

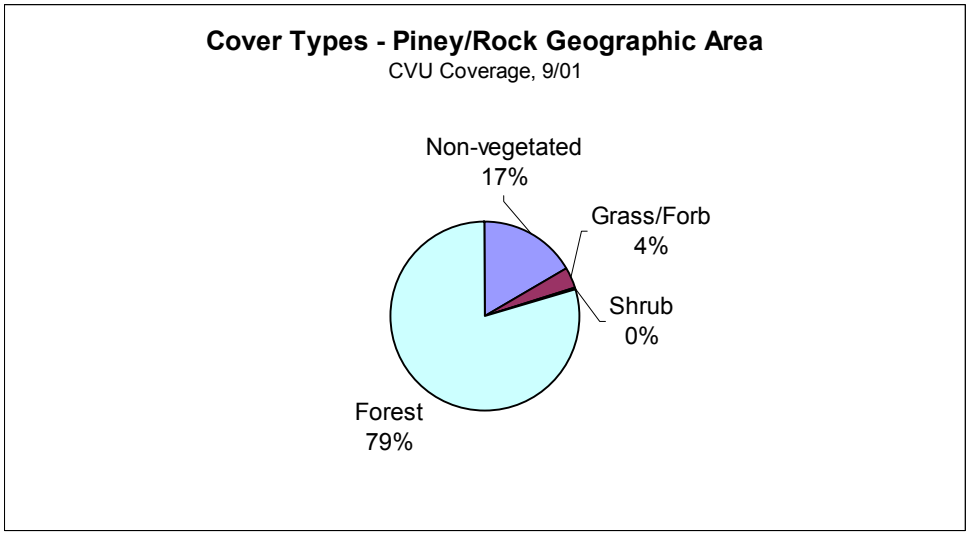
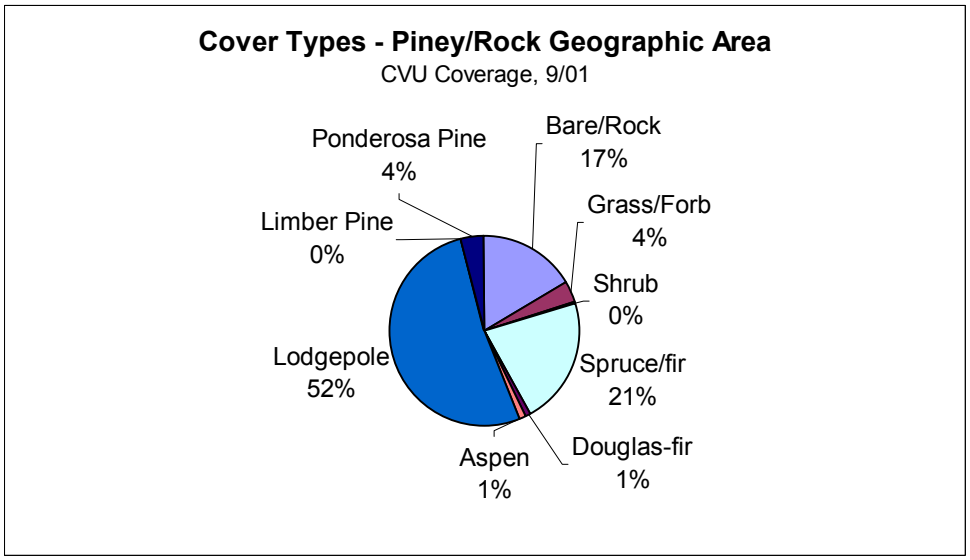


Figure 6 shows the relative amounts of the dominant cover types. Other species exist in the geographic area, but were not of sufficient size and scale to be the dominant cover type in a common vegetation unit polygon.

Figure 6. Vegetation Cover Types in the Piney/Rock Geographic Area.



The origin dates chart, figure 7, 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 largest spike is centered on 1895, which represents the fire described by F.E. Town in 1898:

> "A fire commenced on the divide between Prairie Dog and North Fork of Piney Creek. It is believed that it was started from the campfire of a sheepherder. It was spread by high winds and burned over the divide into the canyon of Little Goose Creek to the north, along the divides to the South Fork of Piney to the south, and from 6 to 8 miles westward, covering an areas of about 30,000 acres."

Figure 7. Forested Stand Origin Dates in the Piney/Rock Geographic Area

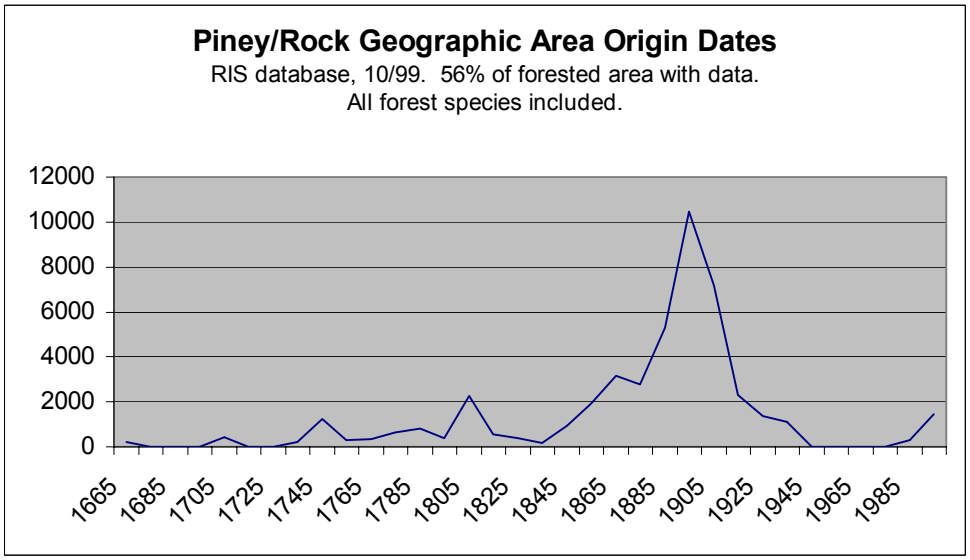


Figure 8 shows the habitat structural stages for the forests in the geographic area. Habitat structural stage provides a "coarse filter" look at habitats provided by forests in the geographic area. It gives an indication of forest size and density, which can be interpreted for wildlife habitat

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 14. 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 14.

Figure 8. Habitat Structural Stages in the Piney/Rock Geographic Area

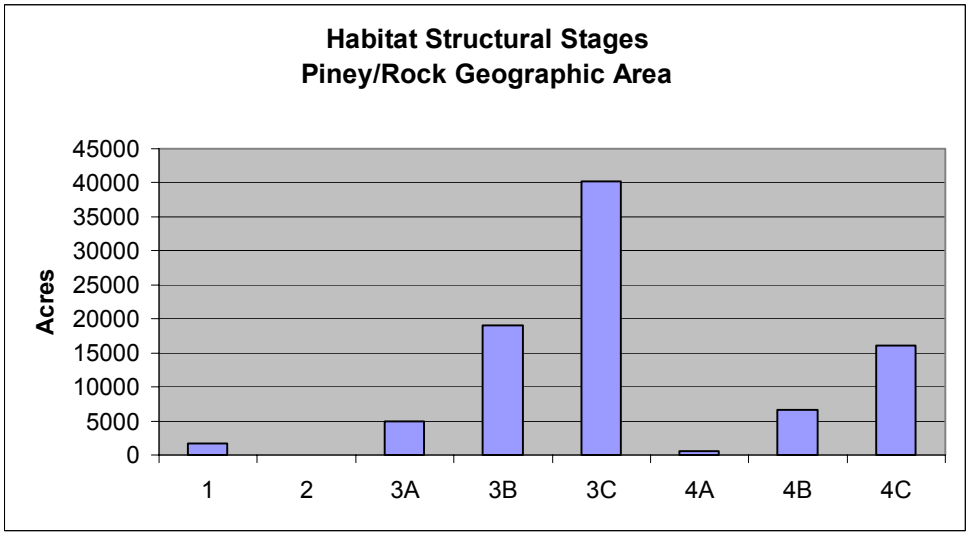


Table 14. Habitat Structural Stage Definitions, Hoover and Wills 1987

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:

- This geographic area has large proportions of 3B and 3C habitat structural stages. This indicates the preponderance of pole-sized lodgepole that exists in this geographic area,

which is a reflection of the numerous fires in the later half of the 19th century, and relatively poor productivity.

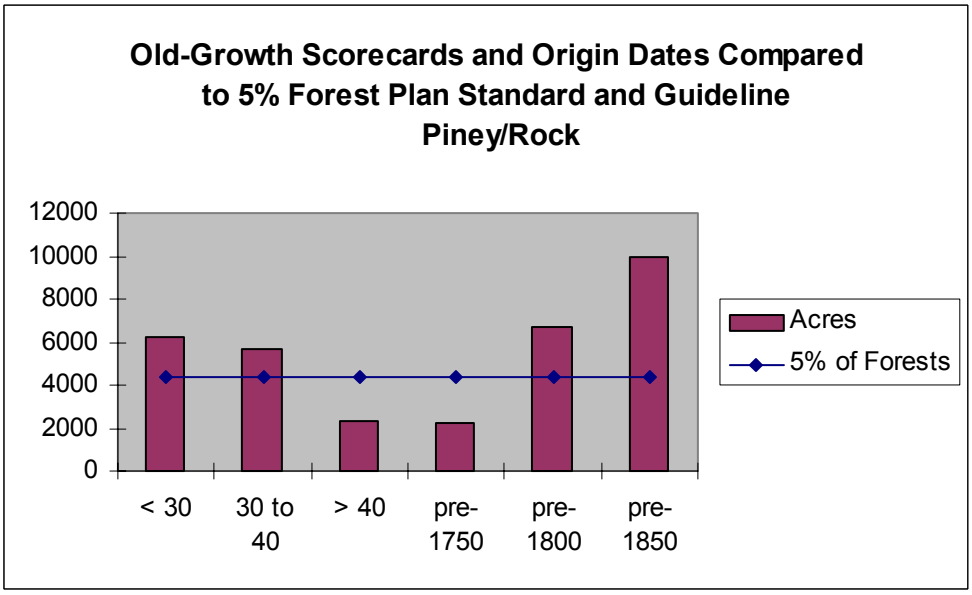
Concerning old-growth, approximately 4376 acres of old-growth are needed to represent 5% of the forested area in the Piney/Rock geographic area, which is the current Forest Plan minimum standard and guideline. Different measures of old-growth are listed in table 15 and in Figure 9:

Table 15. Old-Growth Acres

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
6222	5658	2287		1487	776			3673	3017	
			Total Acres over 250 years old: 2263				Total Acres over 200 years old: 6690			

The scorecard information in figure 7 was taken from the RIS database.

Figure 9. Old Growth Scorecard and Origin Dates – Piney/Rock



Estimate the Range of Variability in vegetative conditions

- The overall change in the relative amounts of forests to meadows in the subalpine habitat types[7] changes very little, due to soil conditions (Despain, 1973). Thus, the current mix of 69% forest to about 4% grassland and shrubland is very constant in this geographic area.
- This geographic area had only scattered patches of unburned forest in 1898 (F.E. Town map, 1898), and the area around the turn of the century was dominated by transitory grass/forb areas with huge numbers of snags. In contrast, the area today is a sea of pole-sized lodgepole, with spruce-fir forests at the higher elevations.
- 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. Since Ponderosa represents only 4% of the current area, this increase can be no more than

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

a few %. Assuming a fire frequency interval of 25-50 years in those forests, at least two fire occurrences have been missed, causing a slight increase in the amount of forest vs. meadow in this habitat type.

- 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

- Vegetation in high use areas of the Cloud Peak Wilderness is threatened by overuse by people. This affects both trees (used for firewood) and long term soil productivity (soil compaction and removal of plant/litter layer in heavily used campsites.) This has been recently addressed by additional use restrictions, but monitoring will be needed to see if the restrictions are sufficient in light of increased rates of human visitation.
- 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)

One area in this geographic area was considered as a potential Research Natural Area (pRNA):

- Pheasant Creek: This 9100 acre pRNA is dominated by lodgepole pine/vaccinium, much of which is the climax vegetation. This area is quite pristine, with minimal human impacts along the few trails in the area. While this area is quite simple in terms of diversity, it meets the RNA criteria very well for the lodgepole/vaccinium type.

In the Fine Filter Analysis (Welp, et al., 2000), lists two areas within the geographic area as containing "… 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):

- Cloud Peak, B2 rank (very high significance): Contains nine species tracked by Wyoming Natural Diversity Database (WYNDD); alpine, granite, habitats are unique in the Bighorn Mountains, and are relatively undisturbed.
- Story, B3 rank (high significance): Contains concentration of Mountain lady's slipper (*Cypripedium montanum*) and Large Yellow lady's slipper (*Cyprepedium calceolus var. pubescens*). *C. calceolus* occurs just off the National Forest. The boundary encompasses the habitat of several state rare orchid species and additional potential habitat along South Piney Creek. Other unusual species are found in associatioin with beaver ponds, and the precipitous sedimentary cliffs contain a number of calceophilic species. Most of the site is off the Forest.

XI. Terrestrial Species and their Habitat

Most of the wildlife existing condition information will be presented at the Forest wide scale, since geographic areas rarely bound terrestrial species. 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. Of concern in this area are 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 one significant cave resources in this geographic area, noted for its occurrence of a sensitive bat species. This cave is in the process of being designated as significant under provisions established in the Cave Protection Act of 1988. The area has limited vehicle access, and as such provides unique attributes for potential wildlife habitat.

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 WYNDD database and existing literature reviews.

WYNDD Biological Areas

The areas within the geographic area identified by Wyoming Natural Diversity Database as having a high concentration of important taxa or representative vegetation communities are described within the Vegetation section. There are two biological areas within the geographic area identified as the Story and Cloud Peak sites. Story is noted for its rare plant communities, and the Cloud Peak site is described in the Clear/Crazy assessment.

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. Aspen habitats are frequently used by beaver for dam construction when they occur in riparian areas. Beaver in this geographic area still occur at isolated ponds outside of main riparian areas in atypical habitat (lodgepole pine dominated sites). Beaver are not abundant in main riparian systems.

- Consider beaver as a potential focal/MIS species for this geographic 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 is a major route of elk migration. In addition, there are conflicts with livestock occurring in this geographic area due to combined use of vegetative resources. In addition, elk calving may be limited in some instances due to the conflict with livestock if livestock are present in all pastures in the spring. 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.

Sensitive amphibian species including the *wood frog* and the *spotted frog* have not been found in sites within these geographic areas. Only limited surveys have occurred, and more thorough surveys may expand the ranges of occupied habitat for these or other species. The management of riparian areas to protect them from livestock and recreation impacts are of key concern.

XII. Cultural, Human Uses, Land Use Patterns

Recreation and Travel Management

Summary

- The Piney/Rock area and Little Bighorn geographic areas are the most primitive areas on the Bighorn National Forest outside of wilderness.
- The remote setting of the area provides primitive backcountry experiences.

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 sightseeing.

There are no developed recreation sites within the project area. There are no current plans to develop recreation sites within this geographic area. There was a campground at Frying Pan Lake, however this was removed in 1976 when recreation funds were reduced for developed campground maintenance. The southwestern portion of the geographic area is in the wilderness.

Access to the area from the east is by the Story-Penrose trail, US Highway 16 from the south. There is motorized access to Kearney Lake and Cloud Peak Reservoir. These are popular summer sites for camping and fishing. Motorized use has increased with atv use through Penrose Park to Willow Lake Reservoir.

The area was part of the Little Goose/Park Reservoir Travel Management Environmental Assessment that restricted motorized travel to roads and trails on 60,000 acres in the Goose Creek and Piney/Rock geographic areas.

There are outfitter/guide camps at Beaver Lakes, Frying Pan Lake, Flatiron and Penrose Creek.

Winter travel: Snowmobile use is prohibited in the southeastern part of the geographic area, the lands adjacent to the Bud Love Winter Game Range. There are no groomed snowmobile trails in the geographic area. There is little winter recreation use because of lack of access. Some persons do snowmobile the Story/Penrose trail to access lakes for ice fishing.

Relationship between supply and demand of opportunities: The relatively remote location provides more supply of backcountry dispersed recreation opportunities than demand, although the increasing motorized summer use is putting pressure on those lakes available for use.

Recreation Opportunities: There are many recreation opportunities within the Piney/Rock 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 16. Recreation Opportunity Spectrum (ROS) Classes within the Piney Creek/Rock Creek Analysis Area

ROS class	Acres in analysis area	Percent
Primitive	40,991	37
Semi-primitive nonmotorized	34,936	32
Semi-primitive motorized	31,942	29
Roaded natural	2,359	2

As displayed in table 16, the area has sixty-nine percent of the geographic area in primitive and semi-primitive nonmotorized classes. Wilderness accounts for twenty-eight percent of this geographic area. Because of the remoteness of the area, it remains relatively undeveloped.

Primitive – 40,991 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 – 34,936 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 – 31,942 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 – 2,359 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.

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.

Until the geographic area analysis is complete, existing Allotment Management Plans 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 17 shows selected information for the six grazing allotments in the Piney/Rock analysis area.

Table 17. Select Information for Grazing Allotments in the Piney/Rock Analysis Area

Allotment	Livestock Permitted	Number Permitees	Total Acres	Capable Acres	Current AMP	Scheduled AMP Update	Permitted Season
Piney C&H	264 C/C	1	9593	1822		2004	7/10 –9/30
Little Piney C&H	67 C/C	1	9518	1446		2004	6/16 – 9/30
Rock Cr. C&H	300 C/C	1	30720	6073		2004	7/1-9/26
Willow Park C&H	91 C/C	1	6710	444		2006	7/10 – 9/15

The geographic area is scheduled for analysis in 2004. This schedule 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. Another factor affecting all geographic area analysis is the cultural resource surveys. The amount of area being surveyed and impacts requiring mitigation are delaying several projects.

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.

XIII. Transportation System (Roads and Trails)

A Forest-wide roads analysis will be conducted during the effects analysis part of Forest Plan revision. It will be done under the 1985 Forest Plan direction. When the revised Forest Plan is implemented, the roads analysis will be reviewed and applicable revisions made.

Roads

There are currently approximately 27 miles of roads in the Piney/Rock Creek Analysis Area. This system of roads accesses an area of approximately 172 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 18 gives a breakdown of roads within the analysis area.

Table 18. Miles of Road by Jurisdiction

Jurisdiction	Length (miles)
Forest Service	26.63
Unclassified	0.64
Total	**27.27**

The 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 shown in Table 19.

Table 19. 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 10 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 10. Roads by Forest Service Maintenance Level and Roads by Other Jurisdiction

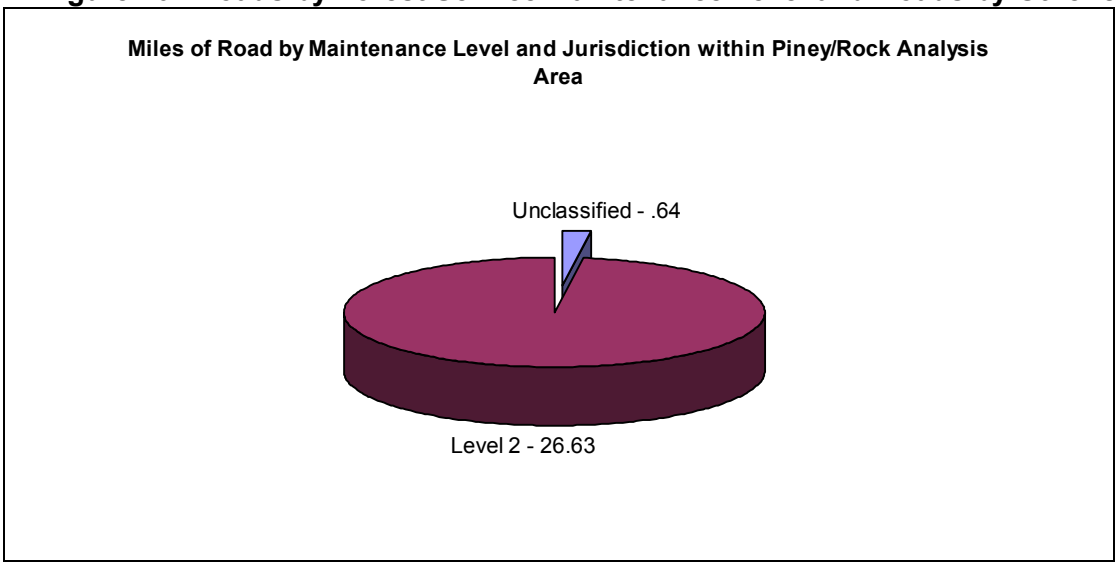


Table 20 lists the road density in the Piney/Rock analysis area. These figures do not include wilderness and private land. The open road density does not include unclassified roads.

Table 20. Road Density in the Piney/Rock Analysis Area (National Forest System, Non-wilderness land only)

Total Road Density	0.22 miles per square mile
Open Road Density	0.21 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. Table 21 shows the breakdown of annual and deferred maintenance needs by maintenance level[8].

Table 21. Annual and Deferred Maintenance Needs by Maintenance Level

Maintenance Level	Miles	Annual Cost/Mile	Deferred Cost/Mile
1	0	$683	$886
2	26.63	$920	$2,316
3	0	$6,561	$8,109
4	0	$5,991	$14,730
Total needs for annual maintenance in Piney/Rock = $ 24,500			
Total needs for deferred maintenance in Piney/Rock = $ 61,675			

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. Current forest plan standard for full maintenance is also not being met under current allocations. Currently, general plan direction

[8] 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.

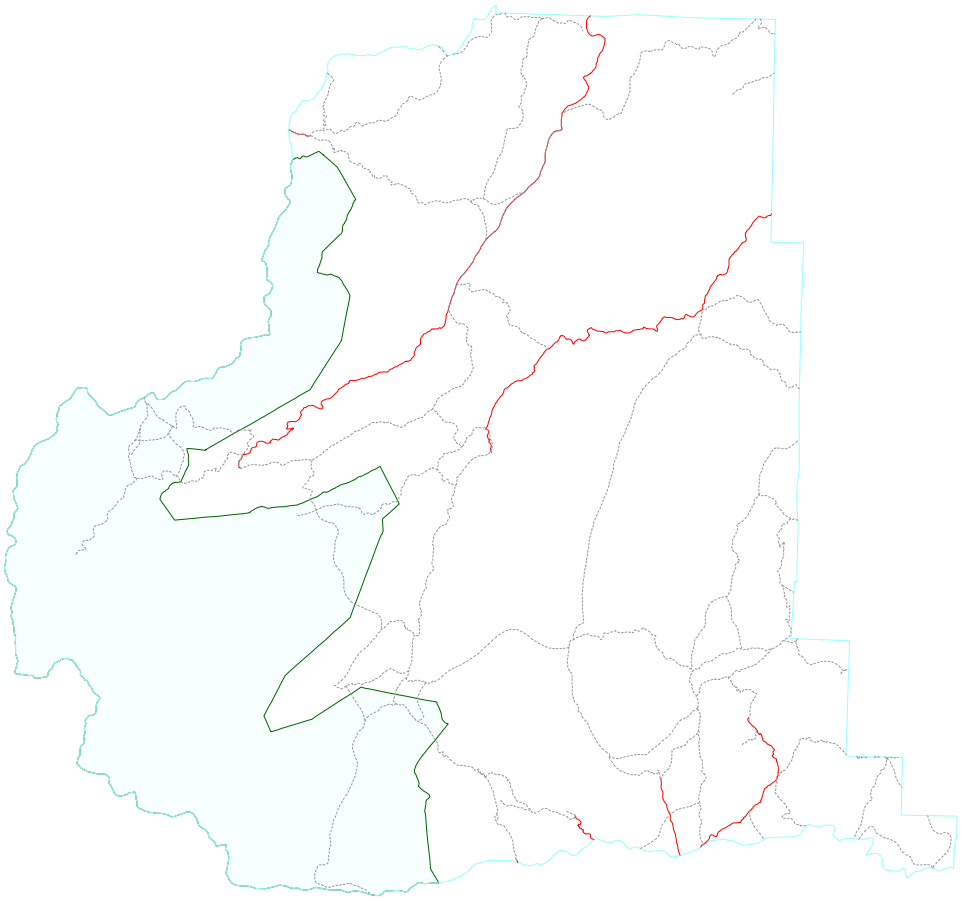
states to keep roads open to public use unless financing is not available to maintain the facility, or use is causing unacceptable damage to soil and water resources. Based on current deferred maintenance and annual maintenance needs, plan direction is not being met.

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 37 shows the current Forest Service Road system by maintenance level in the Piney/Rock analysis area.

Road Display by Maintenance Level for Piney/Rock Analysis Area



Trails

There are currently approximately 139 miles of trail in the Piney/Rock Creek Analysis Area. This trail system accesses an area of approximately 172 square miles, including 48 square miles of wilderness. 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. Table 22 shows the breakdown of classified and unclassified trails within the analysis area.

Table 22. Miles of Trail by Status in Piney/Rock Analysis Area

Trail Status	Length (Miles)
Forest Service	139

Forest Plan Goals/Desired Conditions

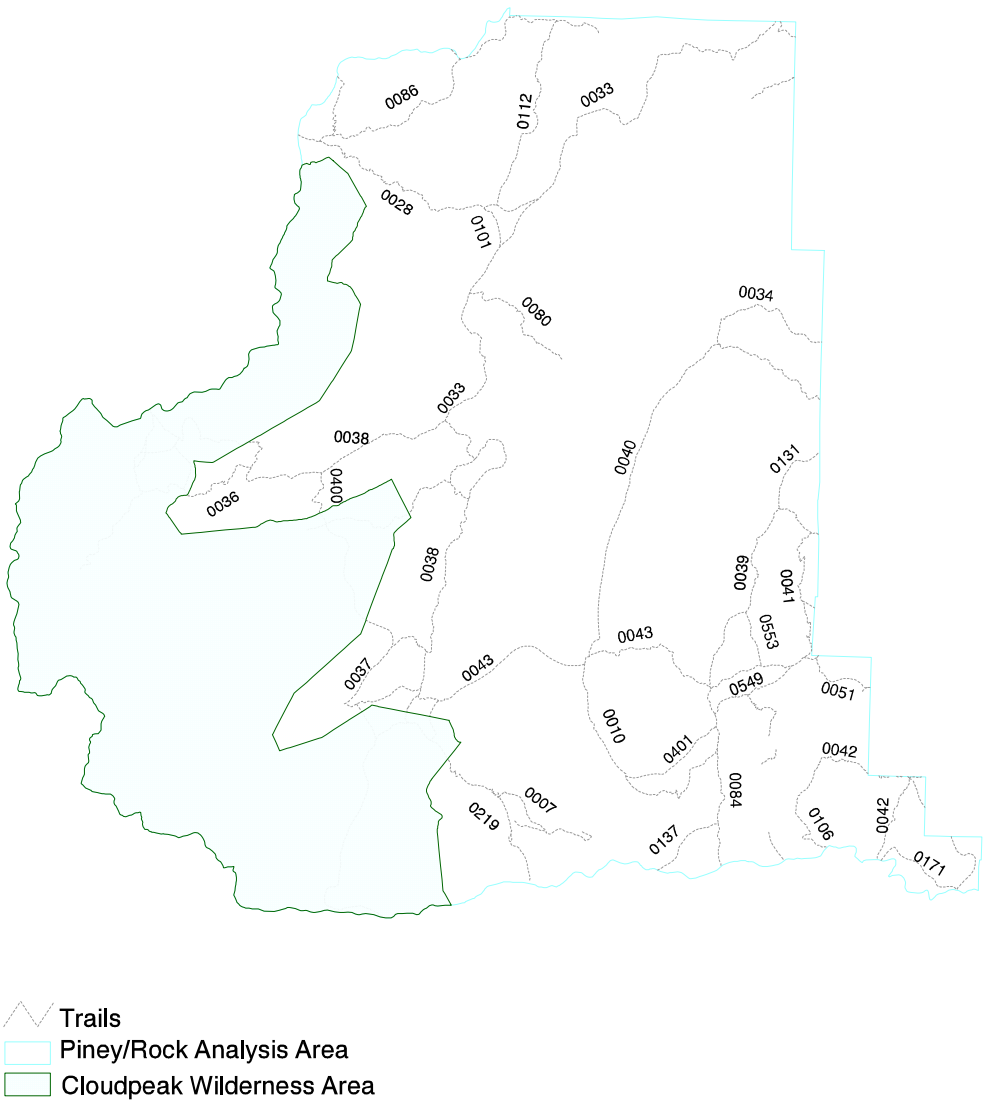
Forest Plan direction for transportation facilities are primarily based on resource needs rather than the road systems as a separate entity. In other words, the driving force behind road management decisions are primarily based on the management directions resource needs for an area. Currently, general 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 trail opportunities in coordination with other state, federal and county municipal jurisdictions and private industries is 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[9]. Total trail maintenance needs in the Piney/Rock analysis area are estimated to be $169,163 annually maintenance, with a $1,824,375 deferred maintenance backlog.

The map on page 39 shows the current trail system within the Piney/Rock analysis area.

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

Trail Display for Piney/Rock Analysis Area



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