

PRAIRIE PROJECT AREA (Lower Rapid Creek Area)

Draft Environmental Impact Statement



USDA Forest Service
Black Hills National Forest
Mystic Ranger District
Rapid City, South Dakota



Commonly Used Acronyms and Abbreviations

ATV	All Terrain Vehicle	MA	Management Area
BA	Basal Area	MBF	Thousand Board Feet
BF	Board Foot	MCF	Thousand Cubic Feet
BHNF	Black Hills National Forest	MIS	Management Indicator Species
BMP	Best Management Practices	MMBF	Million Board Feet
CARs	Community at Risk	MPB	Mountain Pine Beetle
CCF	Cubic Hundred Feet	NEPA	National Environmental Policy Act
CDA	Connected Disturbed Area	NFMA	National Forest Management Act
CEQ	Council on Environmental Quality	NFS	National Forest System
CF	Cubic Feet	ORV	Off-Road-Vehicle
CFR	Code of Federal Regulations	OHV	Off Highway Vehicle
CMAI	Culmination of Mean Annual Increment	PPA	Prairie Project Area
DBH	Diameter Breast Height	RN	Roaded Natural
DEIS	Draft Environmental Impact Statement	RNA	Research Natural Area
EA	Environmental Analysis	ROD	Record Of Decision
EIS	Environmental Impact Statement	ROS	Recreation Opportunity Spectrum
EPA	Environmental Protection Agency	S&G	Standard(s) and Guideline(s)
FSR	Forest System Road	SHPO	State Historic Preservation Office
FEIS	Final Environmental Impact Statement	T&E	Threatened and Endangered
FS	Forest Service	TSI	Timber Stand Improvement
FSH	Forest Service Handbook	USDA	United States Department of Agriculture
FSM	Forest Service Manual	WUI	Wildland-Urban Interface
GIS	Geographic Information System		
ID Team	Interdisciplinary Team		

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**Prairie Project Area
Draft
Environmental Impact Statement
Pennington County, South Dakota**

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Abstract: The Mystic Ranger District of the Black Hills National Forest has prepared a draft Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. The Mystic Ranger District proposes to implement multiple resource management actions within the Prairie Project Area (Lower Rapid Creek Area) as guided by the Black Hills National Forest Land and Resource Management Plan (Forest Plan) as amended and supported by the National Fire Plan, the President’s Healthy Forest Initiative, and by other National level policy. The focus of the actions proposed is to aggressively manage the vegetation in this wildland urban interface setting to minimize the potential for large-scale catastrophic wildfires and to resolve inherently complex and conflicting travel and recreation use issues. Four alternatives are considered in detail. Alternative A is the No Action Alternative. Alternative B accomplishes fuel and fire hazard reduction primarily through non-commercial thinning and extensive application of prescribed fire. It also has a non-motorized use emphasis. Alternative C is the proposed and preferred action. Fuel and fire hazard reduction is accomplished through both commercial and non-commercial thinning plus a moderate amount of prescribed fire. Recreation and travel use issues are addressed through establishment of motorized and non-motorized “core use” areas. Alternative D addresses fuel and fire hazard reduction issues plus recreation and travel issues within the constraints and guidance of the current Forest Plan. This draft EIS discloses the direct, indirect, and cumulative environmental impacts resulting from the proposed action and alternatives.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers’ position and

contentions. *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. *City of Angoon v. Hodel* (9th Circuit, 1986) and *Wisconsin Heritages, Inc. v. Harris*, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Send Comments to:

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Date Comments Must Be Received:

July 28, 2003

Summary

The Black Hills National Forest, Mystic Ranger District proposes to implement multiple resource management actions within the Prairie Project Area as guided by the Black Hills National Forest Land and Resource Management Plan as amended, and supported by the National Fire Plan, The 10 year Comprehensive Strategy Implementation Plan agreed to by the Western Governor's Association and others; and The President's Healthy Forest Initiative. The Prairie Project Area covers about 29,000 acres of National Forest System land and about 6,300 acres of interspersed private land within the lower Rapid Creek watershed directly west of Rapid City, South Dakota (see Appendix E, Map 1). Resource management actions apply to National Forest System (NFS) lands only and do not include private lands.

The focus of the actions proposed is to aggressively manage the vegetation in the project area to minimize the potential for large-scale catastrophic wildfires. Actions proposed include treating vegetation to promote natural and constructed fuel breaks, reducing fuels, and providing a mix of motorized and non-motorized use opportunities. Anticipated co-products of these actions will be commercial timber and vegetation treatment that provides for wildlife habitat.

This action is needed to remove vegetation - both small and large trees plus associated fuels - in order to break up the continuity and reduce the unnaturally high concentration of biomass in the Forest. The project area is located in a classic ponderosa pine fire adapted ecosystem that has been managed for multiple-use objectives for decades. As such, the vegetation management objectives during this period have emphasized suppression and exclusion of fire to meet sustained timber yield, wildlife habitat improvement and other objectives in the area. The project area's wildland-urban interface (WUI) setting is rated as having high fire risk, high hazard, and high value - referred to as the "Red Zone". This situation provides a compelling need to make fire and fuels hazard reduction a primary management goal in the Prairie Project area. The proposed action also addresses the need to resolve inherently complex and conflicting travel management and recreation use issues.

There have been some substantial changes on the Black Hills and specifically in the Prairie Project area subsequent to the 1997 Forest Plan Revision and the appeal decision. This includes land affected by wildfires in the past three years, storm damage from the year 2000 blizzard, and expanding insect infestations. Further, the total amount of biomass (small and large trees plus woody fuels) is increasing on the Forest.

Locally and nationally, the public is demanding actions to reduce the potential for large-scale wildfires on public lands. The National Fire Plan is one of a number of National level policy documents developed to address this issue. In the Prairie Project Area the proposed action has been developed to aggressively manage vegetation to minimize the potential for large-scale wildfires. The primary focus is to remove vegetation and associated fuels thus reducing the unnaturally high concentration of biomass in the Forest. Ultimately, the intent is to limit effects to the environment and reduce the potential for loss of property or life due to large-scale wildfire.

Through varied public involvement efforts, comments on the proposed action, potential concerns, and opportunities for managing the Prairie Project Area were solicited from Forest Service employees, members of the public, other public agencies, adjacent property owners, and organizations. Methods used to request comments included: Publishing the Notice of Intent (NOI) to prepare an EIS in the *Federal Register* on Friday July 12, 2002; a prominent newspaper article in the Rapid City Journal on July 13, 2002 publicizing the project; a scoping letter mailed to approximately 1,400 interested parties soliciting comments; and two public “open houses” held at the Johnson Siding Community Club and the Whispering Pines Volunteer Fire Department.

Comments received during the scoping process were used to help in defining issues, develop alternatives and mitigation measures, and analyze effects. Through review and analysis of the scoping comments and input, the Prairie Project Area Interdisciplinary Team (ID Team) identified five (5) prevailing or key issues related to the proposed activities. The five key issues include: Fuel and fire hazard reduction, Prescribed fire use, Travel and Recreation Use, Wildlife habitat, and Socio-economic concerns.

These issues led the ID Team to develop alternatives to the proposed action. The alternatives analyzed in detail in this EIS are briefly described as follows:

Alternative A (No Action)--The National Environmental Policy Act (NEPA) requires the study of the no action alternative, and to use it as a basis for comparing the effects of the proposed action and other alternatives. This alternative assumes no implementation of any elements of the proposed action or other action alternatives. The no action alternative represents no attempt to actively respond to the purpose and need for action or the issues raised during scoping for this project. For example, there would be no effort to modify existing vegetation or related fuels and habitat conditions in the project area. However, such things as ongoing Forest protection efforts and recurring road maintenance on system roads would continue as directed by the Forest Plan.

Alternative B--This alternative emphasizes a non-commercial vegetation treatment approach to address the purpose of and need--which is keyed to fire hazard and fuels reduction. Alternative B was developed in response to the view expressed by some during scoping that fire hazard and fuels reduction can be accomplished with limited or no use of commercial timber harvest. Commercial timber harvest would be applied on a limited number of acres--primarily in accessible fuel breaks around some private lands. The alternative emphasizes the extensive use of prescribed fire and non-commercial thinning as alternatives to using commercial timber harvest to address fire hazard and fuels reduction needs. Furthermore, this alternative addresses the desire on the part of individuals and groups that feel non-motorized recreational use and travel should be emphasized in the project area.

Alternative C (Proposed Action)--Alternative C was developed in response to the purpose of and need (which emphasizes fire and fuels hazard reduction) and embodies the treatment activities that comprise the proposed action. This alternative aggressively treats forest vegetation to reduce the fire and fuels hazard that currently exists in the project area. This action has been developed and refined in response to recent National direction developed to support efforts to reduce the potential for catastrophic wildfire in fire-adapted ecosystems (e.g., ponderosa pine) particularly near communities at risk and in the wildland-urban interface. The Prairie Project

Area fits that description and condition disturbingly well. This alternative recognizes that because the project area includes communities at risk to catastrophic wildfire, an aggressive approach using multiple vegetation management tools (including commercial timber harvest) is needed to reduce fuels and fire hazard. The scope of vegetation treatment under this alternative may require site-specific Forest Plan amendment(s) specifically related to effects on wildlife habitat. This alternative recognizes the broad spectrum of recreation related uses associated with the modes of travel that people prefer within the Prairie Project Area. Alternative C provides a range of recreation and travel related opportunities by establishing “core use” corridors.

Alternative D--This alternative emphasizes reduction of fuels and fire hazard plus management of other resource needs within the scope and direction of the Forest Plan. The alternative is designed to address the purpose of and need emphasizing fire and fuels reduction along with wildlife habitat improvement and commodity production in accordance with Forest Plan Standards and Guidelines. Multiple vegetation management tools would be used to implement this alternative. Vegetation treatment would be done at a level guided by the Forest Plan. No prescribed broadcast burning is planned for in this alternative. Fuels reduction and maintenance would be accomplished through mechanical means. Landscape size natural fuel breaks are not specifically planned for. Recreation and travel use will be guided by current Forest Plan Standards and Guidelines.

The public and decision maker can make a relative comparison between the alternative effects on the key issues based on specific measurement indicators developed for each issue. Table 0-1 provides a comparative display of the alternative effects and/or outputs relative to the key issues in the Prairie Project Area.

Table 0-1 Effects to Key Issues by Alternative

	Alt A	Alt B	Alt C	Alt D
Fire Hazard and Fuels Reduction				
<i>Issue Measurement Indicators</i>				
Crown Fire Hazard - Low (acres)	11,002	13,813	19,169	13,542
Crown Fire Hazard - Moderate (acres)	7,211	7,771	4,746	6,892
Crown Fire Hazard - High (acres)	10,783	7,441	5,109	8,590
Vegetation Treatment (acres)	0	6,958	11,881	7,112
Fuel Breaks - constructed (miles)	0	23	29	21
Fuels Breaks - hardwoods/meadows (acres)	0	1,599	1,738	1,606
Storm Damage Treatment (acres)	0	965	965	965
Prescribed Burning (acres)	0	7,502	4,224	0
Accessibility for Fire Suppression (road miles)	292	206	233	230
Prescribed Fire				
<i>Issue Measurement Indicators</i>				
Burn Complexity—Moderate (acres)	NA	2,020	4,224	NA
Burn Complexity—High (acres)	NA	5,482	0	NA
Prescribed Burn Area (acres)	0	7,502	4,224	0
Burn Days Required (days)	None	40-45	20-25	None

	Alt A	Alt B	Alt C	Alt D
Travel Management				
<i>Issue Measurement Indicators</i>				
Total Miles of Roads and Motorized Trails	292	206	233	230
Miles of Roads and Motorized Trails Open Winter-Spring (Dec 15-May 15) to Motorized Use	173	128	172	131
Miles of Roads and Motorized Trails Open Summer-Fall (May 15-Dec 15) to Motorized Use	219	128	186	191
Percent of the Area Open Winter-Spring (Dec 15-May 15) to Off-Road Motorized Use	76%	18%	29%	18%
Percent of the Area Open Summer-Fall (May 15-Dec 15) to Off-Road Motorized Use	76%	18%	68%	85%
Miles of Non-Motorized Trails	11	49	33	20
Wildlife Habitat				
<i>Issue Measurement Indicators (Worst – Best)</i>				
Pine Structural Diversity				
Closed Canopy	Best	Better	Poor	Good
Open Canopy	Fair	Better	Best	Good
Late Successional	Best	Good	Fair	Better
Aspen/Oak/Meadow Communities	Fair	Good	Best	Better
Riparian Area Condition	Fair	Better	Better	Better
Water Quality	Fair	Better	Better	Better
In-stream Fisheries Habitat	Fair	Better	Better	Better
Snag Conditions	Good	Best	Better	Fair
Dead and Down Woody Material	Best	Better	Fair	Good
Open Road Density	Poor	Best	Good	Better
Socio-Economic Factors				
<i>Issue Measurement Indicators</i>				
Total Cost (million)	NA	-\$5.3	-\$7.0	-\$3.1
Total Revenues (million)	NA	\$.2	\$5.1	\$1.9
Cost-Benefit Ratio	NA	.04	.73	.61
Funding Certainty (Low to High)	NA	Low	Mod-High	High
Volume Harvested - sawtimber (CCF)	0	2,600	60,048	21,726
Products - poletimber (CCF)	0	476	14,133	5,566
Cooperative Effort with groups and individuals regarding fire/fuels hazard reduction	Good	Better	Better	Better
Wildfire Hazard Reduction (Effectiveness of contribution to safeguarding the health, values and lifestyle of local residents and Forest users by reducing wildfire hazard.)	Least Effective	Moderatel y Effective	Most Effective	Moderately Effective

NOTE: Numbers are approximate

The Prairie Project purpose and need provides the focus and scope of the proposal as related to National and Forest level policy and direction. Given this purpose and need, the Deciding Official (Forest Supervisor) reviews the proposed action, the issues identified during scoping, the

alternatives, and the environmental consequences of implementing the proposal and alternatives disclosed in this EIS. This forms the basis for the Deciding Official to make the following determinations:

- Whether or not the proposed activities and alternatives address the issues, are responsive to National policy/guidance and Forest Plan direction, and meet the purpose of and need for action in the Prairie Project area.
- Whether or not the information in this analysis is sufficient to implement proposed activities.
- Which actions, if any, to approve (decide which alternative to implement).
- Whether there is a need for site-specific amendments to existing Forest Plan direction.

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CHAPTER 1 PROPOSED ACTION AND PURPOSE OF AND NEED

Document Structure

The Mystic Ranger District of the Black Hills National has prepared this Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into seven chapters:

Chapter 1. Purpose of and Need for Action: The chapter includes information related to background of the project proposal, the purpose of and need for the project, and a description of the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Chapter 2. Alternatives, including the Proposed Action: This chapter provides a more detailed description of the proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on key issues raised by public comments, other agencies, and internally. This chapter also provides a discussion of mitigation measures and monitoring required. Finally, this section includes summary tables displaying the activities planned by alternative and a comparison of effects on the key issues associated with implementing each alternative.

Chapter 3. Affected Environment and Environmental Consequences: This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis documentation is organized by resource area, e.g., Fire and Fuels, Recreation and Travel Use, Wildlife Habitat, Watershed and Soils, etc.

Chapter 4. Index: The index provides page numbers by document topic.

Chapter 5. Bibliography/References: The bibliography provides a list of references supporting the documentation in the EIS.

Chapter 6. Glossary: The glossary provides a list of key words, acronyms and terminology used throughout the EIS.

Chapter 7. Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.

Appendices: The appendices provide more detailed information to support the documentation and analysis presented in the EIS.

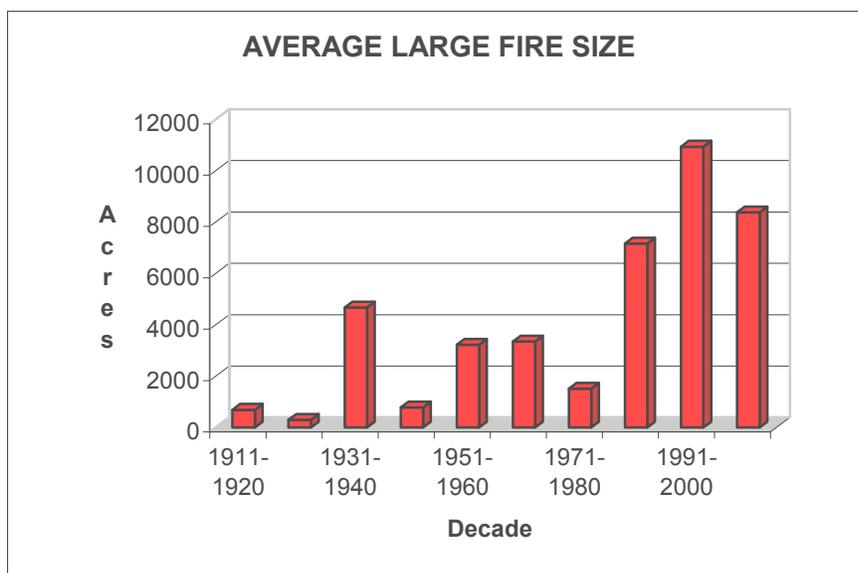
Additional documentation, including more detailed analyses of project-area resources, may be found in the Project File located at Mystic Ranger District office in Rapid City.

Background

There have been some dramatic, eventful changes on the Black Hills National Forest and specifically within or in proximity to the Prairie Project area subsequent to the 1997 Forest Plan Revision and the appeal decision. This includes the amount of land affected by wildfires in the past three years, storm damage from hail and heavy snow, and expanding insect infestations. Further, the total amount of biomass (small and commercial size trees) is increasing on the Forest. Ponderosa pine is the predominant tree species on the Forest as well as the Prairie Project Area. This is a classic fire-adapted ponderosa pine ecosystem located within a wildland urban interface setting. For decades the management emphasis in this area has been aggressive suppression of wildfire with minimal prescribed burning, vegetation management for sustained growth and yield of timber and providing/maintaining wildlife habitat.

There is now a greater potential for large, catastrophic wildfires that are more intense and harder to control than what has historically occurred. These fires can have a significant impact on our environment, economy and personal lives. The dense continuous forest with few openings has resulted in more of the Black Hills being affected by large, intense forest fires. The number of fires has remained fairly constant over time at 65-130 starts per year. The number of wildfires escaping initial attack has also remained constant. However, these “escaped” fires have become larger and more difficult to control. When looking at wildfires over 300 acres, average fire size has increased from under 1,000 acres per fire in the early 1900’s to over 8,000 acres per fire in recent years as illustrated in the figure below.

Figure 1-1 Average Large Size Fires



Large fires (fires greater than 300 acres) burned about 147,900 acres during the period from 1900 to 1980 in the Black Hills. Since 1980 a dramatic increase in acreage burned has occurred. Recent wildfires, including but not limited to the Jasper Fire, Roger's Shack, Elk Mountain II, Grizzly Gulch, Galena, Flagpole, Westberry Trails and the Battle Creek Fire have burned about 238,500 acres.

People that live and work in this area have become increasingly concerned about the frequency and magnitude of wildfires that have occurred recently. Specifically, issues such as drought, forest conditions that resist fire control, suppression response times, risk and safety as related to people and property and other protection issues continue to be topics of discussion, concern and debate locally. These issues have understandably been elevated to a higher level of concern with the local public given the massive wildfires that have been experienced recently throughout the West, and certainly within the Black Hills. The prevailing public attitude, and that of local, State, and Federal politicians, is that the Black Hills National Forest is not doing enough to address fire and fuels risks on National Forest lands. This point of view is supported and amplified at the National Level through a series of initiatives and streamlining of processes related to fuel and fire hazard reduction. The resounding message conveyed by the public during the public involvement phase of this project was the need for action regarding the critical fuels and fire hazard situation in this area.

The Black Hills National Forest has been divided into areas or zones based on fire risk, hazard and value. On the Mystic RD, the areas of high risk, high hazard and high value coincide fairly well with the wildland-urban interface (WUI). This area on the Mystic Ranger District is referred to as the "Red Zone". Much of the Prairie Project Area, which lies directly west of Rapid City is characterized by this Red Zone. This situation provides a compelling reason to make fire and fuels hazard reduction a primary management goal in this area. Within these "zones" fire hazard reduction and minimizing the potential for large-scale wildfires has become the dominant management emphasis.

Locally and nationally, the public is demanding actions to reduce the potential for large-scale wildfires on public lands. The National Fire Plan and other initiatives were developed to address this issue. The administration advocates an aggressive approach to the problem, and this approach is supported by congressional mandate for collaboration and coordination between responsible agencies, Western governors and others in implementing efforts to reduce the risks associated with wildland fire across the landscape.

Research by Cohen (2002) has indicated that structures including homes can be protected from a wildfire by treating the fuel immediately adjacent to structures and by reducing structure susceptibility to firebrands. This research focuses on home ignitibility. It does not address other issues that are associated with large catastrophic fires. There remains the potential for the loss of life and property including outbuildings, land values, vehicles, domestic animals and infrastructure. Cohen's findings do not address the adverse impacts that large wildfires can have on the vegetation, aesthetics, wildlife, soils and watershed resources. The purpose of fuel treatment is to provide for public and firefighter safety, minimize the loss of property and to protect natural resources on a landscape basis.

In an effort to address these issues in the Prairie Project Area, the proposed action has been developed to aggressively manage vegetation to minimize the potential for large-scale wildfires. Specifically, the primary focus is to reduce the potential for uncontrolled crown fire spread within the wildland-urban interface and near communities at risk by removing vegetation - small and commercial sized trees, and reducing the fuel loads - in order to break up the continuity and reduce the unnaturally high concentration of biomass in the Forest.

The Prairie Project Area is located on National Forest within the wildland urban interface west of and along the outskirts of Rapid City, SD. Because of its proximity to Rapid City with approximately 60,000 residents, it receives as much or more dispersed recreation use as any other part of the Black Hills National Forest. Most of this use is by local Rapid City residents and those living within and adjacent to (an estimated 7,800 residents) the project area. The main travel routes within and near the project area (Highway 385, Highway 44 and Sheridan Lake Road) receive heavy tourist traffic in the summer.

The project area provides great scenery and abundant dispersed recreation opportunities in a setting that is close to town or, for some, right out their back door. Heaviest recreation use occurs in the non-winter months, but the typical low snowfall levels in this area also encourages use in the winter.

Travel and access needs are both linked to recreation use within the project area. The amount, location and type of roads and trails as well as areas open and closed to off-road motorized use within the area directly affect recreation use.

Recreation use in the area continues to grow, as do conflicts within and between both motorized and non-motorized groups. Heavy use often results in trash dumping, illegal fires, vandalism and negative effects to natural resources. Travel management restrictions are difficult to enforce within the project area. Opportunities exist to expand recreation uses, reduce conflicts between all users, improve the effectiveness of travel management restrictions, and minimize the amount of trash dumping, vandalism and other negative effects.

In order to address these issues in the Prairie Project Area the proposed action has been developed to provide a variety of recreation and travel choices through the establishment of core use corridors. These core use areas are characterized mainly by their dispersed recreation and travel use opportunities--namely whether they are available for motorized use, non-motorized use or a combination of these uses.

While the proposal is focused on addressing fire/fuels hazard reduction and travel and recreation use, it also accomplishes other Forest Plan objectives. For example, this includes providing wildlife habitat for a variety of species. The proposed vegetation treatments also contribute to providing the local and regional economies with wood commodities.

Management Direction

Forest Plan Direction

The Black Hills National Forest Land and Resource Management Plan (Forest Plan) supported by its Final Environmental Impact Statement (FEIS) 1997, is the Forest programmatic document required by the rules implementing the Forest and Rangeland Renewable Resources Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA). The Forest Plan was amended by the Phase I Forest Plan Amendment (Decision Notice (DN) dated May 18, 2001). This amendment provides revised and new Standards and Guidelines, as well as, additional protection measures applicable to a number of plant and wildlife species on the Black Hills National Forest. The Black Hills National Forest is currently in the process of amending the Forest Plan, referred to as Phase II.

The purpose of the Forest Plan (FP) is to provide direction for the multiple use and sustained yield of goods and services from National Forest System lands in an environmentally sound manner. Moreover, the Forest Plan provides overall goals and objectives (FP Chapter I) as well as associated standards and guidelines (FP Chapter II) for management.

The Forest Plan establishes nine multiple use goals and associated objectives for management of the Forest. The first four goals are directed toward natural resource objectives for multiple use management of the Forest. Also Goal 3 and 5-9 provide socio-economic emphasis for management of the Forest. **The goals and objectives, applicable to specific resource management issues needing resolution, provide the basic direction for defining the purpose and need and ultimately developing the proposed action (Alternative C).** The nine Forest Plan goals are discussed in Chapter I of the Forest Plan. The goals providing management emphasis and direction for the Prairie Project are goals 1, 2, 4 and 7.

1. Protect basic soil, air, water and cave resources.
2. Provide for a variety of life through management of biologically diverse ecosystems.
4. Provide for scenic quality, a range of recreational opportunities, and protection of heritage resources in response to the needs of the Black Hills National Forest visitors and local communities.
7. Emphasize cooperation with individuals, organizations, and other agencies while coordinating planning and project implementation.

The Forest Plan also sets management allocations for specific uses of land (Management Areas) within the Forest to meet multiple use objectives (FP Chapter III). The Prairie Project ID Team reviewed Management Area (MA) direction and confirmed that no new information existed that would require reconsideration of Forest Plan allocations. However, they recognize that there remains a possibility that one or more site-specific amendments may be necessary within a management allocation (emphasis) area in order to implement a needed action. Potential amendments are outlined in Chapter 2 under 'Alternatives Considered in Detail' page 21. The MAs designated in the Forest Plan for the Prairie Project Area, are described in Table 1-1 and displayed in Appendix E, Map 3.

Table 1-1 Management Area designations and acreage in the Prairie Project Area

Acres	Management Emphasis
3,858	3.7 Late Successional Forest
349	4.1 Limited Motorized Use and Forest Products
5,182	5.1 Resource Production
19,486	5.4 Big Game Winter Range
149	8.2 Developed Recreation Complex
29,024	Total

Other Direction Specific to Fire and Fuels Management

As a result of the significant increase in catastrophic wildfire occurring nation-wide, a considerable number of new and/or revised National level initiatives and policies regarding fire and fuels management have been generated. The main focus of this direction is to reduce the probability and occurrence of catastrophic wildfire in fire adapted ecosystems, especially near communities at risk (CAR) and the wildland-urban interface (WUI). This national emphasis further supports and affirms the need to address Forest Plan goals and objectives regarding fuels and fire hazard reduction to minimize the potential for catastrophic wildfire in the Prairie Project Area. Below is an overview of a number of key initiatives and policy statements that have evolved somewhat progressively beginning with the National Fire Plan in the fall of the year 2000.

National Fire Plan—Managing the Impact of Wildfires on Communities and the Environment, September 2000. This plan is the result of an August 2000 directive by then-President Clinton to the Secretaries of USDA and USDI to develop a response to severe wildland fires, reduce fire impacts on rural communities, and ensure effective firefighting capacity in the future. The focus of this plan is the tactical undertaking of operational and implementation activities. And a major feature of the plan is the interagency (especially between federal and non-federal entities) aspect of risk reduction planning and implementation.

Federal Wildland Fire Management Policy, January 2001. This is a review and update of the 1995 Federal Fire Policy. It provides the philosophical and policy foundation for Federal interagency wildland fire management programs and activities, including those conducted under the National Fire Plan—such as hazardous fuel reduction. In summary, the policy states that, ...”federal fire management activities and programs are to provide for firefighter and public safety, protect and enhance land management objectives and human welfare, integrate programs and disciplines, require interagency collaboration, emphasize the natural ecological role of fire, and contribute to ecosystem sustainability.”

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment—10 year Comprehensive Strategy, August 2001. In support for the National Fire Plan, Congress mandated several reporting requirements including creation of this coordinated National 10-Year Comprehensive Strategy by the Secretaries working collaboratively and cooperatively with Western Governors and others. The Strategy provides a

number of goals and guiding principles such as: *Reduce hazardous fuels, Restore fire-adapted ecosystems, ...protection of communities and other high-priority watersheds at-risk.*

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment—10 year Comprehensive Strategy Implementation Plan, May 2002. The plan establishes a collaborative, performance-based framework for achieving specific goals, actions, guiding principles, performance measures and implementation tasks needed to reduce the risks of wildland fire across the landscape. The plan represents a unified national commitment endorsed by Secretaries, Governors, Tribes, local officials and others.

Restoring Fire-Adapted Ecosystems on Federal Lands—A Cohesive Fuel Treatment Strategy for Protecting People and Sustaining Natural Resources, August 2002. A strategy for USDA and USDI agencies that aligns resource and fire programs for the common purpose of reducing risks to human communities and to restore and maintain fire-adapted ecosystems. This provides a unified approach to meeting the goals of the “10-Year Comprehensive Strategy and Plan” of May 2002. Common priorities for fuel treatment are established that provide the ability to address fuel hazards and land health. Implementation of this framework will reduce risk and consequences of unwanted wildland fire to communities and ecosystems while, simultaneously, providing forest products and biomass energy production opportunities.

Healthy Forests, An Initiative for Wildfire Prevention and Stronger Communities, August 2002. Presidential direction to the USDA, USDI and CEQ to improve processes needed to reduce the risk of catastrophic wildfires by restoring forest health. The “Healthy Forest Initiative” directs agencies to implement core components of the National Fire Plan’s 10-year Comprehensive Strategy and Implementation Plan.

National Fire Plan for the Rocky Mountain Region, October 2002. Provides guidance for implementation of the National Fire Plan with the goal of reducing the potential for severe, uncontrollable wildland fires through a sustained program of fuels treatment and increased fire management capabilities within the Rocky Mountain Region of the Forest Service.

MOU for The Development of a Collaborative Fuels Treatment Program, January 2003. Process for FS, BLM, USFWS, NPS, National Association of State Foresters and National Association of Counties to collaborate on fuels treatment work within their respective jurisdictions to provide for community protection and enhance the health of forests and rangelands. This process is guided by the goals, performance measures and collaborative framework outlined in the 10-year Comprehensive Strategy and Implementation Plan (“10-Year Plan”) endorsed by these parties on May 23, 2002. Fuel treatments are to be coordinated across ownerships and jurisdictions and prioritized 1) in the wildland-urban interface and 2) outside the wildland-urban interface that are in condition classes two and three as defined in the “10-Year Plan”.

Purpose Of and Need for Action

As described and referenced under the Management Direction Section above, there are numerous Goals and Objectives identified in Chapter 1 of the Forest Plan. The Deciding Official for the Prairie Project has chosen to propose resource management actions that respond to Forest Plan Goals 1, 2, 4 and 7 as well as the National emphasis on reducing the potential for catastrophic wildfire in the urban interface near communities at risk.

Associated with the four goals are specific resource objectives, as outlined in the Forest Plan (Chapter I). Each goal has objectives, some of which are key to defining the purpose and need and developing the proposed action. Key objectives providing management emphasis for this project are summarized below. Note that other Forest Plan goals and numerous objectives not mentioned below also provide guidance and are achieved to varying degrees depending on project accomplishment (see the Forest Plan, Chapter I).

Goal 1 – Protect basic soil, air, water and cave resources.

- Objective 101. Maintain air quality standards...
- Objective 103. Maintain or improve long-term stream health.
- Objective 104. Maintain or enhance watershed conditions to foster favorable soil relationships and water quality.
- Objective 105. Prohibit motorized vehicle use in wetlands, wet meadows and riparian areas, except at specified locations and times of the year.

Goal 2 – Provide for a variety of life through management of biologically diverse ecosystems.

- Objective 201. During the planning period conserve existing hardwood communities and restore existing hardwood communities...
- Objective 210. Implement at least one adaptive management project (fire simulation cut) in the next 10 years to simulate forest structural conditions following a stand-replacing fire (using primarily mechanical methods). Follow this treatment with low-intensity prescribed fire when ground fuels permit...
- Objective 213. Maintain or enhance existing riparian area biodiversity, physical structure and size.
- Objective 223. Use management ignited fires and prescribed natural fires to achieve desirable vegetative diversity and fuel profiles... Use natural fire on a limited basis under specifically prescribed conditions.
- Objective 224. Reduce or otherwise treat fuels commensurate with risks (fire occurrence), hazard (fuel flammability), and land and resource values common to the area...
- Objective 225. Manage wildfires using the appropriate suppression response (confine, contain or control) based on management area emphasis, existing values, risk of ignition and fuel hazards within a given area.

- Objective 226. Develop fuel management and protection strategies for intermixed land ownerships in partnership with private, state and other federal agencies.
- Objective 227. Manage 28,900 acres of activity fuels and 4,000 acres of natural fuels each year during the next decade, consistent with need to protect life, property and natural resources from the threat of wildfire...
- Objective 229. Using analyses of insect and disease populations, determine where suppression strategies are needed to meet management objectives...

Goal 4 – Provide for scenic quality, a range of recreational opportunities, and protection of heritage resources in response to the needs of the Black Hills National Forest visitors and local communities.

- Objective 407. Provide the following Recreation Opportunity Spectrum (ROS): Primitive, Semi-primitive non-motorized, Semi-primitive motorized, Roaded natural, Roaded natural non-motorized...
- Objective 416. Maintain and construct [motorized and non-motorized] trails...
- Objective 417. ...Develop trail facilities in cooperation with other agencies and partners.
- Objective 420. ...b. Provide recreation facilities, trailheads, trail crossings and other road corridor components to meet demand. c. Include opportunities for pedestrians and bicycle ways. d. Use cooperative opportunities for development of outdoor facilities...
- Objective 421. Provide the following road systems: Roads suitable for public use--passenger car, high clearance vehicles, [and] roads closed to vehicles...
- Objective 422. Provide the following off-road travel opportunities: All motorized travel allowed yearlong-59% [of Forest], Seasonal restrictions apply-23%, Seasonal restrictions—no off-road travel-3%, Backcountry motorized recreation on designated trails-1%, Only OHV travel prohibited-11%, Motorized travel prohibited except snowmobiles-1%, All motorized travel prohibited-1%.

Goal 7 – Emphasize cooperation with individuals, organizations and other agencies while coordinating planning and project implementation.

- Objective 701. Continue to cooperate with interested parties and organizations in the development of plans and projects.
- Objective 703. Seek partnerships with other service providers...
- Objective 706. Cooperate with federal, state, county, local and tribal governments, individuals, and organizations...

Based on the desired condition implicit in the Forest Plan goals and objectives outlined above, multiple resource management actions are needed as described below.

There is a need to reduce the potential for large-scale intense wildfire; reduce fuel loads; ensure access for fire suppression/protection; provide for a variety of motorized and non-motorized uses and travel opportunities; and provide habitat for a variety of plant and animal species.

It is necessary to break up the continuity and reduce the unnaturally high concentration of biomass in the Forest. The project area's wildland-urban interface (WUI) setting is rated as having high fire risk, high hazard, and high value - referred to as the "Red Zone". This situation

provides a compelling need to make fire and fuels hazard reduction a primary management goal in the Prairie Project area. See discussion under the Background Section.

There is also a need to resolve inherently complex and conflicting travel and recreation use issues. These issues exist due to the project area's proximity and attractiveness to users from in and around Rapid City and because Mount Rushmore and other Black Hills attractions make this a destination area for travelers/recreationists year-round.

In association with the focus to reduce fire and fuels hazard and resolve travel and recreation use issues, there is an opportunity to address other Forest Plan objectives providing for wildlife/plant habitat, forest products and other resource amenities/uses. The current Forest Plan management emphasis for the project area is principally big game winter range, resource production and late successional forest landscape.

Finally, there is a need to address the direction and guidance provided by the National Fire Plan, The 10 year Comprehensive Strategy Implementation Plan agreed to by the Western Governor's Association and others, The Healthy Forest Initiative and other goals and objectives outlined in the Black Hills Forest Plan and associated FEIS.

Proposed Action

Development of the proposed action was strongly influenced by public involvement. Modifications to the initial proposal were made in terms of scale but not approach, and focused on meeting the purpose and need. Alternatives to the proposed action, as discussed in Chapter 2 of this EIS, were developed using public involvement to provide different approaches to addressing the purpose and need. The intent was to provide a range of approaches and activities from which the public and decision maker can compare and evaluate.

The initial proposed action was presented during the scoping period (see the Public Involvement and Scoping Section discussed later in Chapter 1). This proposal was based on the purpose and need which contained four elements: 1) reduce the potential for large-scale intense wildfire, 2) reduce fuel loads, 3) provide for a variety of motorized and non-motorized uses and travel opportunities, and 4) provide habitat for a variety of plant and animal species. The purpose and need has remained the same.

During the scoping period there was strong vocal and written feedback received from the public supporting the proposal and rationale supporting actions proposed. The public voiced their deep concern about the threat of catastrophic wildfire in this urban interface setting. Many who live here and recreate here firmly support taking aggressive action to reduce fuels and wildfire hazard and the threat of catastrophic wildfire that currently exists in this area. The public is also very interested and concerned about opportunities available in the project area to recreate - specifically opportunities involving motorized and non-motorized use. There is strong demand by the public for both types of use, which often have been and continue to be in conflict.

Strong public support was given to expanding thinning and fuels treatments and to include some areas for treatment not covered initially. Of particular note was the desire on the part of many to increase vegetation treatment that would help reduce impacts of wildfire to private land and developments/subdivisions. This included adding more thinning and fuels treatments in strategically located landscape fuelbreaks, expanding enhancement (thinning out pine) of natural fuelbreaks—meadows, hardwoods, riparian areas and constructing more fuelbreaks immediately adjacent to private land.

The ID Team undertook additional fieldwork, review, and analysis seeking to make the proposed action more responsive to public comments. The ID Team concluded that by making the modifications, the proposal would more completely address the purpose and need for action regarding minimizing the potential for large-scale intense wildfire and reducing fuel loads.

In terms of non-motorized and motorized use the basic approach remains the same. That is, maintain a large percentage of the project area available to off-road motorized use during the summer-fall and reduce this use in the winter-spring to provide additional needed security for wintering wildlife. Also, provide for non-motorized recreation use and protect other resources; and to provide additional non-motorized opportunities in areas where off-road motorized use is prohibited.

Motorized users provided strong feedback advocating the desire for access through the project area that ties in with other areas on the Forest plus user initiated and maintained use opportunities such as specific use trails. In response, the ID Team realigned proposed use areas into corridors that facilitate connector routes for motorized users through the project area to other parts of the Forest instead of isolating this use in one area as initially designed.

Additional non-motorized trail opportunities were identified as desirable by advocates for that use during scoping. There was also a strong desire on the part of non-motorized users for user initiated and maintenance of restricted use trails and use areas. Additional analysis by the ID Team has generated two non-motorized trails to be developed as part of the proposed action that meet the purpose and need and would be implemented under action Alternatives B and C.

Also, opportunity for both motorized and non-motorized users to propose, sponsor, develop, and maintain special use areas has been made a component of the proposed action. This too was deemed appropriate to addressing the purpose and need - provide for a variety of motorized and non-motorized uses and travel opportunities.

The South Dakota Department of Game, Fish and Parks expressed an interest in opportunities for expanding Big Horn Sheep habitat. In response to this, the ID Team considered adding some recommended vegetation treatment areas for habitat improvement that fit with the purpose and need - providing habitat for a variety of plant and animal species. This habitat improvement proposal was made part of all action alternatives, but modified to fit the theme of the respective alternatives.

During further evaluation of the existing condition within the project area, the ID Team conducted additional detailed analysis that identified a need for soil and water resource

protection projects within the project area. Furthermore, the team identified an opportunity to improve wildlife riparian habitat by dredging and rehabilitating two small reservoirs in Victoria and Prairie Creek. The team determined that these actions were needed as normal resource protection and enhancement measures and that incorporating these projects would be compatible with the purpose and need. The soil and water resource protection measures were deemed appropriate for incorporation into all action alternatives. The reservoir rehabilitation actions would be made part of Alternatives B and C.

In summary regarding adjustments in the proposed action, the vegetative treatments are the same as initially proposed, but have expanded in area because of strong public scoping comments. And the travel and recreation use approach is the same but some areas have changed in focus in response to public feedback.

Proposed Action

Below is a brief summary of the proposed action analyzed by the ID Team and documented in this EIS. This proposal as well as the alternatives are presented in more detail in Chapter 2.

The action proposed by the Forest Service, to meet the purpose and need, is to implement multiple resource management actions that focuses on vegetation treatment to promote natural fuel breaks and constructed fuel breaks, reduce existing and activity fuels, and provide wildlife and plant habitat. The proposal also strives to address recreation/travel management issues by providing a mix of motorized and non-motorized use opportunities.

More specifically the proposal includes thinning the pine forest to a density that minimizes the probability of catastrophic wildfire occurring. It includes developing and maintaining natural and constructed fuel breaks by removing pine from hardwood stands such as aspen, bur oak and birch and expanding or creating meadows. Actions also include reducing the amount of fuel that currently exists and fuel created by vegetation treatment activities. Treatment techniques could include lopping, chipping, crushing, piling and burning; thinning to provide about 30 miles of fuel breaks adjacent to private property, particularly those properties with houses and subdivisions; and prescribed burning of about 4,200 acres to reduce fuels and provide wildlife habitat. Big game winter range would be improved by providing openings for forage and protecting game animals during the critical winter period over a large portion of the area by expanding area closures to off-road motorized use. The proposed action would thin about 11,700 acres of vegetation within the project area. A variety of tools may be applied through the use of timber sale contracts, stewardship contracts, service contracts, and Forest Service crews. Thinning trees would reduce the potential for spreading crown fires by breaking up vegetation continuity, thus establishing fuel breaks, lessening the risk from insects and disease, improving stand growth and vigor, and providing wood-fiber products for the local economy.

The proposed action provides for a mix of motorized and non-motorized use in the area by designating some areas for off-road ATV/4-wheeler or motorbike use and other areas for non-motorized uses such as hiking, mountain biking and walk-in hunting. This action provides this mix of recreation and travel choices through the establishment of core use corridors. These core

use areas are characterized mainly by their dispersed recreation and travel use opportunities--namely whether they are available for motorized use, non-motorized use or a combination of these uses.

In association with the fire and fuels hazard reduction of this proposed action, treatment actions would provide for wildlife/plant habitat and forest products as guided by the Forest Plan and other directives.

Decision Framework

The Prairie Project purpose and need provides the focus and scope of the proposal as related to the programmatic goals of the Forest Plan as amended by the Phase I Amendment, the policy and direction provided by National level guidance from the National Fire Plan, The Presidents Healthy Forest Initiative, other National level policy. Given the purpose and need, the Deciding Official (Forest Supervisor) reviews the proposed action, the issues identified during scoping, the alternatives, the environmental consequences of implementing the proposal and alternatives, and public comments on the Draft EIS. This forms the basis for the Deciding Official to make the following determinations:

- Whether or not the proposed activities and alternatives address the issues, are responsive to National policy/guidance and Forest Plan direction, and meet the purpose of and need for action in the Prairie Project area.
- Whether or not the information in this analysis is sufficient to implement proposed activities.
- Which actions, if any, to approve (decide which alternative or combination of alternatives to implement).
- Whether there is a need for amendments to existing Forest Plan.

If any action alternative is selected, project implementation could begin in the Fall 2003 and most actions would be accomplished within a decade. Certain actions (such as fuel break maintenance) could last into the foreseeable future.

Public Involvement and Scoping

Scoping is the process of obtaining public comments about proposed federal actions to determine the breadth of issues to be addressed.

Comments on the proposed action, potential concerns, and opportunities for managing the Prairie Project Area were solicited from members of the public, other public agencies, adjacent property

owners, organizations and Forest Service specialists. Various methods were used to request comments including:

- The Notice of Intent (NOI) to prepare an EIS published in the *Federal Register* on Friday July 12, 2002. The NOI asked for public comment on the proposal through August 19, 2002.
- A prominent article in the Rapid City Journal on July 13, 2002. This article introduced the project to the public readership by providing a description of the project area and an explanation of the proposal as well as soliciting comments on the project.
- A scoping letter was mailed to approximately 1,400 interested parties, including adjacent property owners on July 2, 2002. This letter included a description of the project area, an overview of the NEPA process, a general explanation of the proposed actions, and an invitation to comment.
- Two Open Houses were held. The first occurred on July 25, 2002 at the Johnson Siding Community Club; approximately 200 people attended. The second occurred on July 30, 2002 at the Whispering Pines Volunteer Fire Department; approximately 50 people attended. At both events, presentations were made describing the proposal, questions were asked and answered, and public comments specific to proposed activities were solicited and accepted.
- A Revised NOI was published in the *Federal Register* on May 16, 2003, identifying changes made to the proposed action since the original NOI was published. Adjustments were made in response to overwhelming public feedback asking the agency to be more aggressive in minimizing the potential for catastrophic wildfire by expanding proposed fuels reduction and vegetation treatments.
- Other information sharing, communication and interaction with interested parties, agencies and individuals has occurred on a continuing basis during the project planning period.

Issues

Comments received during the scoping process were used to help in defining issues, develop alternatives and mitigation measures, and analyze effects. A total of 157 commentors provided feedback via letters, faxes, public meeting transcripts, hand-delivery, or email during the formal scoping process. Through review and analysis of the scoping comments and input received, the Prairie Project Area ID Team identified five (5) prevailing or key issues related to the proposed activities. Comments received and the agency response to comments are summarized in the Prairie Project File (Project File) located at the Mystic Ranger District, Rapid City office.

The key issues represent those needing special emphasis. These issues received the most public and internal specialist attention during the scoping period. In some cases they represent unresolved conflicts regarding the proposed action. Key issues identified are also characterized by the need to address a broad based internal or external resource management concern, the need to meet National and Forest level direction, and the desire to address the purpose of and need for action within the Prairie Project Area. A brief description of the five key issues follows:

Fuel and Fire Hazard Reduction.

Wildfire hazard, the need to reduce fuels, and the potential for catastrophic wildfire are currently of foremost concern with the public and the agency in this area. These issues have understandably been elevated to a higher level of concern with the local public given the massive wildfires that have been experienced recently throughout the West, and certainly within the Black Hills. The prevailing public attitude, and that of local, State, and Federal elected officials, is that the Forest Service is not doing enough to address fire and fuels risks on National Forest lands. This point of view is supported and amplified at the National Level through a series of initiatives and streamlining of processes related to fuel and fire hazard reduction.

The fuel and fire hazard reduction issue is a major focus of the Prairie Project. The importance of addressing this issue is magnified by the fact that the project area is located in a wildland urban interface (WUI) setting that contains several communities at risk (CARs). Furthermore, this entire project area lies within a heavily forested ponderosa pine fire-adapted ecosystem. The issue will be approached by emphasizing that wildfire in this setting cannot be eliminated. But by deliberately managing vegetation and fuels, reduced potential for catastrophic wildfires can be realized.

Comments and feedback during the public involvement phase of the project indicates that there is significant broad public support for dealing with fuel and fire hazard reduction using active management practices including prescribed burning and commercial and non-commercial mechanical tree thinning. One commentor advocated that no active management be used to deal with the fuels buildup and associated potential for wildfire. Instead of active management, the commentor proposed allowing natural processes such as insect infestations, storm damage and natural wildfires to naturally thin stands of trees.

The parameters listed below are measurement indicators for the multiple aspects of the fuel and fire hazard reduction issue in the Prairie Project Area. These indicators are representative of a number of variables associated with fuels and fire hazard reduction. Public concern about risk, health and safety relative to catastrophic wildfire are of paramount importance and implicitly considered and represented in these measurement indicators. These measurement indicators are intended to provide the public and decision maker a basis for making a relative comparison between alternative resolutions regarding fuels and fire hazard reduction. A comparison between alternatives is displayed in table format at the end of chapter 2 (see Table 2-1). Also, a narrative description of the comparative differences in effects is presented briefly in the Comparison of Alternatives section in Chapter 2 and in more detail under the Fire and Fuels section in Chapter 3 of this EIS.

- Crown Fire Hazard Rating*—(acres now/acres in 20 years)
- Tree Thinning—landscape fuel breaks (acres)
- Fuel Breaks—constructed along private land (miles)
- Fuels Breaks—hardwoods/meadows (acres)
- Storm Damage Treatment (acres)
- Prescribed Burning (acres)
- Accessibility for fire suppression (best to worst)

Prescribed Fire.

Prescribed fire can be an effective tool to reduce fuels and contribute to wildlife habitat. The public generally supports the use of prescribed burning, but some have concerns about the threat of an escaped fire, especially within this populated wildland urban interface area. Also, the Agency is always concerned about controlling the timing and amount of smoke from prescribed fire to limit potential health effects and nuisance caused by the smoke.

At least one commentor was concerned that areas first be treated mechanically to remove much of the existing fuels prior to using prescribed fire. Another commentor indicated that prescribed burning has positive effects on wildlife habitat that might not be attained using mechanical treatments alone, and wanted to ensure therefore that prescribed fire be included in the treatments. Another commentor suggested that prescribed burning could be used to limit the amount of regeneration of pine trees and thereby limit future tree density. One commentor suggested using only prescribed burning, with no mechanical treatments, in order to re-establish natural fuel breaks.

The parameters listed below are measurement indicators for the multiple aspects of the prescribed fire issue in the Prairie Project Area. These indicators are representative of a compilation of many variables associated with conducting prescribed burning. Concerns for risk, health and safety regarding prescribed burning are key considerations and implicitly considered and addressed in these measurement indicators. These indicators are intended to provide the public and decision maker a basis for making a relative comparison between alternative resolutions regarding prescribed burning. A comparison between alternatives is displayed in table format at the end of chapter 2 (see Table 2-1). Also, a narrative description of the comparative differences in effects is presented in the Comparison of Alternatives section in Chapter 2 and in the Prescribed Fire section in Chapter 3 of this EIS.

- Burn Complexity*— (Acres)
- Burn Days Required (Days)
- Prescribed Burn Area (Acres)

Travel and Recreation Use.

This issue is largely focused on recreational opportunities for road and off-road motorized travel and use. The issue has a wider divergence of strongly held opinion than any of the other key issues. It was made very evident during the public involvement phase of this project that public desires regarding their recreation and travel use of the project area are diverse and often in conflict. Motorized travel access is a surrogate measure for many people as to whether or not they can enjoy their favorite recreational activities such as hunting, fishing, or sight seeing. And for many, driving an ATV, motorbike, or 4-wheel drive is the actual recreation or sporting use that they desire. A large number of commentors want to have motorized travel access both on and off-road throughout the majority of the project area. Many of these commentors feel that motorized travel access is an important part of their recreation experience and it is why they enjoy living and playing in the Black Hills. Many others, however, want more areas limited to

non-motorized use only. Those that support this position desire a quieter, more natural setting where they can hike, ride mountain bikes, or enjoy walk-in hunting or fishing. Some also feel that there is too much rutting, littering, and other negative effects associated with wide scale off-road motorized use by ATV's and 4-wheel drive trucks.

The parameters listed below are measurement indicators for the multiple aspects of the travel and recreation use issue. These indicators are intended to provide the public and decision maker a basis for making a relative comparison between alternative resolutions regarding travel and access for recreation purposes. A comparison between alternatives is displayed in table format at the end of chapter 2 (see Table 2-1). Also, a written description of the comparative differences in effects is presented in the Comparison of Alternatives section in Chapter 2 and in the Travel and Recreation Use section in Chapter 3 of this EIS.

- Total Miles of Roads and Motorized Trails
- Miles of Roads and Motorized Trails Open Winter-Spring (Dec 15-May 15) to Motorized Use
- Miles of Roads and Motorized Trails Open Summer-Fall (May 15-Dec 15) to Motorized Use
- Percent of the Area Open Winter-Spring (Dec 15-May 15) to Off-Road Motorized Use
- Percent of the Area Open Summer-Fall (May 15-Dec 15) to Off-Road Motorized Use
- Miles of Non-Motorized Trails

Wildlife Habitat

This issue did not receive as wide scale of public comments as some other key issues. To some respondents, however, wildlife habitat related issues are an important concern. This includes providing for big game winter range forage and security needs within Management Area 5.4, protecting and expanding hardwoods, eliminating pine encroachment from meadows, protecting late successional (older trees) habitat, especially in Management Area 3.7, and generally providing for a variety of habitats and associated species. At least one commentor expressed strong support for prescribed burning to enhance and maintain wildlife habitat. One commentor proposed that only natural processes such as insects, disease and wildfire be used to create and maintain wildlife habitat.

Generally speaking, there is public support for wildlife habitat even though many did not list this as a key concern. There is a significant issue, however, related to the tradeoff between public motorized use and wildlife habitat security. Some commentors expressed a strong need to limit motorized use in order to limit negative effects on big game and other wildlife species. Other commentors feel strongly that motorized use should not be limited and do not necessarily agree that such use negatively affects wildlife. See the Travel management issue for more discussion on motorized use.

Measurement indicators are listed below for the varied aspects of the wildlife habitat issue. These indicators are represented by wildlife habitat components applicable to the Black Hills NF

as specified in the Forest Plan. The components selected are representative of the broad range and condition of wildlife habitat existing in the Prairie Project Area. Thus, as measurement indicators, these habitat components can provide the public and decision maker a basis for making a relative comparison between alternative resolutions regarding wildlife habitat. A comparison between alternatives is displayed in table format at the end of chapter 2 (see Table 2-1). Also, a written description of the comparative differences in effects is presented in the

Comparison of Alternatives section in Chapter 2 and in the Wildlife Habitat section in Chapter 3 of this EIS. The Wildlife Habitat Components are as follows:

- Ponderosa Pine Structural Diversity (Best to Poor)
- Aspen/Oak/Meadow Communities (Best to Poor)
- Riparian Area Condition (Best to Poor)
- Water Quality (Best to Poor)
- In-stream Fisheries Habitat (Best to Poor)
- Snag Conditions (Best to Poor)
- Dead and Down Woody Material (Best to Poor)
- Open Road Density (Best to Poor)

Socio-economic Concerns

The project area lies within the wildland-urban interface (WUI) and contains five communities at risk (CAR). The many people who live within and adjacent to the project area strongly value its forested setting and the experiences and lifestyle associated with this environment. People are concerned about property values and their health and safety as related to the potential threat of catastrophic large-scale wildfire in this area. There was a remarkable expression of urgency and expectation by locals participating during the public involvement period. They clearly felt that the agency should act quickly and do something significant and effective to safeguard their well-being and the resource amenities from the potential impacts of catastrophic wildfire.

The local public strongly supports using multiple management tools (including commercial timber harvest) to reduce the potential for large-scale wildfire. Generally, this support is based on the belief that commercial harvest utilizes a renewable resource and provides a needed commodity, employs local residents, adds favorably to the local and State economy, is environmentally acceptable, and can make a significant difference in quickly and effectively reducing wildfire potential.

It was also evident from public feedback that some recognize that commercial harvest provides revenues to help accomplish non-commercial fuels reduction activities such as prescribed burning and mechanical thinning of small diameter trees. Without such funding, all prescribed burning and mechanical thinning of small trees will require direct funding (appropriated tax dollars) that may or may not be available within the specified time period.

One commentor objected to the use of commercial timber harvest as a tool to reduce fire hazard. This commentor prefers an approach of either no active management, or the use of prescribed

burning as the only fuels reduction tool. Generally, support for this approach is based on a belief that commercial timber harvest has negative environmental effects, could actually increase wildfire potential, and is not warranted from an economic perspective.

The parameters listed below are measurement indicators for the various aspects of this socio/economic issue. These indicators are intended to provide the public and decision maker a basis for making a relative comparison between alternative resolutions regarding the social and economic concerns as related to the proposal and fuel/fire hazard conditions in the area. A comparison between alternatives is displayed in table format at the end of chapter 2 (see Table 2-1). Also, a written description of the comparative differences in effects is presented in the Comparison of Alternatives section in Chapter 2 and in the Socio-economic section in Chapter 3 of this EIS.

- Total Cost (millions)
- Total Revenues (millions)
- Cost-Benefit Ratio
- Funding Certainty (low to high)
- Commercial Timber Volume Harvested
- Cooperative efforts with State, County, other groups and individuals (low to high level)
- Wildfire Hazard Reduction (Effectiveness of safeguarding the health, values and lifestyle of local residents and Forest users by reducing wildfire hazard.)

CHAPTER 2 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

INTRODUCTION

This chapter provides a detailed description of the proposed action (Alternative C), and two other action alternatives (Alternatives B and D), as well as a No Action alternative (Alternative A) for the Prairie Project Area (lower Rapid Creek Area). Maps of each alternative considered in detail are located in Appendix E of this EIS.

This chapter presents the alternatives comparatively by both defining and displaying the quantitative and qualitative differences between each alternative. The intent is to provide the public and decision maker a basis for choice among management options when considering the environmental consequences (effects) of implementing each alternative as disclosed in Chapter 3 of this EIS.

There is a brief overview of those alternatives that were considered by the ID Team but eliminated from detailed development and study. The last section of the chapter contains two comparative tabular summaries that describe each alternative and display the quantitative and/or qualitative effects of implementing each alternative relative to the key issues presented in Chapter 1.

ALTERNATIVES CONSIDERED IN DETAIL

This section provides a summary of activities that are planned to occur during implementation of any of the alternatives. It is important to note that the amount (e.g., acres, miles, etc.) of a particular activity in any alternative is approximate (based on inventory and survey estimates). Actual figures may increase or decrease somewhat during “on-the-ground” preparation of the project based on such things as non-uniform fuels regime or stand structure, small inclusions of inoperable terrain, refinement of length or standard of road needed or eliminated, etc. Also, described under applicable alternatives are any Forest Plan amendments considered potentially necessary to fully implement a given alternative. The determination of need for any specific amendment will be made in the Record of Decision.

Alternative A - No Action

The National Environmental Policy Act (NEPA) requires the study of the No Action Alternative and to use it as a basis for comparing the effects of the proposed action and other alternatives.

The No Action Alternative assumes no implementation of any elements of the proposed action or other action alternatives would take place within the Prairie Project Area within the next 10 to 15 years. However, ongoing Forest protection efforts and recurring road maintenance on system roads would continue as directed by the Forest Plan.

This alternative represents no attempt to actively respond to the purpose and need for action or the issues raised during scoping for this project. There would be no effort to modify existing vegetation or related fuels conditions in the project area. Vegetative structure would continue to evolve over time through growth, mortality and other natural events (e.g., wildfire, storm damage, insect and disease outbreaks). Treatment of noxious weeds would continue, as well as active fire suppression. Resource uses such as recreation and livestock grazing would continue. Meadows and hardwood stands would become further encroached by pine, and disappear completely in the next several decades unless an event such as wildfire or future vegetation treatment maintains or restores these communities. No changes to roads, access and travel management would occur.

The theme of this alternative would be to delay or defer management actions intended to move resource conditions toward meeting National policy and direction relative to fire hazard and fuels reduction as well as Forest Plan goals and objectives within the Prairie Project area. This alternative is specifically characterized by:

- No fire hazard/fuels reduction treatments beyond current small-scale efforts.
- No prescribed burning.
- Maintain evolving wildlife habitat conditions.
- Vegetative treatments limited to such things as hazard tree removal, vegetation removal for special use needs (powerline right-of ways, highways).
- No changes to roads, access, and travel management.
- Continue routine maintenance of roads and road improvements.
- Total roads – 292 miles
- Roads and trails open to motorized use (Dec 15 – May 15) – 173 miles
- Roads and trails open to motorized use (May 15 – Dec 15) – 219 miles
- Area Open to off-road motorized use (Dec 15 – May 15) – 76%
- Area Open to off-road motorized use (May 15 – Dec 15) – 76%
- Non-motorized Trails – 11 miles

Alternative B

This alternative emphasizes a non-commercial vegetation treatment approach to addressing the purpose and need--which is keyed to fire hazard and fuels reduction. Alternative B was developed in response to the view expressed by some during scoping that fire hazard and fuels reduction can be accomplished with limited or no use of extensive commercial timber harvest. Furthermore this alternative addresses the desire on the part of individuals and groups that feel non-motorized recreational use and travel should be emphasized in the project area.

Use of commercial timber harvest as a tool to reduce fire hazard and fuels would be limited to certain fuel breaks to be constructed around private land. About 553 acres of fuel break are planned for construction around private land. Commercial timber harvest would be applied in fuel break construction on 346 of these acres where there is existing access. Another 6 acres of commercial thinning would take place at Pactola Work Center to help achieve fuels reduction objectives in and around this development. There is no new road construction planned. Fuel

breaks would average about 200' in width from private land boundaries. Adjacent landowners would be encouraged to address fire hazard/fuel reduction needs on their lands.

This alternative emphasizes the extensive use of prescribed fire and non-commercial thinning as alternatives to using commercial timber harvest to address fire hazard and fuels reduction in the project area. Approximately 7,502 acres are planned for prescribed burning with the primary goal of reducing surface fuels loads and ladder fuels. Prescribed fire would also help retain meadows and hardwoods, by killing young invading conifers. Meadows and hardwoods function as natural fuel breaks and thus are planned for burning and thinning treatment to enhance their ability to moderate wildfire and concurrently provide for wildlife habitat. About 6,958 acres of non-commercial thinning along with slash treatment would occur. Limiting regeneration densities and maintaining low fuel accumulations after initial treatment and into the future is planned in fuelbreaks and throughout the vegetation treatment area. This is necessary in order to maintain the break up in fuel continuity accomplished with treatment.

This alternative recognizes that the project area contains communities at risk (CARs) that lie within the wildland-urban interface. Consequently it emphasizes the need for continued and close collaboration with local entities such as Volunteer Fire Departments, State Division of Wildland Fire, County Fire Coordinator, subdivision representatives and landowners in order to successfully implement this alternative (including development or support and improvement of existing evacuation plans).

The alternative recreation/travel management theme emphasizes non-motorized use. No off-road motorized vehicle use is planned in about 80 percent of the project area. Travel management is characterized by considerable road and area closures in support of the non-motorized use experience. In the non-motorized area nearly all level 1 (low standard) roads and unclassified roads would be decommissioned (obliterated by making impassable) over the next 10 years. These roads would be converted to hiking/biking trails where appropriate. Private land access and special use access needs would be maintained. With the emphasis on dispersed non-motorized recreation, additional trails and trailhead facilities would be developed or expanded and maintained.

See Table 2-1 and Table 2-2 at the end of this chapter for a comparison of alternatives. Appendix E, Maps 4 through 21 display the location of vegetation treatments, fuels reduction and prescribed fire activities, and travel management. Mitigation and monitoring specific to this alternative are described in Appendix B and C. Some specific actions planned and treatment activities in Alternative B include:

Commercial Harvest Treatment (352 acres)

- Fuel breaks - 346 acres.
- Special cut (Pactola Work Center) - 6 acres.
- Thinning – None.
- Overstory Removal – None.
- Hardwoods (Pine removal) – None.
- Meadows (Pine removal) – None.
- Patch cuts – None.

Non-commercial Treatment (6,958 acres)

- Fuel breaks – 553 acres.
- Special cut (Pactola Work Center) – 6 acres.
- Thinning – 4,715 acres.
- Hardwoods (Pine removal) – 919 acres.
- Meadows (Pine removal) – 680 acres.
- Patch cuts – 85 acres.

Total area of commercial and non-commercial treatment (6,958 acres¹)

¹Area total not additive due to some treatment area overlap.

Volume of timber and other products removed

- Volume of sawtimber removed – 1,312 MBF (2,600 CCF).
- Volume of products (pole timber) removed – 476 CCF.

Other Fuels Treatment

- Prescribed burning – 7,502 acres.
- Storm damage fuels treatment – 965 acres.

Road work

- New road construction – None.
- Road reconstruction – 6.7 miles.
- Pre-use maintenance – 11 miles.
- Roads decommissioned – 59.1 miles

Travel and Recreation Use

- Total roads – 206 miles
- Roads and trails open to motorized use (Dec 15 – May 15) – 128 miles
- Roads and trails open to motorized use (May 15 – Dec 15) – 128 miles
- Area Open to off-road motorized use (Dec 15 – May 15) – 18%
- Area Open to off-road motorized use (May 15 – Dec 15) – 18%
- Non-motorized Trails – 49 miles

During analysis the ID Team identified the potential need for site-specific Forest Plan amendments to fully implement this alternative. The effects of implementing each alternative is presented in Chapter 3. The following is a brief description of the situation that would require an amendment:

- Goshawk. Portions of certain goshawk post fledgling areas (PFAs) are planned for harvest treatment under Alternative B. This action is not consistent with Forest Plan Guideline 3114 (to be treated as a Standard) because mid-aged forest stands with

moderate to high canopy closures (VSS 450 and/or VSS 460) are being treated in two PFAs. Treating these sites to address fuel and fire hazard reduction needs adjacent to private land and near a National Forest developed site requires a site-specific Forest Plan amendment.

- MA 3.7. Commercial treatment of landscape scale Management Area 3.7 is planned in Alternative B: Specific treatment planned is to create fuel breaks along private land to address fire and fuels objectives. This is not considered consistent with Forest Plan Guideline 3.7-2103 which states “timber harvest may be used if necessary to move stands toward late successional conditions.”

Alternative C - Proposed Action

Alternative C was developed in response to the purpose and need and comprises the proposed action (See description of the purpose and need plus the proposed action in Chapter 1 of this EIS). Alternative C is designed to aggressively treat the forest vegetation to address the fire hazard and fuels reduction needs that exist in the Prairie Project Area, provide a balance between motorized and non-motorized recreation opportunities, and to provide wildlife habitat, big game winter range forage and security.

Refinement of this action occurred as a result of input received from the public during the scoping phase of the project. There was overwhelming public response and support for treating vegetation and fuels to reduce wildfire hazard in the project area. Also, this action has been proposed, developed and refined in response to recent National direction developed to support efforts to reduce the potential for catastrophic wildfire in fire-adapted ecosystems (e.g., ponderosa pine) particularly near communities at risk and in the wildland-urban interface. The Prairie Project Area fits that description and condition disturbingly well. See the Background section in Chapter 1 for a detailed overview of the situation and conditions that contributed to the development of the proposed action. This alternative also accomplishes multiple Forest Plan objectives such as providing commodity production. However, achieving such objectives is not the primary focus of this alternative, it is a co-product of the effort to treat vegetation that reduces fuels and fire hazard.

This alternative recognizes that because the project area includes communities at risk to catastrophic wildfire, an aggressive approach using multiple vegetation management tools is needed to reduce fuels and fire hazard. The scope of vegetation treatment under this alternative may require site-specific Forest Plan amendments, particularly in management areas where the Forest Plan emphasizes wildlife habitat management (MA5.4)--about two thirds of the project area. For example, this alternative would thin the Forest in specific (strategically located) areas to create natural fuel breaks. Such an action may require thinning the Forest to a wider tree spacing--beyond what is needed for habitat per the Forest Plan for some wildlife species. This is a trade-off, in order to meet the purpose and need regarding fire hazard and fuels reduction objectives.

Vegetation management in this alternative is characterized by a number of specific treatments. There would be commercial timber harvest (estimated 8,889 acres) which thins the forest with the objective of providing landscape wide natural fuel breaks. Harvest would be achieved

primarily with mechanical means. There would be considerable non-commercial thinning (estimated 8,773 acres) also driven by natural fuel break objectives. Natural fuel breaks such as meadows and hardwoods would be treated to enhance their ability to moderate wildfire and concurrently provide for wildlife habitat. Natural fuel breaks that are landscape in scale would be prevalent and constructed fuel breaks (estimated 692 acres) primarily around private land will be a minimum of 200 feet in width. Limiting regeneration densities and maintaining low fuel accumulations after initial treatment and into the future is planned in fuelbreaks and throughout the vegetation treatment areas.

The overall objective for fuel break development and maintenance is to break up the continuity and reduce the unnaturally high concentrations of biomass present in the Prairie Project Area. This in turn serves to minimize the wildfire threat to human life/safety and surrounding property values. Considerable prescribed burning (4,224 acres) to reduce fuels and enhance natural fuel breaks is planned in this alternative. Prescribed burning also helps maintain decreased vegetation and fuels densities. Small areas of dense stands would remain on the landscape primarily as a benefit to some wildlife species--but they would be separated by fuel breaks. Of paramount importance in this alternative, as with all action alternatives, is the concerted effort that would be made to ensure continued and close collaboration with local entities such as Volunteer Fire Departments, State Division of Wildland Fire, County Fire Coordinator, subdivision representatives and landowners in order to successfully implement this alternative (including development or support and improvement of existing evacuation plans).

Another aspect of Alternative C was developed and refined in response to the issues and public comments regarding conflicting recreation and travel uses in the project area. This alternative recognizes the broad spectrum of recreation related uses and associated travel that people prefer within the Prairie Project Area. Alternative C provides a range of recreation and travel choices by establishing “core use” corridors. These use corridors are characterized by three basic recreation use and travel opportunities:

- Open year-round with on and off road motorized use emphasis in the northern portion of the project area (generally north of Highway 44).
- Closed year-round to off-road motorized use (travel on designated routes only) with non-motorized use emphasis in the central portion of the project area along the Rapid Creek corridor.
- Seasonal area closure to off-road motorized use during the winter-spring (Dec 15 – May 15), with limited roads open during this time period. Applies to the southern portion of Project Area and is intended to provide for big game winter range. More roads are open and area is open to off-road motorized during the summer-fall (May 15 – Dec 15).

See Table 2-1 and Table 2-2 at the end of this chapter for a comparison of alternatives. Appendix E, Maps 4 through 21 display the location of vegetation treatments, fuels reduction and prescribed fire activities, and travel management. Design criteria, mitigation and monitoring specific to this

alternative are described in Appendix B and C. Specific actions planned and treatment activities in Alternative C include:

Commercial Harvest Treatment (8,889 acres)

- Fuel breaks – 485 acres.
- Special cut (Pactola Work Center) – 6 acres.
- Thinning – 6,982 acres.
- Overstory Removal – 602 acres.
- Hardwoods (Pine removal) – 480 acres.
- Meadows (Pine removal) – 258 acres.
- Patch cuts – 76 acres.

Non-commercial Treatment (8,773 acres)

- Fuel breaks – 692 acres.
- Special cut (Pactola Work Center) – 6 acres.
- Thinning – 6,252 acres.
- Hardwoods (Pine removal) – 959 acres.
- Meadows (Pine removal) – 779 acres.
- Patch cuts – 85 acres.

Total area of commercial and non-commercial treatment (11,881 acres¹)

¹Area total not additive due to some treatment area overlap.

Volume of timber and other products removed

- Volume of sawtimber removed – 30,435 MBF (60,048 CCF).
- Volume of products (pole timber) removed – 14,133 CCF.

Other Fuels Treatment

- Prescribed burning – 4,224 acres.
- Storm damage fuels treatment – 965 acres.

Road work

- New road construction – 3.1 miles.
- Road reconstruction – 22.8 miles.
- Pre-use maintenance – 45.2 miles.
- Roads decommissioned – 50.4 miles

Travel and Recreation Use

- Total roads – 233 miles

- Roads and trails open to motorized use (Dec 15 – May 15) – 172 miles
- Roads and trails open to motorized use (May 15 – Dec 15) – 186 miles
- Area Open to off-road motorized use (Dec 15 – May 15) – 29%
- Area Open to off-road motorized use (May 15 – Dec 15) – 68%
- Non-motorized Trails – 33 miles

During analysis the ID Team identified the need for several site-specific Forest Plan amendments to fully implement this alternative. The effects of implementing each alternative is presented in Chapter 3. The following is a brief description of the situation that would require an amendment:

- MA 3.7. Commercial treatment of landscape scale Management Area 3.7 and scattered late successional stands to meet fire and fuels reduction needs is planned for in Alternative C. Fuel break construction is planned adjacent to private land development and along a private access corridor through this area. This is not considered consistent with Forest Plan Guideline 3.7-2103 which states “timber harvest may be used if necessary to move stands toward late successional conditions.”
- Goshawk. Alternative C may not meet Standard 3109 because some stands of lesser quality, rather than those “best suited for nesting habitat” were identified as nest stands in the Pactola Work Center (PWC) territory. Vegetation thinning including fuel break construction is planned in this alternative to reduce the potential wildfire threat to the Pactola Work Center and nearby private land. Those stands best suited for nesting habitat are proposed for treatment in Alternative C to meet fuels and fire hazard reduction objectives. Selection of lesser quality stands as nest stands is considered inconsistent with meeting Standard 3109, although the PWC territory is considered a potential territory, and no known nests or nest stands have been identified.
- Goshawk. Actions proposed in Alternative C in the PWC potential territory are not considered consistent with Forest Plan Guidelines 3110 and 3112, for reasons discussed above in relation to Standard 3109.
- Goshawk. Alternative C is not consistent with Guideline 3114 because VSS 450 and/or 460 (structural stages) are treated to meet fire and fuels objectives in three goshawk territories. See discussion under Alternative B.
- Screening Cover. Alternative C is not consistent with Forest Plan Guideline 3203, since planned treatments do not maintain the current level of screening cover along arterial and collector roads. This alternative treats these sites to reduce potential wildfire threat to ingress/egress needs.
- Thermal Cover. Harvesting thermal cover in MA 5.4 is planned in Alternative C. The MA 5.4 portion of the project area does not currently meet the thermal cover Objective 5.4-205 and thus is inconsistent with thermal cover Guideline 5.4-2101. Thinning stands considered thermal cover or potential thermal cover are planned to accomplish the fire/fuels hazard reduction objectives in this alternative.
- MA 3.7. Off-road motorized travel is planned in Alternative C through portions of MA 3.7. This is inconsistent with Forest Plan direction which prohibits off-road motorized travel in Management Area 3.7. See the Travel and Recreation Use section in Chapter 3 for further discussion.

Alternative D

This alternative focuses on reduction of fuels and fire hazard along with management of other resource needs within the scope and direction of the Forest Plan as amended. The alternative is designed to address the purpose and need emphasizing fire and fuels reduction along with providing wildlife habitat and commodity production in accordance with Forest Plan standards and guidelines.

Multiple vegetation management tools would be used to implement this alternative. Commercial thinning (4,086 acres) planned for this alternative would be done at a level that conforms to growth and yield objectives for commercial timber products. Vegetation would be thinned and fuels reduced to a lesser extent than under Alternative C. Non-commercial thinning would occur on 6,338 acres.

No broadcast prescribed burning is planned in this alternative. Fuels reduction and maintenance would be accomplished through mechanical means such as crushing, chipping and spreading, slashing, piling followed by pile burning, and/or removal from the site.

Landscape size natural fuel breaks are not specifically planned. However, to the extent vegetative thinning occurs and the forest is opened up a level of fuel and fire hazard reduction is achieved. Natural fuel breaks such as meadows and hardwoods would be treated to enhance their ability to moderate wildfire and concurrently provide for wildlife habitat. Constructed fuel breaks along private land would average about 200 feet wide. Limiting regeneration densities and maintaining low fuel accumulations after initial treatment and into the future is planned per Forest Plan direction. As with the other action alternatives, a concerted effort would be made to ensure continued and close coordination and collaboration with adjacent landowners along with local, state and other agencies/groups necessary to successfully implement this alternative.

Recreation use and travel management would be guided by current Forest Plan guidelines. On and off-road travel is designed to meet Forest Plan Management Area guidelines. There are two main travel management features to this alternative - many roads and a large portion of the project area would be closed to off-road motorized use during the winter-spring (Dec 15 – May 15) to provide for big game winter range, and some existing yearlong area closures would be open for off-road motorized use during the summer-fall (May 15 – Dec 15).

See Table 2-1 and Table 2-2 at the end of this chapter for a comparison of alternatives. Appendix E, Maps 4 through 21 display the location of vegetation treatments, fuels reduction activities, and travel management. Mitigation and monitoring specific to this alternative are described in Appendix B and C. Specific actions planned and treatment activities in Alternative D include:

Commercial Harvest Treatment (4,086 acres)

- Fuel breaks – 366 acres.
- Special cut (Pactola Work Center) – 6 acres.
- Thinning – 2,041 acres.

- Overstory Removal – 972 acres.
- Hardwoods (Pine removal) – 446 acres.
- Meadows (Pine removal) – 211 acres.
- Patch cuts – 44 acres.

Non-commercial Treatment (7,112 acres)

- Fuel breaks – 505 acres.
- Special cut (Pactola Work Center) – 6 acres.
- Thinning – 4,177 acres.
- Hardwoods (Pine removal) – 926 acres.
- Meadows (Pine removal) – 680 acres.
- Patch cuts – 44 acres.

Total area of commercial and non-commercial treatment (7,112 acres¹)

¹Area total not additive due to some treatment area overlap.

Volume of timber and other products removed

- Volume of sawtimber removed – 10,424 MBF (21,726 CCF).
- Volume of products (pole timber) removed – 5,566 CCF.

Other Fuels Treatment

- Prescribed burning – None.
- Storm damage fuels treatment – 965 acres.

Road work

- New road construction – 1.3 miles.
- Road reconstruction – 18.3 miles.
- Pre-use maintenance – 42.1 miles.
- Roads decommissioned – 55.4 miles

Travel and Recreation Use

- Total roads – 230 miles
- Roads and trails open to motorized use (Dec 15 – May 15) – 131 miles
- Roads and trails open to motorized use (May 15 – Dec 15) – 191 miles
- Area Open to off-road motorized use (Dec 15 – May 15) – 18%
- Area Open to off-road motorized use (May 15 – Dec 15) – 85%
- Non-motorized Trails – 20 miles

ACTIVITIES COMMON TO ALL ACTION ALTERNATIVES

The following is a description of specific actions planned that are common to all alternatives (with some exceptions) both in terms of type of action and amount or size.

Watershed Projects

During the watershed fieldwork for the Prairie Project Area, sites were identified that needed attention from a watershed/soils perspective. On some locations identified there is ongoing degradation of water quality, generally via connected disturbed areas (CDAs), while on other sites soil productivity is being affected by erosion of soil off of the hillside and depositing it on an upland site. A total of 46 watershed projects that eliminate 26 CDAs are planned under all action alternatives. Specific project descriptions and specifications are contained in the Watershed Report held in the Project File.

Recreation Projects

The following recreation trail projects are planned for implementation under two action alternatives. More specific project descriptions and specifications are contained in the Recreation Report held in the Project File. These projects only apply to Alternative B and C. The project was not made part of Alternative D because a portion of the Buzzard's Roost area would be open to off-road motorized use during the summer-fall.

Buzzard Roost Trail System – This non-motorized trail system is planned for construction and reconstruction extending about 4.4 miles in a circular type single-track trail located on the south side of Highway 44 around the Buzzards Roost area. Individuals and groups of non-motorized users would be afforded the opportunity to finance and/or provide support for any future needs. Appendix E, Maps 19 and 20 displays the location of this planned trail.

Crouch Line Railroad Trail System – This non-motorized trail system is planned to be a 6.1-mile loop trail using a segment of the old railroad grade. The trail would start at and connect with the Centennial Trail in the Pactola Basin below Pactola Reservoir. An estimated 5 to 6 walking/trestle type bridges are needed to cross Rapid Creek on the existing railroad grade. Construction would require support from the State of South Dakota Department of Game, Fish and Parks, Rails to Trails Program. Maintenance, support and/or funding would also be needed from local non-motorized groups and Placerville Church Camp. Appendix E, Map 19 and 20 displays the location of this planned trail.

Wildlife Projects

Victoria Lake and Prairie Creek Dams. Restoration and improvement of the riparian habitat, water holding capacity and access for these two small reservoirs is planned. Anticipated work includes dredging, fencing and access maintenance. These projects are planned for Alternatives B and C.

Fire and Fuels Cooperation

Under all the Action Alternatives strong emphasis would be given to further current efforts at working cooperatively with the State Wildfire and Conservation/Forestry Divisions, Volunteer Fire Department's, landowners and others regarding fire and fuels management issues such as:

- Cooperative and educational efforts to treat private lands.
- Use of appropriate building materials, landscaping materials and techniques and fuel break construction techniques on adjoining lands.
- Coordination of access needs for fire suppression with VFD and State.
- Coordinating fuels and fire hazard reduction treatments on adjoining lands.

Maintenance of Vegetative Conditions

All alternatives envision additional, unspecified treatments in approximately 15 to 20 years in the future to maintain vegetative conditions created by proposed treatments. Analysis indicates that after approximately 20 years, new pine growth would return the area to similar conditions to that which exists today, and additional vegetative treatments such as commercial and non-commercial mechanical treatments and prescribed burning may again be necessary. Although this project does not prescribe when or where such treatments might occur, all action alternatives envision the need for continued thinning to maintain reduced levels of crown fire hazard.

DESIGN CRITERIA and MITIGATION

Design criteria and mitigation measures have been developed and are to be implemented as part of the action alternatives. These measures would be applied in order to protect resources and forest users as well as mitigate impacts resulting from implementing action alternatives. Appendix B lists design criteria and mitigation measures specified by the ID Team. Also, other measures that are applicable and expected to be implemented as a matter of standard operating procedure are summarized or referenced. These include such measures as Forest Plan Standards and Guidelines (S&Gs), Best Management Practices, and others.

MONITORING

The Mystic Ranger District assumes responsibility for implementation monitoring of the selected actions. The District would ensure that EIS and Record of Decision (ROD) direction including mitigation measures are applied and carried out appropriately. Reviews would be documented and final monitoring reports would be generated upon project completion.

Project and contract administrators would perform much of the project monitoring during project implementation. Other resource specialists would monitor specific progress including application of mitigation measures related to their resource of concern. There would be a negligible difference in costs associated with monitoring across all action alternatives. See Prairie Project Area Monitoring Plan in Appendix C.

ALTERNATIVES CONSIDERED but ELIMINATED FROM DETAILED STUDY

A wide range of alternatives, using different approaches to address the purpose and need, are presented in this EIS. One alternative that was presented to the Forest Service during public scoping was reviewed and elements of that proposal were included in the action alternatives presented in this analysis. The Forest Service did not include the alternative in its entirety, and it was eliminated from detailed study. An overview of that alternative and reasons for eliminating it from detailed study is presented below.

Restoring a Balance Alternative

During scoping one commentor proposed an alternative called “Restoring a Balance” alternative. Some of the components of this alternative are summarized below:

- Use only prescribed burning to restore natural fuel breaks.
- Allow natural processes such as insect infestations, storm damage, and natural wildfires to naturally thin trees versus mechanically treating vegetation.
- Rather than actively treating the vegetation, the FS should monitor results of natural processes to determine if these processes can adequately and effectively achieve the same goals that vegetation treatment is intended to achieve.
- By allowing natural processes to take their course, the FS would be providing fuel breaks (by creating openings within the forest), providing openings for forage (by creating openings within the forest), lessening the risk from insects and disease (by allowing insects and disease to take place, the risk becomes lower), reducing the risk of a high-intensity wildfire (by allowing natural processes to remove trees), and improving stand growth and vigor.
- No commercial timber harvest except on one acre of forested land to provide products to local industry.
- Complete an analysis of recreational uses and devise a recreation management plan.
- Mitigation measures include installing campfire pits, providing increased sanitation services, road closures, designate areas for non-motorized use, including motorized use, managing areas lightly used for non-motorized purposes.
- Develop a site-specific “Fire Plan of Action”, plan of evacuation, and a suppression plan.
- Identify areas where a wildfire may be allowed to burn naturally to a point where suppression is necessary.
- Develop monitoring plan that ensures fires do not endanger homes or other facilities.

Components of the “Restoring a Balance” alternative were adapted and/or incorporated in structuring Alternative B in a way that still addressed the purpose and need for action and responded reasonably well to management direction. Alternative B reflects a management approach designed to achieve the purpose and need by minimizing commercial timber harvest and emphasizing prescribed burning along with non-commercial thinning.

Some of the components of the “Restoring the Balance” alternative are contained in one or more of the action alternatives. Prescribed burning is planned in Alternatives B and C. All action alternatives include varying amounts of road closure plus designated non-motorized and motorized use areas. Fire management action plans are currently in place and would be a part of management under all alternatives.

The “Restoring a Balance” alternative was not adopted in its entirety because some components did not address the purpose and need or deviated too much from National or Forest level direction.

Allowing natural processes such as insect infestations, storm damage, and natural wildfires to naturally thin trees and vegetation and prescribed natural fire to treat fuels as proposed is not a viable management option near the numerous heavily developed communities at risk in this wildland urban interface setting. Experience has shown that large crown fires are possible in the Black Hills after approximately 10 days of hot, dry weather even if previous conditions were low to moderate fire danger. Experience has also shown that crown fires in the Black Hills can run five to ten miles in a single burning period. Because of the development that has occurred within or adjacent to the project area, it would not be possible to develop management guidelines that would allow natural ignitions to burn without the possibility of threatening houses, communities and other urban related improvements within a single burning period.

Other components of the “Restoring a Balance” alternative are reflected in the action alternatives. Recreation and travel use in Alternative B reflect a non-motorized use emphasis over about 80 percent of the project area. Recreation management plans currently exist. Other than improving or developing trailhead facilities, no developed recreation sites are being proposed or considered with this project. The commentor is encouraged to provide feedback when developed recreation proposals are presented for public feedback. The “mitigation measures” suggested by the commentor regarding travel use are incorporated into the action alternatives.

In Alternative B, commercial timber harvest is limited to accessible fuel breaks near development - primarily around private land. This is the only commercial entry proposed for Alternative B. It is needed where accessibility is available to thin the larger trees to a spacing that reduces potential for crown fire spread immediately adjacent to private land or other development. With very limited commercial thinning in Alternative B, non-commercial thinning was added because of the need to at least thin understory vegetation (in response to the purpose and need) to a level that reduces the threat of crown fire to the extent possible. Weather and fuels conditions have historically limited the opportunities available to burn (thin) standing green vegetation to the intensity needed to open up stands to reduce the potential for crown fire, without threatening adjacent private lands.

COMPARISON OF ALTERNATIVES

This section presents a brief comparative discussion of the four alternatives given detailed study in this EIS. The alternatives are described and compared in terms of the effects each alternative has on the key issues described in Chapter 1. A comparative overview of vegetation treatment

activities is also provided. Table 2-1 and Table 2-2, display comparative summaries of the effects of each alternative and their respective treatment activities. The environmental consequences of the alternatives to the resources affected in the Prairie Project Area are more completely described in Chapter 3 of this EIS and also in the resource specialist's reports held in the project file.

Fuel/Fire Hazard and Prescribed Fire

It is not possible to eliminate fire from a short interval fire regime based on past history of fire events in the Black Hills. Fires will continue to occur within or adjacent to the project area. Most of these fires are of low intensity and are too small to have a significant effect upon the environment. It is the high intensity stand replacement fires that have the most impact upon the ecosystem. The alternatives for the Prairie Project have been evaluated on their effectiveness in reducing the potential for a large, high intensity crown fire.

Within the Prairie Project Area the forest would continue to deviate from its historical range of variability in Alternative A with vegetation becoming more dense, more multi-storied and more susceptible to catastrophic fire. Alternatives B, C and D would reduce the potential of a catastrophic fire by moving the forest in the project area closer to its historical range of variability either by thinning and/or by removing some of the surface fuels. These actions would also reduce the impacts that a large fire would have on the ecosystem.

Alternative C uses a combination of prescribed burning and commercial and non-commercial mechanical thinning. It would have the greatest effect on reducing crown fire potential. This alternative would treat more of the project area compared to other action alternatives and manage the pine stands at a lower density. Management would be on a landscape basis and designed so that it would complement existing features such as Rapid Creek, the Westberry Trails Fire, the Horse Creek Fire, hardwood stands and the grasslands in the Bald Hills. Not all of the project area would be treated and portions would continue to be managed at higher densities to provide for other resource needs. Some sites would be managed for regeneration and smaller trees. While these sites are susceptible to intense wildland fires, they would not exist in large contiguous blocks and would be surrounded by more open, less fire prone sites.

Alternative B uses prescribed fire and non-commercial thinning to reduce the vulnerability to catastrophic fires. The burn units were designed to complement existing features and manage vegetation in the project area on a landscape basis. Most of the beneficial effects from prescribed fire would be short term and begin to diminish as regeneration becomes established and natural fuels begin to accumulate. Additional burns would need to be scheduled at 20-30 year intervals to maintain the beneficial effects. The effectiveness of a large-scale prescribed burn program is also limited by the amount of wildland-urban interface development that has occurred in or near the project area. Prescribed burns would be more complex and more expensive to complete as a result. The number of acres burned per day would need to be reduced to avoid possible impacts to air quality and to minimize the risk of an escaped fire. Non-commercial thinning would also be used to reduce fire potential by reducing aerial fuels and raising crown heights. This alternative would not be as effective in reducing crown fire potential as Alternative C. The pine stands would be managed with a higher stand density and crown fire

potential would increase with gradual buildup of natural fuels. This assumption is supported by Fiedler (2003) who reported that more comprehensive, ecologically based treatments that treat all size classes are more effective in reducing the fire hazard than an understory thinning that only treated trees up to 9" in diameter.

Alternative D would not treat as many acres as Alternative C and the pine stands would be managed at higher densities. In addition, the alternative does not propose any prescribed burning. These factors would reduce the effectiveness that this alternative would have on fire and fuels.

Access would be affected in Alternatives B, C, and D. Less access could result in a longer response time to some fires and reduce the ability to utilize fire engines. This could result in larger fires and a greater potential for fire escaping initial attack. These effects would be greater if the existing routes proposed for motorized or non-motorized trails are not available for fire access. Alternative B would reduce existing roads from 292 to 197 miles. Alternative C and D would have similar effects. Both alternatives would result in approximately 223 miles of roads. These alternatives would not have a significant effect on fire access because most of the roads that would be closed or obliterated are either too rough or steep to be used by engines or are short spurs that can be closed without significantly affecting access.

Any alternative that reduces fire intensities would increase firefighter safety. Alternative A would be the least effective in reducing firefighter safety. In fact, the potential for a serious accident would increase as fire behavior increases because of higher fuel loadings. The prescribed burn units in Alternative B would provide some protection in the short term but would not provide any long-term benefits. Alternatives C and D would be the most effective in providing for firefighter safety. Both alternatives increase the size and amount of meadows and hardwood stands. These, as well as some of the ponderosa pine savannahs created by seed cuts, would provide natural safety zones. Landings required for timber operations would also create openings that can serve as safety zones.

The alternatives were evaluated on how they affected crown fire potential for the forested stands located in the project area. The individual stands were grouped into three categories. Stands that are susceptible to active crown fire initiation and spread were given a high rating. Stands with a moderate rating could sustain a crown fire but only under extreme fire conditions. Stands with a low rating are open enough to prevent an active crown fire. Fires in these areas would be ground fires with the possibility of torching individual or small groups of trees under extreme conditions. Currently (Alternative A) 62% of the forested stands have moderate to high crown fire risk. Implementation of action alternatives would reduce the percentage of total acres of moderate to high crown fire potential to the following levels: Alternative B 52%, Alternative C 34% and Alternative D 53%. Figure 2-1 and Figure 2-2 depict the number of acres with a low, moderate or high crown fire potential for each of the Alternatives.

Figure 2-1 Crown Fire Potential after Treatment

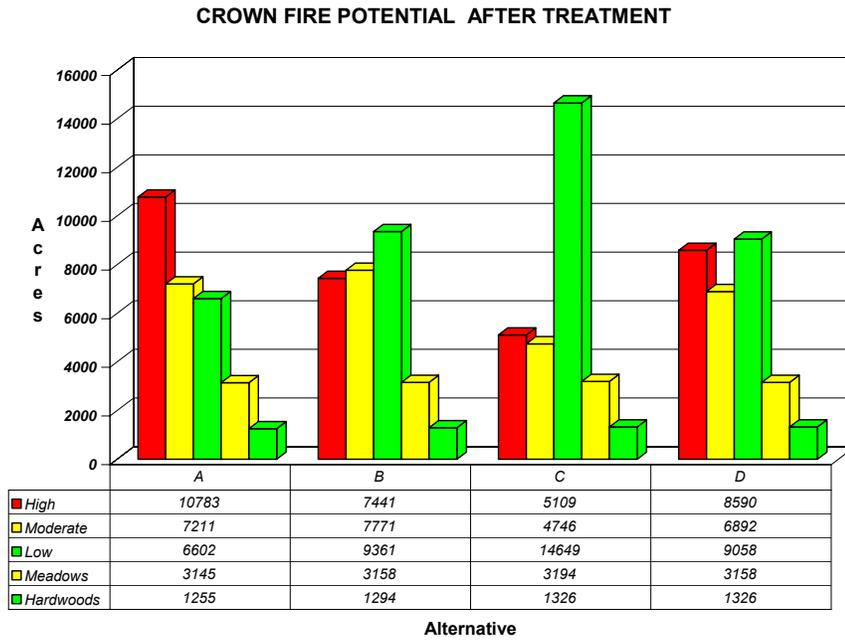
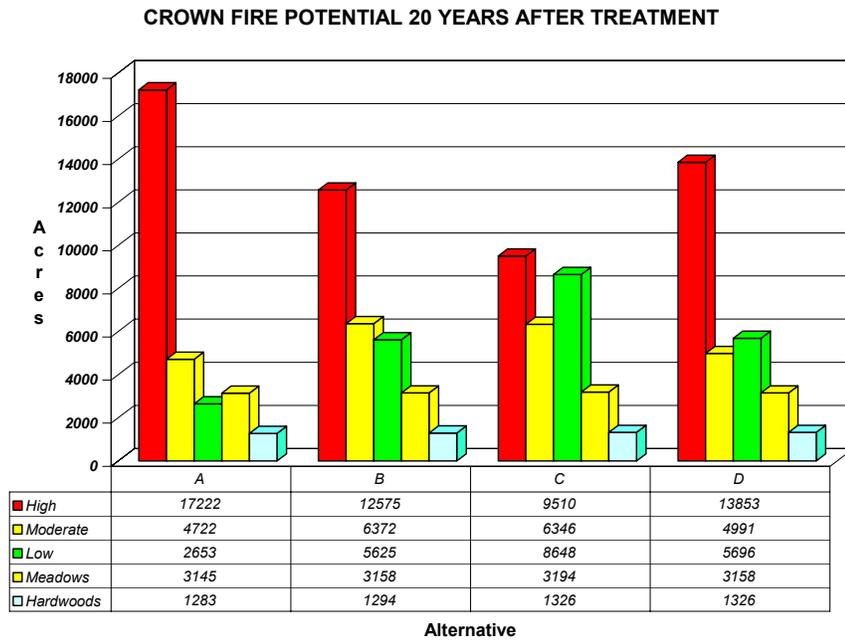


Figure 2-2 Crown Fire Potential Twenty-Years after Treatment



Travel and Recreation Use

No matter what decisions are made regarding travel and recreation use there will be changes in the amount and types of use in this area. This is because the population continues to grow and more people are interested in outdoor recreation. It is also a result of increasing use of off-highway vehicles (OHV) such as All Terrain Vehicles (ATV), dirt bikes and 4x4's. Conflicts between user groups will continue and may expand.

All alternatives, even the No Action Alternative A, would result in changes to the total road system, motorized and non-motorized opportunities, and the resulting effects of these uses. Alternative A would not directly change the current situation. However, the proximity to populated areas and the increased use of OHV's would result in additional user created roads, probably on the scale of several miles per year. Increased conflicts would occur among user groups, and those users that prefer a more non-motorized type of experience would likely abandon this area in favor of other, more remote areas within the Black Hills. Negative effects often associated with motorized access would increase over time. This includes increased trash dumping, illegal campfires, vandalism, damage to soil and water resources, the spread of noxious weeds and disturbance to wildlife.

Alternative B is responsive to those users who want to see a stronger emphasis on non-motorized recreation opportunities and reduced effects from road and off-road motorized use. It reduces the total miles of roads and roads open to motorized use, and eliminates off-road motorized use over most of the area. It has the largest effect of all alternatives on motorized and non-motorized use within the Prairie Project Area. This alternative would divide the project area into two zones. The larger zone would provide for non-motorized use and the smaller zone would provide for motorized use (see Appendix E, Map 19). The majority of the project area, 23,842 acres (82%) would be closed yearlong to off-road motorized use. Motorized vehicles could travel only on open higher standard roads. All unclassified roads and some low standard Forest System Roads would be converted to trails or decommissioned (eliminated). Some low standard roads would be open for private land access only. This zone includes Management Areas 3.7, 4.1, 5.4 and 8.2. The northwest corner of the analysis project area, 5,182 acres (18 percent of area) would be open to off-road motorized use yearlong. All levels of road would be open yearlong to motorized users. This zone consists of Management Area 5.1. The total miles of road in the project area would be reduced from the current 292 miles to 206 miles, and the miles open to motorized use would change from the current 219 miles during the summer-fall to 128 miles yearlong. Miles of non-motorized trails would be expanded from the current 11 miles to 49 miles.

Over all, Alternative B would shift recreation emphasis in this area toward non-motorized uses. More areas would be available for mountain biking, hiking and horseback riding in a more secluded, quiet environment. Hunters who prefer walk-in areas would see opportunities increase. Negative effects often associated with motorized access such as trash dumping and damage to soil and water resources would be reduced more with Alternative B than with the other alternatives. Users who prefer motorized road and off-road activities would find fewer of these opportunities available and likely would shift their use to other areas. This would result in longer drives to access motorized use opportunities, and for some, would result in no longer being able to drive out their back door from adjacent private land.

Alternative C is responsive to those users who want to see more balance between motorized and non-motorized recreation use, and additional opportunities to pursue their favorite recreational activities. It reduces the total road miles and roads open to motorized use, provides protection for other resource needs such as wildlife and soils, expands the area closed to off-road motorized use, and designates a specific area for yearlong off-road motorized use. It also provides opportunities for partnering with the Forest Service to develop motorized and non-motorized “use areas” and trail systems. The design criteria for use areas and trails systems are included in Appendix E.

Alternative C would divide the project area into three zones or corridors. The northern zone would allow yearlong motorized use both on and off-road, the middle zone would favor non-motorized uses, and the southern zone would provide a mix of both motorized and non-motorized uses (see Appendix E, Map 20). Total miles of road would be reduced from the current 292 miles to 233 miles, which is more than Alternative B and about the same amount as Alternative D. Also, relative to the existing condition, miles of road open to motorized use during the winter-spring would be essentially the same, but would be reduced in the summer-fall (see Table 2-1 Effects to Key Issues by Alternative). The area open to off-road motorized use would be slightly reduced from current levels in the summer – fall (68% vs. the current 76%), and substantially reduced from 76 percent to 29 percent in the winter-spring. This large reduction in off-road motorized opportunities during the winter-spring is intended to provide protection to big game winter range. Miles of non-motorized trails would be expanded from the current 11 miles to 33 miles, which is less than Alternative B and more than Alternative D.

Alternative C would provide opportunities for both motorized and non-motorized users to propose and develop “use areas” or trail systems in the project area. These use areas or trail systems would consist of designated areas where specific users could develop opportunities for OHV or mountain bike use. For example, single-track dirt bike or mountain bike courses might be developed or an ATV trail system developed, or possibly a location to do rock crawling for modified 4x4 vehicles. These use areas would be limited in size, would be designed to minimize environmental effects, and would be under special use permit to groups who would be responsible for development and maintenance of the use area. This alternative does not designate specific use areas at this time, but instead provides general criteria and zones where this activity might occur (see Appendix B, Design Criteria and Mitigation Measures).

Over all, Alternative C would provide a mix of motorized and non-motorized recreation opportunities. By reducing the total road miles and reducing the area open to off-road motorized use, it would reduce some of the negative effects that occur with motorized access, such as trash dumping and damage to soil and water resources. Compared to the existing condition, it would provide additional opportunities for walk-in hunting and other non-motorized use, and would provide more protection for big game winter range. This shift toward more non-motorized use, however, would be substantially less than that proposed in Alternative B. Motorized recreation users would still find abundant opportunities within the area, and both motorized and non-motorized users would have the opportunity to work with the Forest Service in developing use areas such as ATV, dirt bike or mountain bike trails.

Alternative D is responsive to management direction presented in the Forest Plan. The Forest Plan provides guidelines for road and off-road motorized use within each Management Area. Alternative D strictly adheres to Forest Plan Management Area boundaries, and it does not include opportunities for development of use areas for OHV's or mountain bikes. It rescinds existing area closure orders and replaces them with new restrictions and orders.

Alternative D is divided into three categories and comprises four separate zones (see Appendix E, Map 21). The northwestern zone includes 5,182 acres (18 percent) of National Forest System Lands, is open to off-road motorized use and has a high open road density. This zone comprises Management Area 5.1, which has a Resource Production emphasis. The middle zone includes 4,356 acres (15 percent) of NFS Lands, is closed yearlong to off-road motorized use and has a low open road density. It comprises Management Areas 3.7 (Late Successional Forest Landscape), 4.1 (Limited Motorized Use and Forest Product emphasis), and 8.2 (Developed Recreation Complex). The northeastern and southern zones include 19,486 acres (67 percent) of NFS Lands. These two zones comprise Management Area 5.4, which has a Big Game Winter Range emphasis. These zones are open to off-road motorized use during the summer-fall period (May 15 to December 15). Most Forest System Roads in these two zones are open to motorized use during the summer-fall and restricted from motorized use in the winter-spring. The northeastern zone has a high summer open road density, and the southern zone has a lower summer open road density.

Total miles of road would be reduced in Alternative D from the current 292 miles to 230 miles, which is more than Alternative B and about the same amount as Alternative C. Miles of road open to motorized use during the winter-spring would be reduced from 173 miles to 131 miles, about the same as Alternative B and less than Alternative C. Miles of road open to motorized use during the summer-fall would be reduced from the current level of 219 miles to 191 miles, about the same as with Alternative C. The area open to off-road motorized use would actually increase over current levels during the summer-fall from 76 to 85 percent, but would be substantially reduced from current levels during the winter-spring. This large reduction in off-road motorized opportunities during the winter-spring is intended to provide protection to big game winter range. Miles of non-motorized trails would be expanded from the current 11 miles to 20 miles, which is less than the other action alternatives.

Over all, Alternative D would have modest effects on summer-fall motorized recreational opportunities, but would have a substantial effect on winter-spring use. This is because a large percentage of the area is big game winter range (MA 5.4), and Forest Plan guidelines propose that both road and off-road motorized use be restricted during that time period. Negative effects often associated with motorized access such as trash dumping, vandalism and the spread of noxious weeds probably would not change under Alternative D because most of the area and roads would be open to motorized use during the heavy use summer-fall time period. Disturbance to big game during the critical winter period would be reduced similar to Alternative B.

Wildlife Habitat

Changes in wildlife habitat will occur in the Prairie Project Area regardless of which alternative is selected, including the No Action Alternative. The vegetation structure of ponderosa pine habitats is dynamic and will continue to change over time, through growth and other natural

events like wildfire and insect outbreaks. Now-open canopied stands will trend toward more closed canopied structure, and stand densities and diameter classes will increase overall. Growth will slow in now-closed canopied stands, and they will become decadent, with higher mortality and susceptibility to insects, disease, and catastrophic wildfire. The overall trend will be towards later successional stages in Alternative A, and species associated with such habitats would be favored.

Commercial harvest treatments will set back succession and the overall trend will be toward early seral stages of ponderosa pine in Alternative C, and to a lesser extent Alternative D. Treatments to closed canopied stands will open the canopy, and stand densities and diameter classes will be reduced overall. The individual stands and the landscape would be less susceptible to insect, disease, and wildfire as a result of proposed commercial harvest treatments. Minimal commercial harvest is proposed in Alternative B, and overstory structure would remain even in non-commercially treated stands. Species associated with early seral pine habitats would benefit from treatments proposed in Alternative C and Alternative D, at the expense of species associated with more mature, later successional stages.

Non-commercial treatments proposed in all action alternatives, and prescribed burning proposed in Alternative B and Alternative C would remove the smaller diameter pine understory. That component of stand structure would be reduced, in individual stands and across the landscape, but such treatments would have a little effect on the overall structure and seral stage of the pine community.

In the absence of fire, early seral communities such as hardwoods and meadows will become further encroached by pine with the No Action Alternative, and there will be less habitat available for species associated with these communities. Similar acreages are proposed for hardwood treatments in all action alternatives, although Alternative C treats approximately 100 acres more of meadows for pine encroachment than the other action alternatives. Since hardwood and meadow treatments proposed in Alternative B are primarily non-commercial, the pine overstory of larger diameter trees would remain to provide a seed source and perpetuate the encroachment problem in both hardwoods and meadows. Alternative C would benefit species associated with hardwood and meadow communities the most, followed by Alternative D and Alternative B. Such species would not benefit by lack of treatment in Alternative A.

Riparian communities, water quality, and fisheries habitat in the Prairie Project Area are currently negatively affected by improperly located and constructed roads, illegal motorized traffic, livestock grazing, heavy recreational use of some areas, and the increasing density of the adjacent pine community. Negative effects include sedimentation, changes in vegetation composition and structure, trampling and resource damage, and decreased water availability. Alternative A represents a continuation of the current condition of riparian areas, water quality, and fisheries habitat. Watershed improvement projects proposed for all action alternatives would enhance these habitat features by rehabilitating connected disturbed areas to reduce soil and erosion and sedimentation, stabilizing streambanks, and improving water quality. The positive effects of these projects on riparian habitats, water quality, and fisheries habitat would be similar under all action alternatives. Additionally, vegetation treatments would reduce the density of adjacent pine communities, resulting in increased amounts of water available to riparian

communities and streams relative to the number of acres treated in each action alternative. Negative impacts to riparian areas, water quality, and fisheries habitat from proposed activities in the action alternatives would be mitigated, and thus not substantially affect those habitats.

It is assumed that the Prairie Project Area is currently deficient in snags, although densities have likely recently increased as a result of a heavy snowstorm, a hailstorm, and an ongoing mountain pine beetle outbreak. Alternative A will produce the greatest number of snags over time, created through natural processes such as old age, insects, disease, wildfire, and weather damage. Compared to the other action alternatives, Alternative B will produce the most snags over time. Alternative D provides the fewest snags of all action alternatives, because there is no prescribed burning proposed to create additional snags, as in Alternative B and Alternative C.

Snags will be created through natural processes over time in all action alternatives, but the number and size of snags created is directly proportional to the number of green trees available to become snags. Alternative A will leave the largest number of green trees/acre greater than 10" DBH with potential to become snags. While all action alternatives decrease the number of existing green trees/acre average available for snag recruitment compared to Alternative A, the number of green trees retained will be adequate to provide for desired levels of snag recruitment. Of the action alternatives, Alternative B leaves the largest number of green trees available for snag recruitment, followed closely by Alternative D. Alternative C leaves the fewest green trees available for snag recruitment.

Although the existing number of down logs and amount of down woody material in the Prairie Project Area has not been quantified, most of the previously treated areas likely are deficient in down woody material. Storm damage from the April 2000 snowstorm increased the amount of down woody material somewhat in some areas. Alternative A would provide the greatest amount of down woody debris over time as a result of tree mortality in denser stands, followed by Alternative B and Alternative D. Alternative C would provide the least amount of down woody material. Untreated sites in all actions alternatives will continue to accumulate down woody debris from natural events like tree mortality and blowdown. Prescribed burning will also reduce small diameter down woody material, but likely would not eliminate larger down logs.

Open road density in the Prairie Project Area currently exceeds five-miles/square mile, and existing road and area closures are for the most part ineffective. Roads displace habitat and their use can disturb wildlife and decrease habitat suitability and availability for most species, but especially for big game species. High road densities makes the area more easily accessible, facilitates poaching and illegal removal of snags for firewood, and results in increased disturbance to all wildlife species. Alternative B proposes to close about 80% of the project area to off-road motorized traffic year-round, with the remainder of the area open year-round. Alternative C proposes yearlong restrictions to off-road motorized use in about 30% of the area, winter/spring road and off-road closures in about 40% of the area, and the remaining 30% of the area would be open year-round to motorized use. Alternative D proposes yearlong restrictions to off-road motorized use in about 15% of the area, 20% of the area would be open year-round, and the remainder of the area would be closed to off-road motorized use during the winter/spring. Selected roads would remain open year-round throughout the project area in all action

alternatives. Alternative B results in the lowest overall open road density of all alternatives, followed by Alternative D and Alternative C, with highest densities in Alternative A. Road closures and obliteration proposed in all action alternatives would substantially benefit wildlife and wildlife habitat.

Socio-Economic Factors

Alternative A poses the greatest risk of catastrophic wildfire, and although it is not fully integrated into the cost/benefit analysis, it is a very real possibility and the actual cost of Alternative A could therefore be much higher than the action alternatives in both economic and environmental terms. Recent large wildfires on the Black Hills and in the western United States have experienced costs in millions of dollars for suppression alone. Obviously, additional costs of rehabilitation and loss of property and resource values must be considered. No revenue is generated with the No Action Alternative.

The cost of implementing Alternative B is estimated at \$5.3 million. There are minimal revenues generated in this alternative because of the small amount of commercial harvest planned. Thus, implementation costs are defrayed to a minor extent by revenues. To cover the cost of implementing Alternative B other funding sources such as congressionally appropriated funding or external contributions would be needed. Note that Alternative B has the greatest uncertainty in funding and therefore of not being accomplished, and this equates to an increased risk in a catastrophic wildfire and all its economic and environmental effects.

The analysis illustrates that commercial harvest revenues offset costs of alternative implementation in proportion to the amount and value of commercial volume produced. Revenues from Alternative C offset costs to a large degree, although not completely. In similar fashion, Alternative D generates revenues that cover much of the cost. As with Alternative B, other funding sources would be needed to accomplish the activities planned - but to a lesser extent.

The difference between revenues and costs in Alternative D is the least of the three action alternatives at \$1.2 million. However, this alternative achieves substantially less in terms of fuels and fire hazard reduction projects than Alternative C. With Alternative C, there is a greater impact in terms of reducing the potential for catastrophic wildfire and the economic and environmental effects associated with such an event. This difference is not reflected in the benefit/cost (b/c) ratio of the respective alternatives as shown in the table below. Alternative B has a very low b/c ratio of .04. Alternative C b/c ratio is .73 as compared to .61 for Alternative D. Alternative D has greater financial certainty than Alternative C. Revenues in Alternative D come closer to offsetting costs because less work is being accomplished (lower costs).

Wildfire hazard reduction is an indirect indicator of how effectively the alternatives contribute to safeguarding the health, values and lifestyle of local residents and Forest users by reducing wildfire hazard. This is a qualitative indicator. However, this measure is supported by the effects to wildfire hazard resulting from the level of vegetative treatment to reduce fuels as disclosed in the analysis. The No Action alternative does nothing to address this issue and the threat of a catastrophic wildfire continues to increase. Alternative C, characterized by the

aggressive landscape-wide vegetation treatment planned, is the most effective at reducing hazard and addressing these social issues. Alternatives B and D have a moderately effective impact.

Table 2-1 Effects to Key Issues by Alternative

	Alt A	Alt B	Alt C	Alt D
Fire Hazard and Fuels Reduction				
<i>Issue Measurement Indicators</i>				
Crown Fire Hazard - Low (acres)	11,002	13,813	19,169	13,542
Crown Fire Hazard - Moderate (acres)	7,211	7,771	4,746	6,892
Crown Fire Hazard - High (acres)	10,783	7,441	5,109	8,590
Vegetation Treatment (acres)	0	6,958	11,881	7,112
Fuel Breaks - constructed (miles)	0	23	29	21
Fuels Breaks - hardwoods/meadows (acres)	0	1,599	1,738	1,606
Storm Damage Treatment (acres)	0	965	965	965
Prescribed Burning (acres)	0	7,502	4,224	0
Accessibility for Fire Suppression (road miles)	250	197	223	223
Prescribed Fire				
<i>Issue Measurement Indicators</i>				
Burn Complexity—Moderate (acres)	NA	2,020	4,224	NA
Burn Complexity—High (acres)	NA	5,482	0	NA
Prescribed Burn Area (acres)	0	7,502	4,224	0
Burn Days Required (days)	None	40-45	20-25	None
Travel Management				
<i>Issue Measurement Indicators</i>				
Total Miles of Roads and Motorized Trails	292	206	233	230
Miles of Roads and Motorized Trails Open Winter-Spring (Dec 15-May 15) to Motorized Use	173	128	172	131
Miles of Roads and Motorized Trails Open Summer-Fall (May 15-Dec 15) to Motorized Use	219	128	186	191
Percent of the Area Open Winter-Spring (Dec 15-May 15) to Off-Road Motorized Use	76%	18%	29%	18%
Percent of the Area Open Summer-Fall (May 15-Dec 15) to Off-Road Motorized Use	76%	18%	68%	85%
Miles of Non-Motorized Trails	11	49	33	20
Wildlife Habitat				
<i>Issue Measurement Indicators</i>				
Pine Structural Diversity				
Closed Canopy	Best	Better	Poor	Good
Open Canopy	Fair	Better	Best	Good
Late Successional	Best	Good	Fair	Better
Aspen/Oak/Meadow Communities	Fair	Good	Best	Better
Riparian Area Condition	Fair	Better	Better	Better
Water Quality	Fair	Better	Better	Better
In-stream Fisheries Habitat	Fair	Better	Better	Better
Snag Conditions	Good	Best	Better	Fair
Dead and Down Woody Material	Best	Better	Fair	Good
Open Road Density	Poor	Best	Good	Better

	Alt A	Alt B	Alt C	Alt D
Socio-Economic Factors				
Issue Measurement Indicators				
Total Cost (million)	NA	-\$5.3	-\$7.0	-\$3.1
Total Revenues (million)	NA	\$0.2	\$5.1	\$1.9
Cost-Benefit Ratio	NA	.04	.73	.61
Funding Certainty (Low to High)	NA	Low	Mod-High	High
Volume Harvested - sawtimber (CCF)	0	2,600	60,048	21,726
Products - poletimber (CCF)	0	476	14,133	5,566
Cooperative Effort with groups and individuals regarding fire/fuels hazard reduction	Good	Better	Better	Better
Wildfire Hazard Reduction (Effectiveness of contribution to safeguarding the health, values and lifestyle of local residents and Forest users by reducing wildfire hazard.)	Least Effective	Moderately Effective	Most Effective	Moderately Effective

Table 2-2 Treatment Outputs by Alternative

Treatment (acres)	A	B	C	D
Fuels & Vegetation Treatment (Non-Commercial)				
Fuel Breaks	0	553	692	505
Special Cut (Pactola WC)	0	6	6	6
Thinning	0	4,715	6,252	4,177
Hardwoods (Pine Removal)	0	919	959	926
Meadows (Pine Removal)	0	680	779	680
Patch Cuts	0	85	85	44
Total	0	6,958	8,773	6,338
Fuels & Vegetation Treatment (Commercial)				
Fuel Breaks	0	346	485	366
Special Cut (Pactola WC)	0	6	6	6
Thinning	0	0	6,982	2,041
Overstory Removal	0	0	602	972
Hardwoods (Pine Removal)	0	0	480	446
Meadows (Pine Removal)	0	0	258	211
Patch Cuts	0	0	76	44
Total	0	352	8,889	4,086
Total Area Treated (Not additive due to some overlap in treatment area)	0	6,958	11,881	7,112
Volume Removed				
Sawtimber MBF	0	1,312	30,435	10,424
Sawtimber CCF	0	2,600	60,048	21,726
Products CCF	0	476	14,133	5,566
Other Fuels Treatment				
Prescribed Burning	0	7,502	4,224	0
Storm Damage Treatment	0	965	965	965

CHAPTER 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the affected environment for each resource analyzed. Subsequently, the environmental consequences of the alternatives on the resource components of the physical, biological, and social environment in the Prairie Project Area are disclosed. Environmental consequences are described in terms of the beneficial/adverse, short and long-term direct/indirect and cumulative effects. Effects are quantified where possible, although qualitative discussion is often necessary. Elements that are not affected or minimally affected by the alternatives such as climate, noise, and topography are not discussed. This chapter provides the scientific and analytical basis for the comparison of alternatives presented in Chapter 2.

Direct and indirect effects of the proposed action and its alternatives were analyzed over the planning period (10-15 years). Cumulative effects differ from direct and indirect effects in that they take into account past, present, proposed, and reasonably foreseeable activities that could affect issues and resources. The area analyzed for cumulative effects is the project area for all resources. This area encompasses six 7th level watersheds in the lower Rapid Creek basin—i.e., below Pactola Dam to the National Forest boundary west of Rapid City.

Past activities can have long-lasting and far-reaching effects regardless of whether they are active or passive in nature. Past activities or events that have been considered in the cumulative effects analysis include wildfires, timber harvest, livestock grazing, storms, insect infestations, residential development and fire suppression. Some of these activities and/or events have been affecting the area for over 100 years. A significant activity that has occurred in the past 100 years is fire suppression. Records indicate that the area was not heavily timbered with pine in the late 19th century. Instead grasses, shrubs, and hardwoods (mixed with pine) dominated uplands while willows covered low-lying areas along streams. Pine occurred as scattered trees or in dense stands separated by meadows, hardwoods and rock outcrops. A substantial increase in the extent of the coniferous forest in the project area has resulted from fire suppression. Hardwoods and shrubs such as aspen and willow have decreased in density and extent during the same timeframe. This change has occurred despite a long history of timber harvest in the project area that also began over 100 years ago primarily to provide timber in support of the gold rush. Since then timber harvest has occurred within the area during every decade.

Establishment of mineral claims and homesteading has resulted in many tracts of private land throughout the project area especially along streams. Much of this private land has been developed into subdivisions and/or residences and ranches. Roads were also built often along the easiest routes, generally parallel to streams.

Weather-related events such as storms, floods, droughts have affected the project area in the past and more recently. Extremely heavy rains caused damaging floods during the summer of

1972—the evidence and impact of which lingers today. A late spring snowstorm in April of 2000 damaged pole-sized trees in some areas increasing fire hazard. Three to four years of drought (1999-2002) has increased the level of forest insects resulting in pockets of dying trees. These events have affected streams and forests in localized areas. Additional past activities considered by the ID Team are discussed under the resource sections in this chapter.

Present activities are those activities currently occurring within the project area boundary. Present activities include livestock grazing on both private and National Forest lands, residential/subdivision development on private lands, and dispersed recreation. Recreational activities include camping, hunting, hiking, OHV use, motorbike and ATV riding, some snowmobile use, horseback riding, bicycling, and wildlife watching. There are two summer home groups, portions of the Centennial and Deerfield trails, and many roads (Federal, State, County, private and National Forest roads). Additional present activities considered by the ID Team are discussed under the resource sections in this chapter.

Reasonably foreseeable actions include those management activities that are ongoing or scheduled to occur within the next five to fifteen years or beyond. These activities may occur regardless of which alternative is selected for implementation. Foreseeable actions include continued livestock grazing and increased residential development on private lands. A continued increase in travel and recreation use is likely based on current trends. Vegetation treatment on public and private lands, suppression of wildfires and prescribed burning at various levels is likely to continue. Additional foreseeable activities considered by the ID Team are discussed under the resource sections in this chapter.

The resource components described in this chapter are arranged in three sections:

- Physical Environment
- Biological Environment
- Social Environment

PHYSICAL ENVIRONMENT

This section will describe the affected environment and environmental consequences for each resource of the Physical Environment (Watershed, Geology and Soils, Transportation, and Minerals).

WATERSHED, GEOLOGY and SOILS

Affected Environment

The Prairie Project Area watershed is comprised of different components and the varying characteristics of each component make each watershed unique. These components are: watershed boundaries, precipitation and climate, geology, soils, slope, watershed condition, streams, floodplains, wetlands, beneficial uses, water quality and quantity, private land, connected disturbed areas and roads. Some of these components are discussed below as they

relate to the Prairie Project Area (PPA). See the Watershed Specialist Report held in the Project File for detailed information on each component.

Precipitation and Climate. The PPA elevation ranges from 3,600 feet at Rapid Creek to 6,000 feet on an unnamed peak in the Prairie Creek Watershed. The PPA has a semi-arid climate with low humidity throughout the year. Temperatures range from 100° F during the summer months to well below 0° F in winter. Average annual precipitation is 19 to 20 inches and generally decreases from west to east (Driscoll, Carter, Williamson and Putnam, 2002). Localized intense thunder cells can produce much greater rain than surrounding areas within one storm event. The Black Hills is prone to flash flooding because of steep stream gradients and intense thunderstorms. An extreme flood in 1972 on Rapid Creek and in adjacent drainages caused 237 deaths (Fact Sheet Team, 2001).

Topography within the project area consists of canyons, ridges, hill, and gently sloping terrain. The predominant bedrock is Precambrian aged metamorphic and igneous rocks. They are exposed over approximately 75 percent of the area. Draping these Precambrian rocks are younger layers of sedimentary sandstones and limestones that are exposed on the eastern portion of the project area. Abundant caves are found within the limestone beds, both within and adjacent to the project area, and elsewhere within the Black Hills.

Watershed Condition. The PPA is within six Hydrologic Unit Code (HUC) 7 level watersheds. HUC 7 watersheds are generally 5,000 to 10,000 acres in size. The PPA is within two HUC 6 watersheds, which are the next larger watersheds. HUC 6 watersheds are generally 10,000 to 50,000 acres in size. All the Prairie Project watersheds fall into the Moderate Sensitivity category for the sensitivity index and all watersheds fall into what is considered minor for the impact index. See the Project File for specific information on the Natural Watershed Sensitivity Index (NWSI) and the Impact Indexes.

Beneficial Uses. The South Dakota Department of Environment and Natural Resources (DENR) assigns water quality standards based on the beneficial uses of each water body. All streams in South Dakota are assigned the beneficial uses of irrigation, wildlife propagation and stock watering. Within the PPA the Rapid Creek, Deer Creek, Prairie Creek, Victoria Creek and South Victoria Creek have additional designated beneficial uses. These include Domestic Water Supply, Coldwater Permanent Fish Life Propagation, Coldwater Marginal Fish Life Propagation, Immersion Recreation and Limited Contact Recreation.

Water Quality and Quantity. No streams or waterbodies within the project area are listed in the 2002 South Dakota 303(d) Waterbody List.

The following statements were taken from the ‘The 2000 South Dakota Report To Congress.’ “The Black Hills region traditionally has some of the best surface water quality in the state. This is due in large to a cooler climate during the growing season, and higher rainfall than the surrounding plains as a result of greater elevation and forest cover. Also contributing importantly to better water quality in this region is the nature of local bedrock formations which are much less erodible than the highly erosive and leachable marine shales and badlands on the surrounding plains.”

“Black Hill streams...usually have good to satisfactory water quality and fulfill their fishable/swimmable designated uses. They are, however, relatively small streams vulnerable to losses of flow exacerbated by periodic droughts in the Black Hills and the increase in size and density of the ponderosa pine forest canopy; the latter being the natural result of forest fire suppression in the long term. Recent studies suggest a management regime that would maintain an intermediate level (e.g. 40-60% canopy cover) rather than a dense or open ponderosa pine canopy would benefit soil moisture, ground water, and therefore, improve stream flow during drier years. Establishing this level of forest cover would represent a good compromise between maintaining a forest ecosystem and increasing the water production potential of the Black Hills.”

“Rapid Creek water quality typically ranges from good to satisfactory in its upper reaches...During the present and previous assessments...downstream (of Pactola Reservoir) and adjacent to the Rapid City limits (Rapid Creek) fully supported its assigned uses with elevated water pH and TSS were minor exceedances recorded.”

Peak flows on Rapid Creek and contributing streams can occur any month from March to October.

Roads. Roads are generally the number one watershed concern because they tend to concentrate water on the roadway and runoff can contribute sediment into streams and wetlands. Increased sediment can have a negative impact to water quality and aquatic life. During the Prairie analysis, 13 system roads and 59 unclassified roads were identified as having a potential for causing erosion and sedimentation.

Environmental Consequences

The proposed projects may affect the following watershed components: aquatic ecosystems, soil productivity, geologic hazards and special areas. Aquatic ecosystems include physical conditions (sediment, bed/bank stability and flow regimes), chemical conditions (temperature/oxygen and water purity) and biological conditions (aquatic life). Soil productivity includes soil erosion, soil compaction, nutrient removal, soil heating and regeneration hazard. Geologic hazards include landslides and soil failures. Special areas include riparian ecosystems, wetlands and floodplains. Below is a discussion of the above items as they apply to the Prairie Project Area (PPA).

Aquatic Ecosystems (Physical)

Sediment. Most sediment delivered to streams comes from a source zone along streams whose width depends on topography, soils, and ground cover. Connected Disturbed Areas (CDAs) like roads and other disturbed soil near streams can deliver sediment during runoff events. Increased sediment deposits in streambeds harm insect populations and fish habitat.

Bed and Bank Stability. Streambeds and banks can be damaged from trampling by animals or humans, vehicle impact, degraded bank vegetation, or excessive flow augmentations. Streams

can be made wider and shallower, pools and overhanging banks can be destroyed, and sediment can be added to streams.

Flow Regimes. Water flows can be altered by major changes in cover type or ground cover, dense road networks, or water projects. Water temperature and chemistry, sediment transport, aquatic habitats, and aquatic life cycles can be degraded.

The biggest impact on flow regimes in the Black Hills and this watershed is the results of the past fire suppression policies. These policies have resulted in the increase of tree biomass in the Black Hills. This increase in biomass uses more water through evapotranspiration, thus making less water available for streamflow and groundwater recharge.

Flow regimes do not appear to be adversely affected by dense road networks in the Black Hills. Based on professional observations, the roads have contributed to flow regimes, because roads are occupying areas where trees or biomass would be. Normally roads tend to change flow regimes by delivering water more quickly to the channels and streams making the peak flows higher.

Water projects affecting flows in this watershed include Pactola Dam and Deerfield reservoirs. Base flows are generally maintained or enhanced but peak flows can be affected by reducing them because of the need to store water in the reservoirs.

ALTERNATIVE A

Direct/Indirect Effect

Sediment. No new activities occur within the watershed so additional sediment sources would not be established. The CDAs that are within the watershed will continue to produce sediment. There would be no overall change in sediment being delivered to the streams unless a wildfire occurs, which could deliver a large amount of sediment to the channels and Canyon Lake downstream. Canyon Lake is a popular recreation area in Rapid City. Sediment into this lake would negatively affect recreation use and could be very expensive to remove. A wildfire would have both short and long-term sediment impacts on streams and Canyon Lake for years to come. Travel and recreation use in the area can have an effect on stream sediment. This alternative could potentially have the highest negative impact to streams from sediment. Many closures are ineffective and most of the area is open to off-road motorized use and possible vehicle use in or near streams.

Bed and Bank Stability. Under no action no new activities occur within the watershed so the bed and bank stability will generally not be affected and will remain unchanged. Impacts from the past such as low water road crossings will remain unchanged, motorized trail crossings will remain unchanged and existing unstable stream banks will remain. If a wildfire occurs, bed and bank stability may be affected with the increased risk of floods. This alternative could potentially have the highest negative impact of all the alternatives to bed and bank stability.

Many closures are currently ineffective and most of the area is open to off-road motorized use and possible vehicle use in or near streams.

Flow Regimes. Flow regimes will generally be not be affected under no action. However, if fire is kept out of this watershed, the biomass will continue to increase and consume more water, which will affect the flow regime by making less water available for streamflow or ground water recharge over time. If a wildfire or stand replacing fire occurs, this will reset the area and more water will be available for streamflow and ground water recharge.

Cumulative Impact

Sediment. Past activities, usually road related, in the watershed have contributed sediment to the streams. Known impacts have been identified and are listed in the CDA section of the watershed report. These generally include sections of road that drain directly into the stream, low water crossings and roads located near streams without much buffer area. There would not be increase or decrease to the cumulative impacts from sediment in the watershed with this alternative, unless a wildfire occurs, which would have a large impact from sediment being delivered to the streams. If a wildfire occurs, this generally removes the organic layer and exposes the soil. The soil is subject to erosion during intense precipitation events and the soil can be delivered to the stream.

Bed and Bank Stability. There have been past activities in the watershed that have contributed to bank instability. One large event in the past that has had a significant impact on the bed and bank was the flood of 1972. Effects of this event can be seen today, though most everything has recovered and is currently stable. Activities that are currently affecting bank stability are stream crossings with roads or motorized trails. Areas identified during field inventory are listed in the Project File. Other areas of unstable banks have been identified and are usually road related. Some drainages were identified as having headcuts that affect bed and bank stability.

There will be no increase or decrease to the cumulative impacts on bed and bank stability in this watershed under this alternative, unless a wildfire occurs. Should this happen, there could be an impact because of the increased flood risks that are associated with wildfires.

Flow Regimes. Past activities and events in the watershed have influenced flow regime. Impacts from past fire suppression have reduced water available for stream flow through the increase in biomass and increased evapotranspiration. Past timber harvest has helped maintain biomass water consumption, but it has not kept pace with the increase. Two wildfires in the recent past have affected 11% of the watershed. These wildfires have helped to reset these areas past flow regime.

There would be no increase or decrease to the cumulative impacts on flow regime in this watershed with this alternative, unless a wildfire occurs. In this case, a wildfire would increase flows because biomass will be reduced and more water will become available for streamflow or groundwater recharge. Over time, if wildfire does not occur, biomass will continue to increase, using more water, thereby reducing the flow regime in the watershed.

ALTERNATIVE B

Direct/Indirect Effect

Sediment. This alternative includes limited commercial activities, non-commercial timber activities, prescribed fire, travel management, watershed and wildlife projects. Commercial timber harvest proposes to treat approximately 300 acres in this alternative. Of acres, six (6) acres are located in the Watershed Influence Zone (WIZ) and have the potential to generate sediment. These treatment units are fuel break construction. Implementing the Forest Plan Standards and Guidelines (FP S&G), which include Watershed Conservation Practices (WCP) and Best Management Practices (BMP), such as minimizing skid trails in the WIZ, and the small amount of acres proposed for treatment, would generate very little sediment. Also included in this alternative is to prescribe burn approximately 7,400 acres, of which 151 acres are located in the WIZ. Sediment produced from the prescribed fire would be minimal with the implementation of the FP S&G, such as burning when soil moistures are higher. Implementation of prescribed fire is designed to reduce wildfire risk within the watershed, which would in turn reduce the sediment risk from wildfire. However, just implementing prescribed fire without reducing the density of the timber stands, still leaves the watershed at risk for a large wildfire and, if it occurs, could deliver a large amount of sediment to the stream channels and Canyon Lake downstream. Canyon Lake is a popular recreation area in Rapid City. Sediment into the Lake would negatively affect this recreation use and could be very expensive to remove. Other actions in this alternative include watershed projects that would minimize CDAs and other problem areas. This would have a direct affect on sediment. In the short-term, sediment contributions may increase but over the long-term sediment will be reduced. One of the proposed projects that have the potential to produce a large amount of sediment is the restoration of the reservoirs at Victoria Dam and Prairie Dam by dredging the accumulated sediment. This will be a short-term effect but these two projects have the potential of generating the most sediment of anything proposed. The effect would be fine sediment, going downstream, generated from cleaning out the accumulated sediment. This sediment would be flushed through the system and would have no long-term effects. A positive long-term effect is the improved trap efficiency of the dams (to collect sediment). This improvement reduces the amount of sediment making its way past the dams versus if this project was not done. Travel and recreation use in the area can have an effect on stream sediment. Assuming effective enforcement of closures and use, this alternative could potentially provide the best protection to streams from sediment because the least area is open to off-road motorized use.

Bed and Bank Stability. Watershed projects would have a direct impact on bed and bank stability. Other projects will not have an impact. Projects to stabilize banks and headcuts, and repair low water crossings would all have a positive affect on bed and bank stability and reduce the past impacts. Implementation of prescribed fire is designed to reduce wildfire risk within the watershed, which could reduce the potential floods and bed and bank stability problems from wildfire. However, just implementing prescribed fire without reducing the density of timber stands, still leaves the watershed at risk for a large wildfire and if it occurs, the risk for a flood is increased, thus increase the risk of destabilizing the bed and banks. Travel and recreation use in the area can have an effect on bed and bank stability. Assuming effective enforcement of

closures and use, this alternative could potentially provide the best protection to streams from sediment because the least area is open to off-road motorized use.

Flow Regimes. Commercial and non-commercial timber activities would have the greatest affect on the flow regimes. Prescribed fire generally would not affect the flow regime unless a large amount of tree mortality occurs. Other proposed activities would have a negligible effect. Even though limited in this alternative, commercial timber harvest would have a positive effect to the flow regime relative to the size in area being treated. The non-commercial thinning activities would have a short-term positive effect because of the reduction of the biomass. It will be short-term because the adjoining remaining trees will grow to take up the available space and capture available water.

Cumulative Impact

Sediment. Past cumulative impacts are described under Alternative A. There would be a short-term increase to the cumulative impacts from sediment to the watershed from the proposed projects. Over the long-term there would be a decrease to the cumulative impacts from sediment because of the watershed projects by repairing the CDA's. Wildfire sediment risk could be somewhat reduced by prescribed fire but there is still a risk from a large wildfire, which could have a large cumulative impact from sediment being delivered to the streams.

Bed and Bank Stability. Past cumulative impacts are described under Alternative A. There would be a decrease to the cumulative impacts on bed and bank stability in this watershed under this alternative from the proposed watershed projects. Wildfire bed and bank stability risk could be reduced by prescribed fire but there is still a risk from a large wildfire, which could have potential to impact the bed and bank stability of the streams if one were to occur.

Flow Regimes. Past cumulative impacts are described under Alternative A. This alternative would have some positive short-term impact to the flow regime primarily from past and proposed non-commercial thinning. Biomass will generally continue to accumulate thus reducing flows over the long-term. Wildfire risk is somewhat reduced by the prescribed fire planned. But if a wildfire were to occur, flow regimes would be restored to past levels.

ALTERNATIVE C

Direct/Indirect Effect

Sediment. This alternative includes commercial and non-commercial timber activities, prescribed fire, travel management, watershed and wildlife projects. Commercial timber harvest proposes to treat approximately 8,800 acres with this alternative. Of these acres, 135 acres are located in the WIZ and have the potential to generate sediment. Eighty-four percent (84%) of these commercial units within the WIZ are either hardwood restoration or meadow restoration. The rest of the units are commercial thin, fuel break construction or seed cut. By implementing the FP S&G, such as minimizing skid trails in the WIZ, very little sediment would be generated. Also included in this alternative is prescribed burning of approximately 4,200 acres, of which 98

acres are located in the WIZ. Sediment produced from prescribed fires would be minimal with the implementation of the FP S&G, such as burning when soil moistures are higher. Implementation of the commercial harvest and prescribed fire is designed to reduce the wildfire risk within the watershed, which would reduce the sediment risk from wildfire. Other actions in this alternative include watershed projects that would fix CDAs and other problem areas. In the short-term, sediment contributions may increase but over the long-term sediment will be reduced. One of the proposed projects that have the potential to produce a large amount of sediment is the restoration of the ponds at Victoria Dam and Prairie Dam, by dredging the accumulated sediment. This will be a short-term effect but these two projects have the potential of generating the most sediment of anything proposed. The effect would be fine sediment, going downstream, generated from cleaning out the accumulated sediment. This sediment would be flushed through the system and would have no long-term effects. A positive long-term effect, is the trap efficiency of the dams. See discussion under Alternative B above. The potential for increased sediment production is greater in areas where off-road motorized use is occurring. Monitoring and mitigation efforts can reduce this potential impact. Travel and recreation use in the area can have an effect on stream sediment. There is more of a balance of off-road motorized use and non-motorized use available in this alternative. Assuming effective enforcement of closures and use, this alternative could potentially provide protection to streams from sediment (or impact them) at a level between Alternatives A and B.

Bed and Bank Stability. Watershed projects will have a direct impact on bed and bank stability. Other projects would not have an impact. Projects to stabilize unstable banks, stabilizing headcuts and repairing low water crossings would all have a positive affect on bed and bank stability and reduce the past impacts. Implementation of the commercial harvest and prescribed fire is designed to reduce the wildfire risk within the watershed, which will reduce the potential floods from wildfire and maintain the bed and bank stability. There is more of a balance of off-road motorized use and non-motorized use available in this alternative. Assuming effective enforcement of closures and use, this alternative could potentially provide protection to streams from sediment (or impact them) at a level between Alternatives A and B.

Flow Regimes. Commercial and non-commercial timber activities will have the greatest effect on the flow regime under this alternative. Prescribed fire generally would not affect the flow regime unless a large amount of tree mortality occurs. The other projects would not have an effect. The commercial timber harvest under this alternative will have the most effect on flow regime of all other alternatives because the most biomass would be removed. This would in turn, move the flow regime back towards where it was prior to the establishment of the Forest Reserves--but not entirely back. In order to get as close to pre-reserve flows the whole watershed would need to be treated instead of the proposed 22%. The non-commercial timber activities will have a short-term positive effect because of the reduction of the biomass, but it would be short-term because the adjoining remaining trees will soon grow to take up the space that was occupied by the removed trees. This alternative does the best to restore flow regimes.

Cumulative Impact

Sediment. Past cumulative impacts are described under Alternative A. There would be a short-term increase to the cumulative impacts from sediment to the watershed from the earth

disturbance associated with proposed projects. Over the long-term there will be a decrease to the cumulative impacts from sediment because of the watershed projects. Wildfire sediment risk would be reduced by treatment of the stands and prescribed fire. There is still a risk from a large wildfire, which could have a large cumulative impact from sediment being delivered to the streams, but this combination of treatments would have the least risk of all alternatives.

Bed and Bank Stability. Past cumulative impacts are described under Alternative A. There would be a decrease to the cumulative impacts on the bed and bank stability with this alternative as a result of the proposed watershed projects (repairing the CDA's). Wildfire bed and bank stability risk could be reduced by treatment of the stands and prescribed fire. There is still a risk from a large wildfire, which could have the potential to impact the bed and bank stability of the streams if one were to occur, but this combination of treatments will have the least risk of all alternatives.

Flow Regimes. Past cumulative impacts are described under Alternative A. This alternative would have a very positive impact to the flow regime. Biomass would be reduced in the areas treated. However, biomass would continue to accumulate in untreated areas and would eventually offset the gain in flow that was achieved from the treatment. Prescribed fire reduces wildfire risk and treatment of stands but, if a wildfire were to occur, flow regimes would be restored to past levels.

ALTERNATIVE D

Direct/Indirect Effect

Sediment. This alternative includes commercial and non-commercial timber activities, travel management, watershed and wildlife projects. Commercial timber harvest proposes to treat approximately 4,400 acres with this alternative. Of these acres, 107 acres are located in the WIZ and have the potential to generate sediment. Ninety-one percent (91%) of these commercial units within the WIZ are either hardwood restoration or meadow restoration. The rest of the units are fuel break construction or over-story removal. By implementing the FPS &G, such as minimizing skid trails in the WIZ, there would be very little sediment generated. Implementation of the commercial harvest would reduce the wildfire risk within the watershed, which would also reduce the sediment risk from wildfire. However just implementing commercial harvest without prescribed fire leaves the watershed at risk for a large wildfire and if it occurs it could deliver a large amount of sediment to the stream channels and Canyon Lake downstream. Other actions in this alternative include watershed projects that will fix CDAs and other problem areas. This will have a direct effect on sediment. In the short-term, sediment contributions may increase but over the long-term sediment will be reduced. Travel and recreation use in the area can have an effect on stream sediment. There is more of a balance of off-road motorized use and non-motorized use available in this alternative. Assuming effective enforcement of closures and use, this alternative could potentially provide protection to streams from sediment (or impact them) at a level between Alternatives A and B.

Bed and Bank Stability. Watershed projects will have a direct impact on bed and bank stability. Other projects would not have an impact. Projects to stabilize unstable banks, stabilizing headcuts and repairing low water crossings would all have a positive affect on bed and bank stability and reduce the past impacts. Implementation of commercial harvest would reduce the wildfire risk within the watershed, which could reduce the bed and bank stability risk from wildfire. However just implementing commercial harvest without prescribed fire, still leaves the watershed at risk for a large wildfire and if it occurs, the risk for a flood is increased, thus increase the risk of destabilizing the bed and banks. There is more of a balance of off-road motorized use and non-motorized use available in this alternative. Assuming effective enforcement of closures and use, this alternative could potentially provide protection to streams from sediment (or impact them) at a level between Alternatives A and B.

Flow Regimes. Commercial and non-commercial timber activities would have the greatest effect on the flow regime. The other projects would not have an effect. The commercial timber harvest in this alternative would not have the same effect on flow regime as Alternative C. Less biomass would be removed. Treatment moves the flow regime back towards where it was prior to the establishment of the Forest Reserves, but not back as far as Alternative C. In order to get it close to pre-reserve flows the whole watershed would need to be treated instead of the proposed 11%. Non-commercial timber activities would have a short-term positive affect because of the associated reduction of biomass. But eventually adjoining remaining trees will grow to take up the space that was occupied by the removed trees. This alternative does the second best to restore flow regimes.

Cumulative Impact

Sediment. Past cumulative impacts are described under Alternative A. There would be a short-term increase to the cumulative impacts from sediment to the watershed from the proposed projects. Over the long-term there would be a decrease to the cumulative impacts from sediment because of the watershed projects (repairing the CDA's). Wildfire sediment risk could be somewhat reduced by treatment of the stands but there is still a risk from a large wildfire, which could have a large cumulative impact from sediment being delivered to the streams if one were to occur.

Bed and Bank Stability. Past cumulative impacts are described under Alternative A. There would be a decrease to the cumulative impacts on the bed and bank stability in this watershed with this alternative from the proposed watershed projects. Wildfire bed and bank stability risk could be reduced by treatment of the stands. There is still a risk from a large wildfire since prescribed fire is not a part of this alternative, which could have the potential to impact the bed and bank stability of the streams if one were to occur.

Regime Flows. Past cumulative impacts are described under Alternative A. This alternative would have a positive impact to flow regime. Biomass would be reduced in the areas that have been treated. Biomass would continue to accumulate in untreated areas and would eventually offset the gain in flow that was achieved from the treatment. This would happen sooner in this alternative because of fewer acres treated relative to Alternative C. The risk of Wildfire is reduced by the treatment of the stands, but without prescribed fire, this alternative it is not as

effective because accumulated organic material will remain on the ground that can contribute to the spread of wildfire. If a wildfire were to occur, flow regimes would be restored to a level that was present in the past.

Aquatic Ecosystems (Chemical)

Temperature/Oxygen. Summer water temperature is increased, and winter water temperature is decreased by removing shade, reducing low flows, or damaging banks so streams are wider and shallower. Dissolved oxygen is usually reduced when summer water temperature is increased. Such impacts impair the suitability of water bodies for aquatic biota.

Water Purity. Water purity can be degraded by placing concentrated pollutant sources near water bodies, applying harmful chemicals in or near water bodies, or intercepting hazardous rock strata by roads. Degrading water purity can impair or destroy use of the water body by aquatic biota, and humans. There are no known hazardous rock strata to degrade water purity within this watershed.

ALTERNATIVE A

Direct/Indirect Effect

Temperature/Oxygen. Under No Action temperature/oxygen will not be affected and will generally remain unchanged from where it is now unless a wildfire occurs. If a wildfire occurs base streamflows would be increased which could maintain or reduce stream water temperature. Also a wildfire could negatively affect stream shading, which could increase stream water temperature. How it balances out would be dependent on how a given wildfire patterns out in the watershed.

Water Purity. Under no action water purity will be unaffected and will remain unchanged from current conditions.

Cumulative Impact

Temperature/Oxygen. There have been past impacts in the watershed that have affected the temperature/oxygen in the streams. These impacts are generally road related and usually associated with low water stream crossings and are identified in the CDA section of the Watershed Report held in the Project File. These low water crossings widen the stream, allowing the water to sit in pools and gather solar radiation. This increases water temperature. The more low water crossings within the watershed, the bigger the impact. Another impact, but not as noticeable, is due to fire suppression, which has resulted in the increase of biomass across the entire forest. Increased biomass has resulted in an increase in evapotranspiration and less water available for groundwater recharge or streamflow, resulting in reduced base streamflows. These reduced base streamflows can result in increased stream temperature due to less water.

This change is slow to occur and happens over decades. Past timber activities have helped slow the increase of the biomass.

No increase or decrease in cumulative impacts to temperature/oxygen within the watershed is anticipated within this planning period. An exception to that is if a wildfire occurs, which could have a positive or a negative effect on stream temperature. However, without reducing the biomass in the watershed, there would be a general trend to reduce base streamflows slowly as the biomass increases. This trend will potentially increase water temperature and reduce oxygen availability over the decades.

Water Purity. There are no known concentrated pollutant sources in the watershed from past or present activity and no known harmful chemicals applications near water bodies occurring in the past, present or anticipated within the watershed. There will no increase or decrease to the cumulative impacts to water purity within the watershed with this alternative.

ALTERNATIVE B

Direct/Indirect Effect

Temperature/Oxygen. Watershed projects will have the greatest positive affect on stream temperature. Projects to repair low water crossings will lower stream temperatures by eliminating pools of water and solar radiation gains at the crossings. Other proposed activities will have limited or no effect on stream temperature. Prescribed fire will reduce some of the risk of wildfire. The effects of wildfire are described in Alternative A.

Water Purity. None of the activities proposed in under this alternative involves placing concentrated pollutant sources near water bodies or applying harmful chemicals near water bodies. See the Watershed/Soils Report held in the Project File for adherence to the Forest Plan Management Requirements (FPMR), Standard 1211.

Cumulative Impact

Temperature/Oxygen. Cumulative impacts from past activities are as described under Alternative A. Additionally, positive impact to stream temperature will occur under this alternative primarily from the corrective and protective measures resulting from the watershed projects.

Water Purity. There are no known concentrated pollutant sources in the watershed from past or present activity and no known harmful chemicals applications near water bodies occurring in the past, present or anticipated within the watershed. Activities in this alternative will not increase or decrease the cumulative impacts to water purity within the watershed.

ALTERNATIVE C

Direct/Indirect Effect

Temperature/Oxygen. Watershed projects will have a comparatively greater positive effect on stream temperature in this alternative. Projects to repair low water crossings will lower stream temperatures by eliminating the pools of water at the crossings, thus reducing the solar radiation gain on the streams. Plus, reducing the stand density on 22% of the watershed with timber activities will provide an increased positive effect on stream temperature. Biomass will be reduced to a greater extent resulting in more water being available for streamflow. More water will help maintain stream temperatures.

Water Purity. Same as Alternative B.

Cumulative Impact

Temperature/Oxygen. Cumulative impacts from past activities described under Alternative A are applicable. This alternative would have a positive impact to stream temperature and oxygen availability, primarily from the watershed projects. Vegetation treatment contributes positively by making more water being available for streamflow with the decreased biomass.

Water Purity. Same as Alternative B.

ALTERNATIVE D

Direct/Indirect Effect

Temperature/Oxygen. Effects are similar to those under Alternative C. Reducing the stand density on 11% of the watershed with vegetation treatment activities will have some positive effect on stream temperature.

Water Purity. Same as Alternative B.

Cumulative Impact

Temperature/Oxygen. See Alternative C.

Water Purity. Same as Alternative B.

Aquatic Ecosystems (Biological)

Aquatic Life. Migration barriers, changed flow regimes, riparian damage, big sediment loads or chemical loads, can degrade aquatic life such as fish, frogs and aquatic insects. Flow regimes are

discussed under the flow regime section. Sediment loads are discussed under the sediment section and chemical loads are discussed under water purity section of this report.

ALTERNATIVE A

Direct/Indirect Effect

Under No Action, aquatic life will be unaffected and will generally remain unchanged unless a wildfire occurs. Wildfire has the potential of affecting aquatic life by changing flow regimes or increasing sediment loads. One culvert in the project area was identified as being installed too high. This will continue to be a migration barrier to aquatic life.

Cumulative Impact

From a watershed perspective, there will be no increase or decrease to the cumulative impacts to aquatic life within the watershed with this alternative.

ALTERNATIVES B, C and D

Direct/Indirect Effect

These alternatives include limited commercial timber activities, non-commercial timber activities, prescribed fire, travel management, watershed and wildlife projects. The only project that will affect aquatic life is a watershed project. Repairing the high culvert will restore aquatic life migration--a positive impact. Other activities will not affect aquatic life.

Cumulative Impact

Cumulative impacts are as described under Alternative A.

Soil Productivity

The long-term maintenance of site productivity is a goal of the 1997 Black Hills National Forest Land and Resource Management Plan (LRMP), and part of the mission of the Forest Service. Soil erosion, soil compaction, nutrient removal, soil heating and regeneration hazards can limit the long-term productivity of forested sites. All analysis is based on Natural Resource Conservation Service (NRCS) soil surveys and the Black Hills National Forest Soil Interpretation Notebook.

Soil Erosion. Erosion can impair long-term soil productivity if soils are heavily disturbed on shallow or highly erodible soils. Evidence of severe erosion is rills or pedestals.

Soil Compaction. Soil compaction is caused by excess weight of vehicles and animals. It impairs infiltration, root growth, and soil biota. Activities on soils subject to compaction, when wet, can change the characteristics of these soils, causing more runoff or resulting in poor plant growth. Implementing FPS&G restrictions on these soils by allowing activities only when the soils are dry or frozen, will mitigate these problems and will minimize the overall impacts as the result of the activities.

Nutrient Removal. Soil fertility depends on organic matter and nutrients. Soil productivity can be degraded if humus and topsoil, or even excess leaves, needles and limbs, are taken off site.

Soil Heating. Soil heating is caused by severe fires that occur when humus and large fuels are dry and are consumed near the ground. Soil heating sterilizes the soil, alters soil physics, consumes organic matter, and removes much of the site nutrients.

Regeneration Hazard. This is discussed in the Silviculture section later in this chapter.

ALTERNATIVE A

Direct/Indirect Effect

Soil Erosion. Under No Action, soil erosion will generally not be affected and remain unchanged. Problems identified where erosion is currently occurring would continue to occur. These problems are generally road related and are listed in the watershed project list. If a wildfire occurs, soil erosion will take place. In areas where the duff layer is removed soil erosion will occur until the duff layer is re-established.

Soil Compaction. No effect under No Action.

Nutrient Removal. No effect under No Action.

Soil Heating. No effect under No Action. By doing nothing, the potential effects from a wildfire remain and increases as the density of trees increase and the organic matter continues to accumulate.

Cumulative Impact

Soil Erosion. Soil erosion from past, present and anticipated activities are often road related, where water has been concentrated. Areas that were identified during field inventory are listed in the Watershed Report held in the Projects File. The Westberry and Horse Creek fires occurred in the watershed resulting in soil erosion--but have since recovered. There will be no increase or decrease to the cumulative impacts from soil erosion in the watershed with this alternative. If a large wildfire occurs, it will have a large impact on soil erosion.

Soil Compaction. There have been past activities in the watershed that may have caused soil compaction problems. These are generally activities that involve using heavy equipment at the

wrong times. Areas with these problems have not been identified. Soil compaction is not permanent and when it occurs, natural process such as freeze/thaw help break up these conditions. There will be no increase or decrease to the cumulative impacts from soil compaction to the watershed with this alternative.

Nutrient Removal. Events in the watershed that have affected soil nutrients include the Horse Creek and Westberry Fires. These and other wildfires generally remove organic duff layer or humus layer. This has a direct effect in that the humus layer will need to rebuild, which will take years. During this time there will be less nutrients available to vegetation. There will be no increase or decrease to the cumulative impacts to the soil nutrients in the watershed under no action. If a wildfire occurs, there will be effects to soil nutrients in proportion to the scope and intensity of the fire.

Soil Heating. The Horse Creek and Westberry fires have affected soil heating in the recent past. These and other wildfires generally occur when conditions are dry and result in soil heating that causes the problems described above. There will be no increase or decrease to the cumulative impacts from soil heating in the watershed with this alternative--unless a wildfire occurs, which will have a large impact on soil heating.

ALTERNATIVE B

Direct/Indirect Effect

Soil Erosion. Commercial timber harvest is proposed to treat over 300 acres in this alternative. Of these acres, 239 acres are located on soils with a high or very high erosion hazard rating. These commercial units are fuel break construction. Also, substantial areas of non-commercial thinning and prescribed fire are planned in this alternative. By implementing the FP S&G, which includes WCPs and BMPs, there would be very little soil erosion occurring for short distances from these activities. Other actions in this alternative include watershed projects that would minimize soil erosion problems. These projects could have a direct and largest effect on soil erosion in the short-term. But over the long-term soil erosion would be reduced. Travel and recreation use in the area can have an effect on soil erosion. Assuming effective enforcement of closures and use, this alternative could potentially provide the best protection from soil erosion because the least area is open to off-road motorized use and possible vehicle use in areas with erosive soils.

Soil Compaction. A portion of the vegetation treatment area and prescribed burn sites are located on soils subject to compaction from equipment used to operate. By implementing the FP S&G, which include WCPs and BMPs, there would be negligible soil compaction occurring.

Nutrient Removal. Soils with low organic matter are located in portions of the vegetation treatment area and prescribed burn sites. Implementing the FPS&G, which includes WCPs and BMPs, on these soils, will minimize any impacts on soil nutrients. Other actions that would benefit soil nutrients is the planned prescribed fire. The burns are planned to take place under set conditions, and designed to not consume the entire organic layer of the soil. This will also

reduce the intensity and severity of future wildfire if one were to occur and would have a positive effect on soil nutrients.

Soil Heating. Prescribed fire will have the greatest positive effect on soil heating by reducing the fuels. This will minimize the effects of a wildfire if one were to occur. The vegetation treatment activities will also help in reducing the density of the trees and any potential indirect effect on soil heating.

Cumulative Impact

Soil Erosion. See cumulative impacts described under Alternative A. There would be a short-term increase to the cumulative impacts from soil erosion in the watershed from the proposed projects. Over the long-term there would be a decrease to the cumulative impacts from soil erosion because of the watershed projects. Wildfire soil erosion risk could be somewhat reduced by prescribed fire and vegetation treatment. A large wildfire could have a large cumulative impact to soil erosion if one were to occur.

Soil Compaction. Past cumulative impacts are described under Alternative A. There is some potential to increase the cumulative impact of soil compaction from this alternative given the vegetation treatment activities proposed. However, by implementing FP S&Gs, which include WCPs and BMPs, there would be little soil compaction occurring.

Nutrient Removal. Past cumulative impacts are described under Alternative A. There is a small potential to increase the cumulative impact to soil nutrient from this alternative within the watershed with the vegetation treatment activities that occur on low organic soils. Impacts from wildfire will be reduced with the proposed prescribed fire.

Soil Heating. Past cumulative impacts are described under Alternative A. There would be negligible cumulative impacts from soil heating in the watershed with this alternative. This alternative also reduces the risk of soil heating from wildfire with prescribed fire.

ALTERNATIVE C

Direct/Indirect Effect

Soil Erosion. Commercial timber harvest is proposed to treat approximately 8,800 acres with this alternative. Of these acres, 6,176 acres are located on soils with a high or very high erosion hazard rating. These commercial units have a variety of treatments. Also, non-commercial thinning and prescribed fire are planned in this alternative. By implementing the FP S&G, which includes WCPs and BMPs, there would be very little soil erosion occurring and it would be only movements for short distances. See Alternative B for other anticipated effects. There is more of a balance of off-road motorized use and non-motorized use available in this alternative. Assuming effective enforcement of closures and use, this alternative could potentially provide protection to erosive soils (or impact them) at a level less than Alternative B.

Soil Compaction. A portion of the vegetation treatment area and prescribed burn sites are located on soils subject to compaction from heavy equipment used to operate. This alternative treats the most acres. Thus, there is greater opportunity to affect soils considered highly compactive. However, by implementing the FP S&G, which include WCPs and BMPs, soil compaction would be kept to a minimum.

Nutrient Removal. See effects described under Alternative B.

Soil Heating. This alternative will have the most benefit to reducing the soil heating impacts. It is done through a combination of reducing the stand densities with vegetation treatment and prescribed fire on the largest number of acres.

Cumulative Impact

Soil Erosion. See effects described under Alternative B.

Soil Compaction. See Alternative B. Because the largest number of acres are treated with heavy equipment in this alternative, there is the most opportunity to affect highly compactive soils. But as stated above, by implementing the FP S&G, which include WCPs and BMPs, cumulative contribution to soil compaction would be minimized.

Nutrient Removal. Past cumulative impacts are described under Alternative A. There is potential to increase the cumulative impact to soil nutrients from this alternative within the watershed. Activities on low organic soils will affect the most acres with this alternative. This effect is not considered significant. The potential effects from wildfire will be reduced the greatest with this alternative with the combination of prescribed fire and vegetation treatments to reduce stand density.

Soil Heating. Past cumulative impacts are described under Alternative A. There will be negligible cumulative impact from soil heating in the watershed with this alternative. This alternative is the best at reducing the risk of wildfire and the potential impacts on soils from heating.

ALTERNATIVE D

Direct/Indirect Effect

Soil Erosion. Commercial timber harvest is proposed on approximately 4,400 acres with this alternative. Of these acres, 3,448 acres are located on soils with a high or very high erosion hazard rating. These commercial units have a variety of treatments. Also, non-commercial thinning is planned in this alternative. By implementing the FP S&G, which includes WCPs and BMPs, there would be very little soil erosion occurring and it would be only movements for short distances. See Alternative B for other anticipated effects. There is more of a balance of off-road motorized use and non-motorized use available in this alternative. Assuming effective

enforcement of closures and use, this alternative could potentially provide protection to erosive soils (or impact them) at a level less than Alternative B.

Soil Compaction. Portions of the vegetation treatment area are located on soils subject to compaction from heavy equipment used to operate. This alternative has the second greatest potential to impact soils with soil compaction because it has the second most acres treated. However, by implementing the FP S&G, which include WCPs and BMPs, soil compaction would be kept to a minimum.

Nutrient Removal. Soils with low organic matter are located in portions of the vegetation treatment area. Implementing the FPS&G, which includes WCPs and BMPs, on these soils, will minimize any impacts on soil nutrients. There is no prescribed burning in this alternative to affect soil organic matter.

Soil Heating. The vegetation management activities have the potential to reduce the effect of soil heating by reducing the stand density and reducing the wildfire potential. No prescribed burning is planned in this alternative.

Cumulative Impact

Soil Erosion. See effects described under Alternative B.

Soil Compaction. Past cumulative impacts are described under Alternative A. There is a moderate potential to increase the cumulative impact of soil compaction from this alternative within the watershed with the moderate amount of commercial and non-commercial activities planned. However, by implementing the FP S&G, which include WCPs and BMPs, there would be minimal additional soil compaction.

Nutrient Removal. Past cumulative impacts are described under Alternative A. There is potential to increase the cumulative impact to soil nutrients from this alternative within the watershed. Activities on low organic soils will affect the second most acres of all alternatives. Impacts from wildfire will be reduced with the reduced stand densities, but without prescribed fire to reduce the fuels, the potential effects on soil organic matter remain.

Soil Heating. Past cumulative impacts are described under Alternative A. There will be minimal cumulative impact from soil heating in the watershed with this alternative. Vegetation treatment in this alternative reduces the risk of wildfire by reducing the density of stands. However, without prescribed fire, the potential impact from heating will still remain.

Geologic Hazards

Landslides. Soil creep, debris avalanches and flows, slumps, and earth flows can occur on unstable slopes if roads overload or undercut them, vegetation is removed from them, or runoff is

emptied onto them. Hazard depends on type of disturbance, nature of earth material, and water content.

Soil Failures. Soil failures include land subsidence, shrinking and swelling soils, and collapsing soils. Removal of subsurface fluids or materials, or changed hydrology on certain soil types, can induce soil failures.

ALTERNATIVE A

Direct/Indirect Effect

Landslides. No effects under No Action.

Soil failures. None of the proposed activities or lack of activities will have an effect on soil failures. Soil failures are not a concern within the Prairie Project Area.

Cumulative Impact

Landslides. Past activities within the watershed have not caused problems with landslides. There will be no increase or decrease to the cumulative impacts from landslides in the watershed.

Soil Failures. None of the activities in the watershed in the past have affected soil failures or soil failure risks. There will be no increase or decrease to the cumulative impacts to soil failures within the watershed with any alternative.

ALTERNATIVES B, C and D

Direct/Indirect Effect

Landslides. Vegetation treatment could have a potential effect on landslides because some activities occur on slopes greater than 20% and some greater than 40% with mass wasting potential soils. Activities on these soils will be restricted and will follow FPS&G to reduce the risk of landslides. There should be no affect on landslides.

Soil Failures. See Alternative A.

Cumulative Impact

Landslides. Past cumulative impacts are described under Alternative A. There will be negligible cumulative impacts from landslides in the watershed with these alternatives.

Soil Failures. See Alternative A.

Special Areas

Riparian Ecosystems. Riparian ecosystems provide shade, bank stability, fish cover, and woody debris to aquatic ecosystems. They also provide key wildlife habitat, migration corridors, sediment storage and release, and surface-ground water interactions. Composition and structure of riparian vegetation can be changed by actions that remove certain species age classes.

Wetlands. Wetlands control runoff and water quality, recharge ground water, and provide special habitats. Actions that may alter their ground cover, soil structure, water budgets, drainage patterns, and long-term plant composition can impair these values.

Floodplains. Floodplains are natural escape areas for floods that temper flood stages and velocities.

ALTERNATIVE A

Direct/Indirect Effect

Riparian Ecosystems, Wetlands and Floodplains. This alternative will have no new activities within the watershed so there will be no impact or effect on riparian ecosystems, wetlands or floodplains.

Cumulative Impact

Riparian Ecosystems, Wetlands and Floodplains. Activities in the past that have affected the riparian areas are grazing and roads. Cattle affect riparian areas when grazing and looking for water. Impacts include trampling the area creating a hummocky landscape or damaging the stream bank because the area is wet. Grazing the vegetation too much for a long period of time can change the species composition of the area. Roads crossing riparian areas have a direct effect by eliminating these areas at the crossing. There will be no increase or decrease to the cumulative impacts to riparian ecosystems, wetlands or floodplains within the watershed with this alternative.

ALTERNATIVE B

Direct/Indirect Effect

Riparian Ecosystems, Wetlands and Floodplains. Projects that have the potential to affect the riparian areas are roads related to vegetative management activities and watershed projects dealing with stream crossing. Improvement to the existing stream crossings will occur where problems have been identified and these improvements will enhance the riparian ecosystems, linear wetlands and floodplains by reducing the area impacted. Effects will be minimized with repair of stream crossings that meet design standards. There will be no new impacts as a result

of the proposed projects. Alternative B has some hardwood work proposed (non-commercial only), which has an effect but less than Alternatives C and D.

Cumulative Impact

Riparian Ecosystems, Wetlands and Floodplains. Past cumulative impacts are described under Alternative A. There will be a decrease to cumulative impacts to the riparian ecosystems, wetlands and floodplains within the watershed with this alternative. Repair of stream crossings will occur, reducing the area involved, allowing the riparian areas to re-establish over time.

ALTERNATIVE C

Direct/Indirect Effect

Riparian Ecosystems, Wetlands and Floodplains. The projects that have the potential to affect the riparian ecosystems, wetlands and floodplains are roads related to vegetative management activities and watershed projects dealing with stream crossing. Improvement to the existing stream crossings will occur where problems have been identified and these improvements will enhance the riparian ecosystems, linear wetlands and floodplains by reducing the area impacted. Hardwood and meadow restoration will remove the pine that has encroached into these areas and this will enhance the riparian ecosystem where these treatments are near riparian areas. The effects on riparian areas will be less with repair of stream crossings that adhere to design standards. There will be no new impacts as a result of the proposed projects.

Cumulative Impact

Riparian Ecosystems, Wetlands and Floodplains. Past cumulative impacts are described under Alternative A. There will be a decrease to the cumulative impacts to the riparian ecosystem, wetlands and floodplains within the watershed with this alternative. Repair of stream crossings will occur, reducing the area involved, allowing the riparian ecosystem and linear wetland to re-establish over time. Also pine will be removed in riparian ecosystems that had originally supported meadows or hardwoods. This will enhance the riparian ecosystems. There will be minimal negative cumulative impacts to these watershed components with this alternative.

ALTERNATIVE D

Direct/Indirect Effect

Riparian Ecosystems, Wetlands and Floodplains. See discussion under Alternative C.

Cumulative Impact

Riparian Ecosystems, Wetlands and Floodplains. See discussion under Alternative C.

Summary of Cumulative Effects of All Alternatives

The PPA is located within two HUC 6 watersheds, Middle Rapid Creek and portions of the Lower Rapid Creek. This comprises an area of 39,139 acres. Land uses and events within this watershed include timber harvest and non-commercial thinning, wildfire, grazing, private land ownership and development for residential housing and roads. All of these activities or events individually have an impact on the watershed. This results in a cumulative impact on the watershed. Reference is made to the Watershed report for further disclosure of cumulative effects from past, present and future activities in the Prairie Project watershed.

Land uses and events contribute to the cumulative watershed impacts, some more than others. Some are short-term impacts that disappear with time, while with others the impacts persist. These combined uses in the watershed have not impacted the watershed to the point that the beneficial uses have been affected.

The proposed action (Alternative C) plans to impact up to 22% of the lower Middle Rapid Creek watershed with commercial timber harvest, 15% noncommercial timber activities, 19% with prescribed fire and a reduction of the road mileage. These impacts are right in line with what the watershed have been subject to in the past. These actions in this watershed will not affect the beneficial uses in this watershed or downstream.

As land managers it is wise to take opportunities to fix problems as opportunities arise or are identified, thus reducing the cumulative impacts on the watershed. The watershed projects that have been identified in the PPA are those areas identified during the fieldwork that are affecting the watershed. Repairing these areas as outlined in the Watershed Report held in the Project File will reduce the cumulative impacts to the watershed.

TRANSPORTATION

Affected Environment

Primary roads that provide access into the Prairie Project Area, from the city of Rapid City, are State Highway 44 and Sheridan Lake Drive (Forest System Road 433). Both roads connect with US Highway 385 (Forest Highway-1), which provides access to the project area from the cities of Hill City, Deadwood and Lead.

The transportation system within the project area is comprised of approximately 292 miles of existing roads. Of this total, U.S. and state highways account for 22 miles and county jurisdiction roads account for 10 miles. There are 116 miles of Forest System Roads (FSR), 108 miles of unclassified roads on forest land, and 37 miles of roads on private property with no Forest Service jurisdiction. Currently, 73 road miles are closed yearlong and an additional 46 road miles are closed seasonally, resulting in an open road density of 4.0 miles per square mile from May 15 to December 15 and 3.14 miles per square mile from December 15 to May 15.

Within the Prairie Project Area, 32 miles of road are maintained by the State or Pennington County and the Forest Service maintains 19 miles of system road annually. The remaining system roads are reviewed for maintenance needs every five years, or sooner if identified for other management needs or causing resource damage. The unclassified roads are not maintained unless identified for project needs.

Environmental Consequences

No changes to the transportation system would occur under Alternative A, but periodic routine maintenance would occur.

The proposed transportation system would vary somewhat between the action alternatives. Reconstruction activity would bring road standards up to the minimum necessary to accommodate commercial timber haul while protecting soil and water resources. Construction of existing unclassified roads (FSR conversion) would also bring roads up to minimum standards necessary for commercial haul while protecting soil and water resources. New road construction would be needed to access presently inaccessible commercial timber in alternatives C and D. All new roads are proposed to be closed after activities. Temporary roads may also be needed to access portions of proposed units and would be obliterated after activities. Proposed yearlong and seasonal closure of forest system roads and decommissioning of existing system and unclassified roads would reduce the open road density. Table 3-1 through Table 3-3 summarize mileages contained within the alternatives. Appendix E, Maps 18-21 display the existing and proposed travel management activities.

Table 3-1 Action Alternatives – Activity in miles (approximate)

Activity	Alternative B	Alternative C	Alternative D
Maintenance	11	45	42
Reconstruction System Road	7	23	18
New Construction	0	3	1
Estimated Cost*	\$82,900	\$402,700	\$293,100

* The alternatives road cost summary and individual road costs are located in the Project File.

Table 3-2 Road Management – Open Motorized

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Open Roads and Motorized Trails*	174	131	168	133
Seasonal Roads and Motorized Trails	46	0.0	20	60
Open Road Density May 15 – Dec. 15	3.97	2.36	3.39	3.49
Open Road Density Dec. 15 – May 15	3.14	2.36	3.04	2.41

* Includes 68 miles of other jurisdiction (US and State Highway, County and private roads)

Table 3-3 Road Management – Closed and Decommissioned Motorized

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Closed Roads*	35	78	46	37
Non-motorized Trails ⁺	0.0	27	11	8
Decommissioned	38	59	50	55
Decommission Costs**	⁺⁺	\$17,640	\$15,030	\$16,530

* Roads physically closed yearlong or gated/posted for Administrative/Special Use only

⁺ Unclassified roads identified through the roads analysis to be converted to non-motorized trails

** Estimated closure costs are discussed and provided in the Project File.

⁺⁺ Further field surveys and analysis need to be completed to determine cost of reinforcing existing closures

Open roads would include management strategies ranging from high standard suitable for all types of vehicles to those primitive roads where off-highway vehicles (OHV's) are required. Closed roads would be managed such that motor vehicles use is prohibited via a closure order or the road is physically barricaded to all traffic. Decommissioned roads would be obliterated from use. A more detailed description of these management strategies is provided in the Transportation Report held in the Project File. The existing and proposed Travel Management Strategy for each road segment by alternative is also listed in the Transportation Report held in the Project File and the Travel and Recreation Use section in this chapter.

ALTERNATIVE A

Alternative A, the no action alternative, maintains the current road system. No additional roads would be closed and the open road density would remain the same. Current road closures in the project area range from totally effective to non-effective. Additional funding would be needed to reinforce these existing closures.

Some segments of roads are located in drainage bottoms creating drainage problems and rutting. A few drainage crossings and structures are also not adequate to prevent sediment movement. Some existing user defined roads have no drainage structures and poor alignment and location, which are contributing to drainage problems. Direct, indirect and cumulative effects from possible continued sediment contribution would continue to occur.

As budgets continue to decline, fewer roads within the areas would be maintained at current standards. This may contribute to increased sediment delivery to drainages and decreased positive driving experiences as the roads become difficult to navigate (see Watershed Geology / Soils section).

ALTERNATIVES B, C, & D

Under all action alternatives, the existing arterial and collector roads would remain open to the public year-round and also receive maintenance year-round, but the existing local roads would vary by alternative. Open local roads would be managed to accommodate high clearance vehicles but not low clearance passenger vehicles. These open roads would generally be

maintained at 5-year intervals. Roads closed seasonally would be closed with a gate or barrier and receive maintenance every 5 years. Roads closed yearlong for administrative use only would be gated with use legally prohibited (closure order) and maintenance done at 5-year intervals as needed. Roads closed/stored would be physically barricaded and maintained every 5 years. Roads decommissioned would be removed from the forest road system. See Table 3-4 below for a summary of travel management miles for existing system roads. It should be emphasized that the Table 3-4 applies to National Forest System Roads only.

Table 3-4 Travel Management Miles for Existing System Roads and Decommissioned Roads

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Open Roads	62	50	67	51
Closed Road (Seasonal*)	19	0.0	16	39
Closed Road (Yearlong)	31	54	24	19
Closed/Stored Roads	4	8	5	4
Decommission	0	3	3	3

*Seasonal Closure in winter-spring (Dec. 15 - May 15)

The proposed transportation system under Alternative B would add 7 miles of road to the forest road system by converting these unclassified roads to FSR. Of this total mileage, 3 miles would remain open, 4 miles would be closed yearlong and 0.5 miles would be physically closed and ‘stored’ for future use. Any temporary road construction and all other unclassified roads would be decommissioned.

The proposed transportation system under Alternative C would add 16 miles of road to the forest road system by converting 13 miles of unclassified roads to FSR and constructing 3 miles of FSR. Of this total mileage, 7 miles would remain open yearlong, 1 mile would be closed seasonally, 3 miles of new construction would be closed yearlong and 5 miles would be physically closed and ‘stored’ for future use. Any temporary road construction and all other unclassified roads would be decommissioned.

The proposed transportation system under Alternative D would add 15 miles of road to the forest road system by converting 14 miles of unclassified roads to FSR and constructing 1 mile of FSR. Of this total mileage, 3 miles would remain open yearlong, 6 miles would be closed seasonally, 3 miles would be closed yearlong and 3 miles would be physically closed and ‘stored’ for future use. Any temporary road construction and all other unclassified roads would be decommissioned.

Alternatives B, C and D would reduce the open road density as shown in Table 3-2. Fewer road miles would be open and more road miles would be closed or decommissioned which would enable the Forest Service to better meet their ability to maintain these roads. Direct, indirect and cumulative effects to the aquatic and terrestrial ecosystem would also diminish as roads are closed or decommissioned.

Roads utilized under the action alternatives would be reconstructed or constructed and maintained in accordance to the Engineering Design Guidelines and Best Management Practices

Compliance that are listed in the Transportation Report held in the Project File. Proposed corrective actions for existing conditions with soil and water problems are listed in the Specific Concerns under the Best Management Practices Compliance. The direct, indirect and cumulative effects of sediment contribution would diminish as these actions are taken.

Cumulative Effects

Under all the action alternatives, fewer road miles would be open and more road miles would be closed or decommissioned which would reduce the overall road maintenance costs. Alternative B would reduce the open road miles and would cost the least in terms of Activity cost (\$82,900). Alternative C would have more open road miles than the other alternatives, except for the no action alternative. Estimated Activity cost for Alternative C would be the highest (\$402,700). The open road mileage and Activity cost (\$293,100) of roads in Alternative D would fall between Alternatives B and C.

Under all action alternatives, identified roads would be reconstructed to stabilize road surfaces, to improve and provide adequate drainage structures, and to reduce future maintenance costs and sediment contribution. Alternative C would reconstruct and improve the most miles, followed by Alternative D, and then by Alternative B.

MINERALS

Affected Environment

Minerals can be divided into three categories on National Forest System lands. This includes locatable, leaseable, and saleable minerals. Locatable minerals are those such as gold, copper, and silver and other metals, which can be claimed under the mining laws. A person or company files a mining claim when they have found something of value, and must get approval from the Forest Service before conducting any surface disturbing activities. There are mining claims located within the project area, but none that are conducting active operations.

Leasable minerals include deposits such as oil and gas or coal. Leases are awarded at the discretion of the government for these types of minerals. There are no mineral leases within the project area and the potential for these types of minerals is low in this area. Saleable minerals include such things as sand and gravel and building stone. The project area contains deposits of saleable type minerals but none are being developed at this time.

Environmental Consequences

There should be no direct, indirect, or cumulative effects to the mineral resource or to mining claimants from any of the alternatives.

BIOLOGICAL ENVIRONMENT

This section will describe the affected environment and environmental consequences for each alternative to the Biological Environment (Vegetation, Fire and Fuels, Range, Noxious and Invasive Weeds, and Wildlife Habitat).

VEGETATION

Affected Environment

Timber has been harvested in this area for more than a century. Records indicate that harvesting within the area has occurred as far back as the late 1800's and provided timber for the gold rush. Harvesting has occurred within the area every decade since the turn of the century. Significant harvesting occurred around the turn of the century, post World War I during the 1920's, again during and after World War II and extending into the early 1950's. Since the 1950's and into the 60's and 70's harvesting levels remained relatively constant until the mid 1980's through the mid 1990's. Timber harvest levels increased during this time period and affected much of the project area.

Commercial harvests and non-commercial thinning from the late '80's through the early '90's occurred on about 54% of National Forest lands. Many treatments were designed to lower the basal area to promote increased growth and vigor as well as lessen susceptibility to Mountain Pine Beetle attack.

Records indicate that 22 timber sales yielding 71 million board feet (MMBF) and covering nearly 34,000 acres in or near the project area have occurred over the past 20 years. During this period non-commercial thinning of 11,723 acres of ponderosa pine has occurred within the project area. Revenues from timber sale receipts have funded a large number of resource improvement activities within the project area. Activities include:

- Fuels Treatments
- Wildlife Habitat Improvements
- Watershed Protection
- Range Habitat Improvements
- Harvest Treatments
- Reforestation
- Inventories and Surveys
- Wildlife Habitat Surveys

Interviews with the State of South Dakota Foresters and personal knowledge reveal numerous silvicultural activities have occurred on private land within the project area over the past 25 years. These activities cover approximately 490 acres of timber harvesting and 75 acres of non-

commercial thinning. Not included in the figures are land clearing and thinning activities for rural homes and subdivisions, which approximates 500 acres.

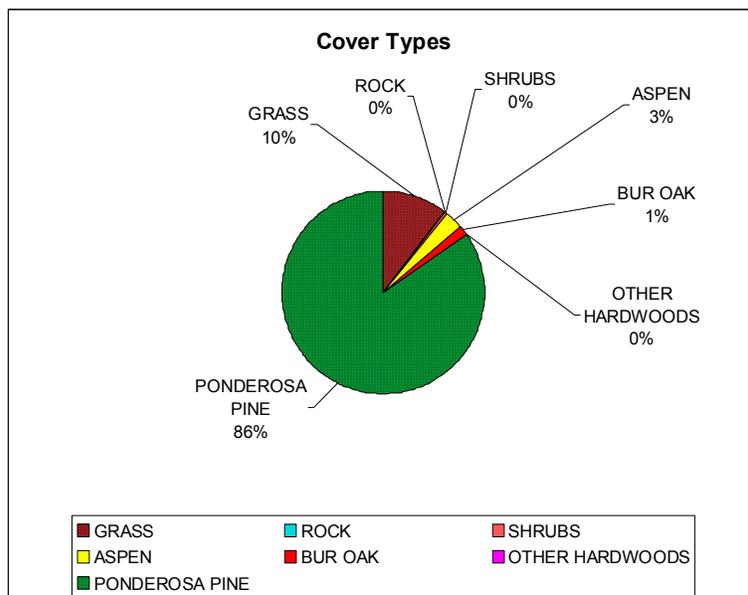
Fuel-loading:

Most of the slash from past harvesting and non-commercial thinning has been treated to a point where existing fuels are at levels below forest plan standards. Approximately 20% of the area has had treatments that have reduced the crown spacing to a level that would reduce the risks of a crown fire.

Plant Species Composition:

The vast majority of the forested acres are ponderosa pine (24,606 acres). Other cover types include 876 acres of aspen, 371 acres of oak, 21 acres of other hardwoods (see Figure 3-1). There are numerous small inclusions (10 acres and less in size) of oak, aspen and other hardwoods well distributed throughout the area. These are usually very productive pine sites where pine will eventually take over the site if no treatment is done. In addition, there are 3,018 acres of grassland, 97 acres of shrubs and 30 acres of rock and barren land. Some of these areas have pine encroaching on them.

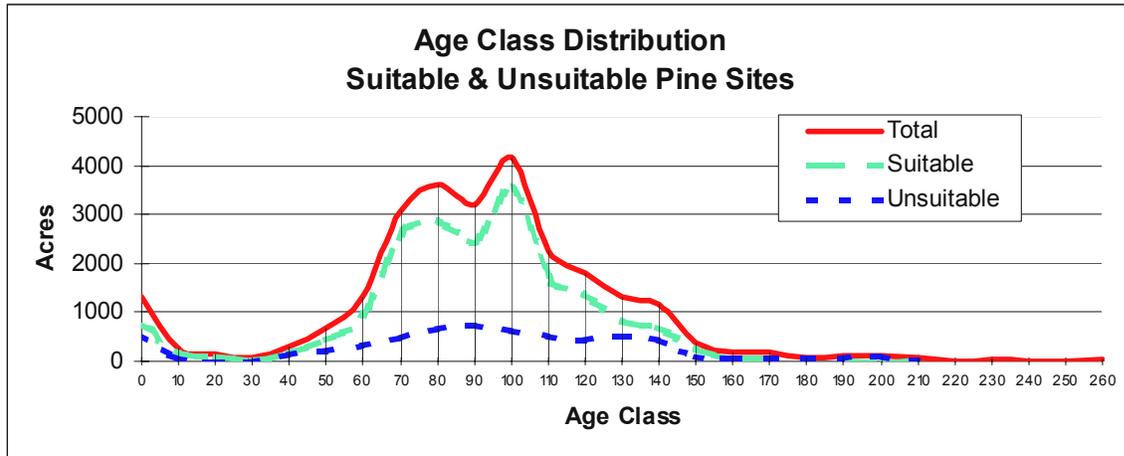
Figure 3-1 Cover Types



Age Class Distribution:

Approximately 8,690 acres (45%) of the suitable pine acres inventoried, within the project area, are greater than 100 years of age. 8,880 acres (46%) of the suitable pine acres are between 60 and 99 years old, with 1,759 acres (9%) being 59 years or less.

Figure 3-2 Age Class Distribution



The distribution of age classes ranges from 1 to 260 years with the majority of stands in the 70 to 110 year age classes. The age class curve is a bell shaped curve with the greatest acreage in the 100-year class as illustrated above. The majorities of the stands were regenerated post European settlement and are indicative of intensive harvest activities and fire protection occurring within the last 130 years.

Stocking Level:

Approximately 4,954 acres of the pine type have stocking levels outside desired Forest Plan levels (See Appendix H-3 of the Forest Plan). Of that acreage, 2,352 acres (9.6% of the inventoried area in the suitable base) have stocking levels below desired levels and 2,602 acres (10.6% of the inventoried area in the suitable base) are above desired levels. Stands with stocking levels below generally can be brought up to the desired level with natural or artificial regeneration. Stands with stocking above the desired levels will generally need to be thinned. Each stand was evaluated using diameter at breast height (DBA), basal area (BA), stand density index, trees/acre and average maximum densities to determine stocking levels.

About 4,917 acres (25%) of the suitable pine acres have a basal area greater than 100 square feet and are at or approaching an overstocked condition. Another 10,523 acres (55%) are between 60 and 100 basal area, which is usually considered fully stocked. 3,894 acres (20%) are less than 60 basal areas, which can be considered under-stocked using basal area standards. Although basal areas are generally a good indication of stocking in most sawtimber and poletimber stands, it doesn't represent smaller diameter stands (less than 6' dbh) nor large diameter stands (greater than 16' dbh) well.

Regeneration:

Pine regeneration is occurring in the project area where the crown canopy is open and where competition from grasses and forbs is low. In areas where grasses have invaded the site, regeneration is at moderate to low levels. The most common plant association in the area is ponderosa pine/snowberry, which appears to favor pine regeneration.

Insects & Disease:

Current losses from insect and disease are at an endemic level. Western gall rust (*Peridermium harknessii*) has been observed in the area. The result will be reduced growth of the pine stands to a certain extent but should not be considered a major threat to the merchantability of the stands in the area. Armillaria root disease (*Armillaria ostoyae*) is another important disease in the Black Hills that kills trees by killing the cambium and effectively girdling the trees and causing decay of both sapwood and heartwood. Within the project area there is little evidence of armillaria centers and can be considered a minor problem. Also, Red rot disease (*Dichomitus squalens*) and Diplodia tip blight (*Sphaeropsis sapinea*) generally have occurred at very low levels, but with recent damage to pine from hailstorms there has been a noticeable increase in minor amounts. Other diseases that occur in the tree species either are occurring infrequently or have not been observed.

Much of the area has had harvesting and non-commercial thinning activities. Slash buildup from these activities has a potential to favor a buildup of insects, especially the pine engraver or ips beetle (*Ips pini*). Where non-commercial thinning has occurred within the area, in the past 6 years, no major infestation has occurred and additional activities can be considered a minimal risk. Mortality from insects and disease in general is low and can be attributed to moderate stocking levels below thresholds favorable to mountain pine beetle (MPB) buildups. Generally, stands of sawtimber size pine greater than 120 BA are considered highly susceptible to MPB infestations. (Schmid RM-529)

Stands were rated using research work done by John Schmid (RM-529). The hazard rating is summarized as follows:

Table 3-5 Mountain Pine Beetle Hazard Rating

RATING	AREA	PERCENT <u>1</u>
0 – None	4,502 ac.	16%
1 – Low	11,264 ac.	38%
3 – Moderate	9,294 ac.	32%
5 – High	3,964 ac.	14%

1 Percent based on National Forest System lands in the project area.

The overall hazard of Mountain Pine Beetle infestation can be considered low to moderate in the project area. The hazard rating refers to the chances of losses within a stand if an infestation occurs within the area and not the probability of an infestation. If an infestation occurs within stands with a high hazard rating, then one can expect higher overall losses than those stands with lower hazard ratings.

Other insects affecting both pine and other species of trees in the project area that are present are having minimal impact on the area and will probably continue to have a low impact in the future.

Mechanical Damage:

In the spring of 2000, a major snowstorm occurred with high winds. Because of this storm, many pine trees were broken off and a few were uprooted within the planning unit. Most of the damaged pine were less than 9" in diameter and scattered throughout the stands. This "natural thinning" had some minor beneficial effects of opening up stands and providing some additional growth to adjacent pine that may have been overcrowded. The amount of death and damage was too small to have any measurable effect on the timber resource. Hail damage has occurred within the project as recently as 2 years ago near Buzzards Roost, mostly on private land. Private landowners in the area removed much of the heavily damaged pine and it appears further damage is decreasing. An additional effect of these natural events has been a decrease in the scenic quality of the forest.

Environmental Consequences:

Most of the treatments and cutting methods discussed below are described and illustrated in section II-31 "Methods to Achieve or Influence Vegetative Diversity" of the Black Hills National Forest Final Environmental Impact Statement (EIS).

ALTERNATIVE A

Direct and Indirect Effects

Under this alternative, no timber management activities would occur other than on going activities such as firewood gathering, right-of-way clearing and Christmas tree cutting.

There are state and county right-of-ways throughout the planning area. Many of these right-of-ways have both commercial and non-commercial timber in them. Hazard trees and timber within these right-of-ways will be removed to reduce the risk to motorists and "daylight" the roads to reduce icing. Timber may be removed with small sales, or in the case of very small quantities or unmerchantable timber, the timber may be removed as administrative free use. The effects of removing this timber would be minimal. The amount of volume removed would be insignificant and the impacts to the timber resource almost non-measurable when compared to the project area.

The effects of deferring treatment in the project area would be an increase in yield as the size of the existing trees increases; a reduction of diameter growth due to age and overstocking; an increasing risk of mountain pine beetle infestations; and an increased risk of catastrophic wildfire. With no treatments, the 1,106 acres of pine type that are above management zone levels will experience reduced growth due to overcrowding and competition for nutrients, water and light.

Age class distribution would not change except for changes created through natural processes such as insect infestations and wildfire. Long-term effects would be an increase in mortality due to competition between pine and an increase in merchantable defect due to disease.

Periodic annual increment is declining (i.e. growth is slowing) in some of the stands and is less than desired due to overstocking and age. Deferment will cause a further drop in the periodic annual increment. Federal regulations (36 CFR 19.16(2)(iii)) require that even-aged stands scheduled to be harvested during the planning period will generally have reached the culmination of mean annual increment (CMAI) of growth. During the diagnosis phase of the analysis, 368 stands were identified that had essentially reached CMAI. Net growth will remain positive, but it will be below its potential. Overall, quality of the pine will remain the same, which is below its potential due to suppression, damage, disease and poorly formed trees.

The overstocked stands of pine pose a moderate risk to attack by mountain pine beetle. This risk will increase over time, with growth, due to increasing stocking levels. Stands with basal areas over 120 generally are at a high risk. There are 3,964 acres of stands with a high-risk rating. Since this comprises 16% of the pine type, 14% of National Forest System lands and 11% of the project area, the likelihood of a widespread epidemic level infestation of mountain pine beetle (*Dendroctonus ponderosa*) is moderate. The risk should remain moderate for the first decade but would increase to high within the next two decades if not treated. See Figure 3-3 and Figure 3-5 below.

Figure 3-3 Mountain Pine Beetle Existing

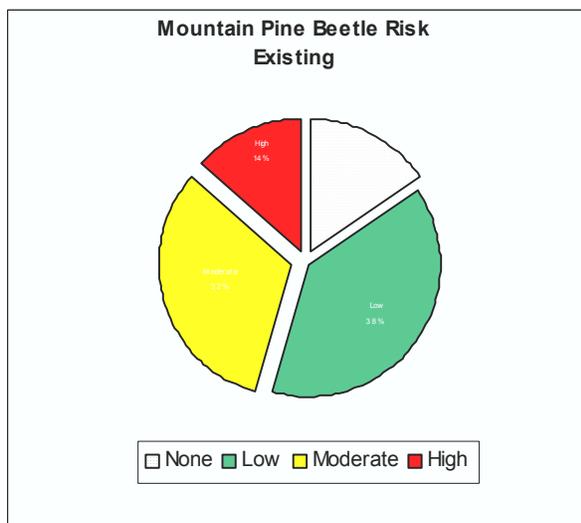
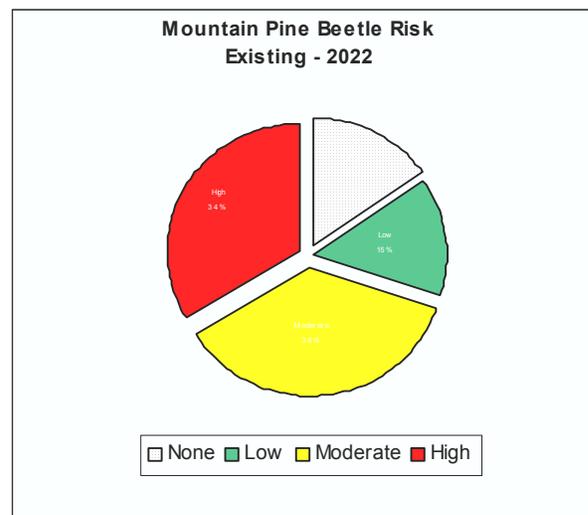


Figure 3-4 Mountain Pine Beetle Year 2022



Pine engraver beetles (*Ips pini*) are non aggressive and breed in damaged ponderosa pine trees and slash greater than 2 inches in diameter. Unless severe drought, weather damage or fire damage occurs within the area, the probability of a major buildup of these insects is very unlikely. Other insects and diseases are expected to remain at current levels barring natural disasters.

As the stands of pine become dense, they will become susceptible to snow damage. Dense stands of pine with interlocking crowns cannot shed snow as well as open stands. During times of heavy snowfall and wind, snow can build up on the crowns of dense stands and cause heavy

breakage. Stands with open canopies shed their snow as wind shakes them and are less susceptible to snow buildup. Under this alternative more snow damage will most likely occur.

Plant species composition and diversity will decrease. Pine is encroaching into hardwood and meadow areas and filling in small openings in the forest canopy. As the canopy closes, aspen, oak and other hardwoods will diminish in numbers until natural disturbances once again open up the canopy. Within many sites, forbs and grasses in the under story will be shaded out reducing benefits to other resources such as wildlife, range, recreation and the visual resource.

The risk of a stand replacing wildfire will be higher without treatment. Crown fires, such as the Battle Creek fire of 2002 just ten miles south of the planning area, would cause many of the stands to be completely killed. The effect of such a catastrophic fire to the timber resource would be a loss of timber value, a large reduction of age class distribution, a disruption of an even flow of timber to local mills, and increase in insects, and a disruption of the natural regeneration process. Solarization will reduce the success of both natural and artificial regeneration. Soil sterilization would reduce productivity for many years, as the process of rebuilding soil horizons in this relatively dry climate is slow.

ALTERNATIVE B

Direct and Indirect Effects

Under this alternative approximately 6,958 acres of forestland would be treated (see Appendix E, Map 4), not including prescribed burning. Prescribed burning will treat 7,502 acres and an additional 965 acres of storm damage will be treated non-commercially. The majority of the stands will be treated using non-commercial methods such as mechanical thinning, pruning, pine encroachment control in meadows and hardwood stands, patch clearcuts and improvement cuts, taking out pine less than 9 inches in diameter at breast height (DBH taken at 4.5 feet above ground level). The removal of both non-commercial and commercial size material 9" DBH and greater will occur in fuel-breaks around private land. Additional commercial material may be removed in connection with road reconstruction and landing development associated with treatment activities. See Silvicultural Report held in the Project File.

Right-of-Ways

There are state and county right-of-ways throughout the planning area. Many of these right-of-ways have both commercial and non-commercial timber in them. Hazard trees and timber within these right-of-ways will be removed to reduce the risk to motorists and 'daylight' the roads to reduce icing. Where timber harvest units are adjacent to these areas the right-of-ways will be included in the timber sale. The effects of removing this timber would be minimal. Public safety would be increased by the removal of hazard trees that could fall on the roads; removing shade in some areas would reduce winter icing or allow quicker melting of ice and snow pack; and visibility around curves would be improved. The amount of volume removed would be insignificant and the impacts to the timber resource almost non-measurable when compared to the project area.

Fuel Breaks

Fuel Breaks using both commercial thinning and non-commercial thinning will occur on approximately 553 acres of the area with about 346 of those acres receiving commercial treatments. Generally, commercial treatments will be used to treat fuel breaks where topography and access allows. In some areas where it is not feasible to remove commercial products, only the non-commercial trees (8.9" DBH and smaller) will be removed. In both areas, non-commercial material will be cut and the trees pruned up 6' to 8' in height. The thinning will reduce the stocking levels in overstocked stands and reduce the crown spacing to approximately 10 to 20 feet apart. Thinning will be from below removing the shorter suppressed, co-dominant pine and smaller diameter trees with the goal of raising the crown height and increasing the spacing to reduce the stands susceptibility to a sustained crown fire. The effects will be a reduction in stand yield due to the reduced number of trees in the stand. There will be an increase in the quality of the timber through the removal of damaged, diseased, and poorly formed trees and an increase in individual tree growth by releasing the remaining trees from competition for light, water, and nutrients. Trees will develop larger diameters due to a reduction of competition, which concentrates the stand growth on fewer stems and a slight increase in height growth. There will be a reduction of risk to the pine stands due to the reduction of basal area below the level of susceptibility to pine beetle attack. Once the stands are opened up, there will be an increase in natural regeneration. The amount of regeneration will vary from less than 100 trees/acre to as many as 10,000 trees/acre depending upon soil and moisture conditions. On north slopes, where remnants of forbs and grasses occur, regeneration will be low because of competing vegetation. On south and west slopes regeneration will be low due to low soil moisture and solarization. Where competing vegetation does not occur, regeneration will be abundant and will require periodic maintenance by removing regeneration to keep fuel breaks open. If maintenance does not occur, dense "dog hair" stands of pine will develop creating an even greater problem.

Special Cut – Pactola Work Center

There will be approximately 6 acres of pine harvested within the Pactola Work Center administrative site. The treatment will remove hazard trees, pine adjacent to buildings and increase the spacing of pine within the site to develop a defensible space around buildings and improvements. In the event of a wildfire, fire crews protecting structures will have a greater margin of safety for themselves and a higher probability of success in their efforts. This is a special cut and will include removing commercial and non-commercial pine and pruning.

Non-commercial Thinning

Non-commercial thinning will occur on 4,509 acres of the area. Of that, 4,240 acres will be thinned only and 269 acres will additionally be pruned. Non-commercial thinning will occur in pine stands and consists of the removal of pine one foot in height up to 8.9 inches in diameter leaving the largest pine at a rate of 170 trees per acre. Spacing of leave trees will vary from 10 to 22 feet apart to create a more natural appearing stand. Pruning will consist of removal of the lower branches of the leave trees to a height of approximately 6 to 8 feet to increase crown height and reduce ladder fuels in specified stands. The thinning will reduce the stocking levels

in overstocked stands and bring those stands into forest plan condition. The effect will be an increase in the quality of the timber through the removal of damaged, diseased, and poorly formed trees. There will be an increase in individual tree growth by releasing the remaining trees from competition for light, water and nutrients. Trees will develop larger diameters due to a reduction of competition, which concentrates the stand growth on the fewer stems. Stands that are also pruned will have a lower risk of damage from fire due to the reduction of ladder fuels that would allow a ground fire to climb up into the crowns. Pruning will also improve the quality of lumber in the lower bole of the pine when it becomes mature and harvested. A reduction of risk to the pine stands will occur due to the reduction of basal area below the level of susceptibility to pine beetle attack. Slash buildup from non-commercial thinning, if not treated properly, could encourage Ips Beetle (*Ips pini*) buildup and mortality in residual stands of pine. Past practices of lopping, scattering, and burning of slash piles within a year of treatment has reduced Ips infestation to less than a few trees per acre. Additional fuel treatments for fire risk reduction will also reduce the probability of insect infestations. Scattering slash facilitates the rapid drying of fuels, which reduces conditions favorable for Ips buildup. No major adverse effects are anticipated to the timber resource.

Hardwood Retention & Restoration

The release of 728 acres of hardwoods (aspen/birch and oak) from pine competition and the restoration of 16 acres of hardwoods that have been taken over by pine will occur, taking out only non-commercial pine in this alternative. Small inclusions of established hardwoods that are scattered throughout the stands in the project area will be enlarged by removing pine from within and adjacent to the hardwood inclusions. In other areas hardwood stands will be enlarged to include adjacent pine stands that have encroached upon them. Pine will be removed from the area within 33 feet of the edge of the inclusion or, in the case of draws where there are remnants of past hardwood occupation, the pine will be removed to the boundary of the original stand which will normally be 33 feet to 100 feet. Since most of these areas will be small (0.1 to 1 acres in size or narrow linear bands adjacent to existing hardwood stands), the amount of increase in acreage is estimated to be approximately 100 to 150 acres or 0.3% to 0.5% of the pine type. Currently there are 1,584 acres of hardwood stands. Upon completion of this alternative, hardwood acreage will increase by not more than 166 acres or 0.6% of National Forest System lands in the project area to approximately 1,750 acres. If 166 acres are restored, there will be an increase of 10% in hardwood communities. This will move the area toward the Forest Plan goal of conserving existing hardwood communities and restoring historic hardwood communities by 10% (LRMP I-10 - 201). The effects of this treatment will be an increase in vegetative diversity and increased vigor of hardwood communities by release from the competition of pine. Indirectly, the hardwood dependent wildlife species will have increased habitat. An additional indirect benefit would be the value of hardwood stands as fuel breaks. Since the commercial sized pine (9" DBH +) will not be removed, the remaining pine will be a seed source that will allow the pine to encroach on the hardwood communities sooner than if all of the pine was removed and the only seed source was from adjacent stands of pine.

Aspen Regeneration

Aspen stands specified in the project area for hardwood regeneration will be regenerated using the coppice method of regeneration. That is, the aspen in the sites will be clearcut and allowed to regenerate vegetatively. The timing of cutting is important and should be accomplished in the late fall or early spring when the aspen is dormant. Cutting during the growing season reduces the number of stems/acre produced and is not desirable. Regenerating aspen stands will increase the age class distribution throughout the project area. One hundred seventy-five acres will be treated in each of the three action alternatives.

Meadow Retention & Restoration

Non-commercial pine encroaching in meadows and draw bottoms will be removed on 667 acres and an additional 13 acres of historical meadows that have been invaded by pine will be restored to their previous condition. This will move the area toward the Forest Plan goal of conserving existing meadow acreage and restoration of some historic meadows. Since the commercial sized pine (9" DBH +) will not be removed, the remaining pine will be a seed source that will allow the pine to encroach on the meadow communities sooner than if all of the pine was removed and the only seed source was from adjacent stands of pine. Currently there are 3,018 acres of meadow sites within the project area. Upon completion of this alternative, meadow acreage will increase by 13 acres or 0.4% to 3,031 acres. The effects of this treatment will be an increase in vegetative diversity and increased grass production in the meadow communities by the release from the competition of pine. Indirectly, meadow dependent wildlife species will have increased habitat. An additional indirect benefit would be the value of meadows as fuel breaks. Since the commercial sized pine (9" DBH +) will not be removed, the remaining pine will be a seed source that will allow the pine to encroach on meadows sooner than if all of the pine was removed and the only seed source was from adjacent stands of pine.

Patch Clearcutting

Patch clearcuts (2 to 22 acres in size) will be non-commercially treated totaling 85 acres. All of the pine 1 foot in height and greater will be removed from the stand. This will be followed by removal of the slash by broadcast burning and/or piling and burning. The openings created will provide forage and habitat diversity for wildlife until the sites seed in naturally. The openings will be created for other than timber management purposes and therefore do not have to be at culmination of mean annual and periodic annual increment. (36 CFR 219.16(2)(iii)). Regeneration of these small openings will occur from adjacent pine stands. The Black Hills Land and Resource Management Plan specifies "Only use clearcutting to meet ecosystem management objectives w/ patch clearcuts limited to 10 acres or less in size. (LRMP pg. I-19 - 306)." One site is 22 acres in size and is larger than recommended as an objective in the Forest Plan, yet smaller than the maximum size of 40 acres specified in the R2 Guide. The larger size clearcut provides additional bighorn sheep habitat.

Improvement Cutting

Improvement cuts will be made on 206 acres of pine stands to improve habitat for bighorn sheep. The treatments will consist of removing seedlings, saplings and other non-commercial pine from these sites. The larger diameter pine in the overstory will be retained. Mechanical treatments will be followed up with prescribed burning to encourage grass and forb production for the benefit of bighorn sheep and other wildlife species. Direct effects will be a significant reduction in existing regeneration and, as grasses invade the sites post burning, future regeneration will be retarded. Long-term yields will be reduced by 20 years since the establishment of a new stand will be postponed up to 10 years and the 10 years of growth in the current understory will be lost. Indirect effects will be the benefit to bighorn sheep and other wildlife species as well as the reduction of crown fire risk from the removal of ground fuels.

Prescribed Burning

Moderate intensity broadcast prescribed burning will occur on 7,502 acres, reducing ground fuels and increasing vegetative diversity in the understory. In some of the stands, the understory vegetation is lacking due to needle cast and a closed canopy cover. A moderate intensity prescribed fire will reduce inhibiting duff and stimulate residual grasses and forbs. Broadcast prescribed burning should be designed to limit mortality in the polesize and sawtimber size pine stands within the suitable land base to 10% or less with seedling/sapling mortality less than 75%. Seedling/sapling size pine stands will not be burned or burned at a time of the year when mortality will be less than 75%. Burning in stands to be regenerated will favor grass establishment and reduce regeneration. The effects of prescribed burning on the timber resource will be a short-term increase in growth from the nutrients released into the soil. Total yield in the project area will be reduced by the mortality. The reduction in yield should be in the magnitude of 150 mbf per year for the project area if burn mortality is 10%. The reduction in yield would be reduced due to less competition for light and moisture in trees adjacent to openings and short-term nutrient release, but the increase in growth would not make up for the mortality loss. Additional protection of the timber resource from catastrophic wildfire will be increased by the removal of ground fuels and ladder fuels. Burning will encourage grass and forb production, which compete with pine regeneration. Regeneration will be reduced which will reduce future maintenance treatments to keep regeneration from occurring. The competition with grasses also may reduce the opportunity to regenerate a stand once it has been identified as needing regeneration. At that time, site preparation and scarification may be needed to provide a seedbed for successful regeneration.

Storm Damage Treatment

Storm damaged pine occurs throughout the project area. Approximately 965 acres of heavily damaged pine stands have been identified. Additional acreage of storm damage has also occurred but is light or in areas too small to map. Generally, the storm damage includes tops broken out of trees, minor amounts of wind throw, and snow bends in the smaller size classes. Identified storm damaged areas will have the slash lopped to less than 18" and/or piled and burned. Damaged pine less than 8.9" in DBH and larger pine posing a safety hazard will be cut down, limbed and the slash lopped and scattered or piled. In areas in or adjacent to commercial

harvest activities, merchantable pine extensively damaged may be removed with other commercial treatments. Damaged or dead pine greater than 10" DBH that do not pose an immediate safety hazard will be retained as snags for wildlife.

Stand Structure

Stand structure within the project area generally will be even-aged with the majority of the trees in the stands having an age within a range of 20 years of one another. Most of the pines are either dominant or co-dominant. This alternative will have more stands with multiple age classes than the other action alternatives since commercial treatments are limited.

Plant Species Composition

Plant species composition will increase in this alternative. The amount of hardwood and meadow acreage will increase a minor amount with the largest increase in plant species composition increasing in the understory of the pine stands. As the pine is thinned out and prescribed burning occurs there will be a large increase of grasses, forbs, and inclusions of hardwoods. Compared to the other action alternatives this will have less species diversity but far more diversity than the no action alternative (Alternative A).

Stocking Levels

In this alternative, stocking levels will be decreased where thinning and prescribed burning occurs. However, this alternative will provide adequately stocked pine stands for future management. Decreased stocking levels will increase diameter growth of individual trees, increase plant species composition in the understory, reduce the risk to stands from insects and disease, and improve the general vigor of the stands treated. The limited use of commercial treatments in this alternative reduces the opportunity in commercial size stands to reduce stocking levels and, as a result, this alternative does not bring as much of the area down to desired Forest Plan stocking levels as other action alternatives.

Regeneration

The natural regeneration of pine and other native species of trees within the project should be good with the treatments in this alternative. Prescribed burning will have an adverse effect on pine regeneration. Existing pine seedlings will be killed resulting in a loss of up to 10 years of growth. Burning will encourage grasses and forbs crowding out new regeneration and reducing the initial stocking levels of pine seedlings. Past prescribed burning in the area has resulted in lower initial stocking levels but has not prevented successful regeneration within 5 to 10 years. A greater amount of prescribed burning will occur in this alternative than in other action alternatives and will have the largest effect on regeneration.

Age Class Distribution

Age class distribution will improve in this alternative, but not as much as in the other action alternatives where commercial treatments allow the regeneration of new stands using the

shelterwood regeneration method. Most of the change in age class distribution will come from patch clearcuts and fuel breaks. Thinnings and prescribed burning may change age class distribution by removing younger pine, but generally the distribution will not change significantly. See the Silviculturist Report in the Project File for a comparative illustration of age class distribution by alternative.

Growth and yield

Growth within this alternative will be good. Extensive thinning of the area will open up many stands where full crown closure has occurred and stand growth is slowing down due to crowding. An analysis was done using the Forest Vegetation Simulator provided by the USDA Forest Services Forest Management Service Center. Growth and yield calculations were made on the majority of stands in the project area for a period of 40 years. See the Silviculturist Report in the Project File for a comparative tabular illustration of yield by alternative. Alternative B yields slightly less volume than Alternative A, post treatment and in out years. The reasons for this is because the smaller trees removed have a low volume per tree. Alternatives C and D are lower than B because larger, higher volume commercial sized trees are removed. Merchantable cubic volume yields show a marked increase in yield in Alternative B, much higher than all alternatives. The higher yields are due to increased growth from thinning crowded stands and an increase in the number of non-merchantable stems growing into the merchantable size classes. In all treatments, however, future yields are much greater than current yield, increasing by over 20% within the next 20 years and almost doubling in 40 years.

Mechanical Damage

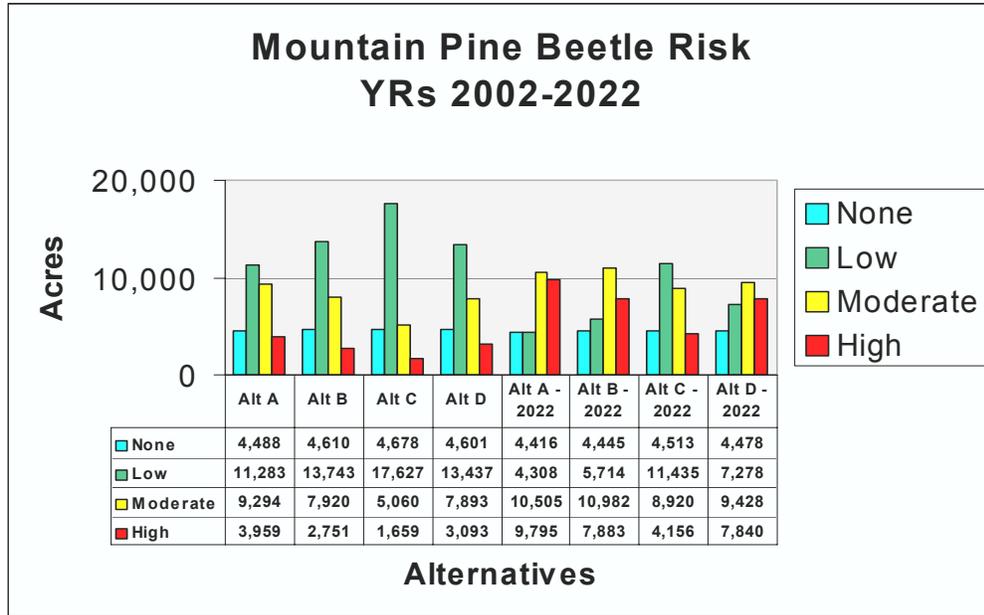
Storm damaged pine from the spring of 2000 storm will be reduced by a combination of thinnings, prescribed burning and storm damage treatments. Generally, there will be a positive effect to the timber resource under this alternative by mitigating the potential of insect buildups, and reducing ladder and aerial fuels that could lead to mortality from wildfire. Differences between alternatives generally will be small.

Insects & Disease

Current losses from insect and disease are at an endemic level. The effect of Alternative B on the current risk of Mountain Pine Beetle (MPB) infestation will be positive and further improve the overall risk rating to low. The protection provided for the area will be short term however, and within the next 20 years will move to high. The move to a high-risk rating is because the non-commercially thinned stands will reach densities favored by MPB, generally over 120 basal area (BA). In addition, diameter growth in thinned stands will increase to a diameter over 6 inches where phloem thickness is adequate to sustain a large mountain pine beetle population. Alternative B is more favorable than Alternative A in reducing MPB risk but when compared to Alternative D and especially Alternative C, Alternative B has a far less positive effect on MPB risk in out years. There will be a reduction of 2,582 acres of stands from a risk rating of high/moderate to low/none. There currently is 32% of the area in a moderate, and 14% in the high-risk rating. Upon completion of the treatments, there will be 27% of the area in a moderate

and 9% in the high-risk rating. The figure below illustrates the comparative difference in MPB risk by alternative both currently and after 2 decades.

Figure 3-5 Mountain Pine Beetle Years 2002-2022



Slash buildup from treatments, if not treated properly, could encourage Ips Beetle (*Ips pini*) buildup and mortality in residual stands of pine. Past practices of lopping, scattering, and burning of slash piles within a year of treatment has reduced Ips infestation to less than a few trees per acre. Additional fuel treatments for fire risk reduction will also reduce the probability of insect infestations. Scattering slash facilitates the rapid drying of fuels, which reduces conditions favorable for Ips buildup. Other insects and diseases affecting both pine and other species of trees in the project area that are present are having minimal impact on the area and will probably continue to have a low impact under this alternative.

ALTERNATIVE C

Direct and Indirect Effects

Under this alternative approximately 11,881 acres of forestland would be treated (see Appendix E, Map 5), not including prescribed burning. Many of the stands in the project area have inclusions of less than 10 acres in size that may have basal areas, age classes, size classes and tree species that differ from the majority of the stand. Treatments specified generally apply to 80% and more of the stand. As these stands are laid out and marked, these inclusions may not be prescribed and marked as specified in the stand treatment table, but rather prescribed using criteria developed for other stands with similar characteristics i.e. an inclusion of polesize pine may be thinned if located within a stand scheduled for a seed tree cut. See Silvicultural Report held in the Project File.

Right-of-Ways

See discussion under Alternative B.

Fuel Breaks

Fuel Breaks using both commercial thinning and non-commercial thinning will occur on approximately 692 acres of the area. About 207 of those acres will receive non-commercial treatments only. The effects will be similar to commercial thinning as described above except for the amount of acres treated. There will be 139 more acres thinned in this alternative than alternative B and 187 acres more than alternative D.

Commercial Thinning

Commercial thinning will occur on 5,871 acres of the area with 2,009 of those acres also having non-commercial thinning done. Commercial thinning will generally consist of removing suppressed and intermediate pine from the stand and the dominant pine from the overstory unless needed for snag replacements. The remaining co-dominant pine will be left at an approximate basal area (BA) of 50. This alternative calls for a lower basal area than is normally prescribed for under the Forest Plan. Fire managers have determined a lower basal area and associated reduced bulk density of crown fuels reduce the potential for catastrophic wildfires. While the average BA will be reduced to 50 in the project area, some of the stands may have less or more BA depending on crown width and the diameter of the trees. Generally, the range of BA's for commercial thinning will be from 40 to 60 BA. Leave trees will not be uniformly spaced to create a more natural appearing stand. The thinning will reduce the stocking levels in overstocked stands. The effect will be an increase in the quality of the timber through the removal of damaged, diseased, and poorly formed trees and an increase in individual tree growth by releasing the remaining trees from competition for light, water and nutrients. Trees will develop larger diameters due to a reduction of competition which concentrates the stand growth on the fewer stems, and a reduction of risk to the pine stands will occur due to the reduction of basal area below the level of susceptibility to pine beetle attack. Total yield will be lower over time than other treatments that would leave more basal area because the trees will not fully occupy the stand.

Non-commercial Thinning

Non-commercial thinning will occur on 6,240 acres of the area. Of that, 1,470 acres will be non-commercially thinned only, 306 acres will be thinned and pruned, 4,464 acres will have non-commercial thinning done in conjunction with other commercial treatments. The effects are comparable to those disclosed under non-commercial thinning in Alternative B. However, they will be proportionally greater because of the increased number of acres being thinned.

No major adverse effects are anticipated to the timber resource from the extensive application of non-commercial thinning planned in this alternative.

Sanitation Cutting

Sanitation cutting will occur on 12 acres within this alternative. Heavy storm damage has occurred in the area and the purpose of this treatment will be to remove commercial and non-commercial pine damaged and reduce the risk of infestation by Ips or MPB. Other treatments may be considered as sanitation treatments, since they too will reduce damaged trees from insect attack. But treatment in other stands is done for additional objectives beyond removal of declining pine only to prevent insect and disease infestation.

Shelterwood Seed Cuts

Shelterwood Seed cuts will begin the regeneration process on 469 acres of pine. Pine will be left at a spacing of 45 feet, leaving 21 trees per acre. Opening up the canopy allows sufficient sunlight to reach the forest floor to establish seedlings, yet provides enough shade to limit the harsh microclimates of full canopy openings. Leave trees will generally be dominant or co-dominant pine with full crowns and good form. These stands have reached culmination of mean annual and periodic annual growth. In order to provide thermal and/or hiding cover or meet other resource requirements, not all stands that can be regenerated will be regenerated. In addition, many of the stands that were identified as having reached CMAI have a multi-storied structure or are all-aged and will be deferred for later treatment or treated using other methods. These stands have over-mature inclusions or stories within them. Treating these stands at this time using a silvicultural regeneration method, while appropriate for the over-mature components of the stand, would not be appropriate for the mature or immature components of the stand. Mortality due to age in the over-mature pine within the stands should be minor over the next decade. This silviculture method has been extensively used in this area and regeneration success is very high.

Seed Tree Cuts

Seed Tree cuts will begin the regeneration process on 630 acres of pine. Pine will be left at a spacing of 66 feet, leaving 10 trees per acre. The seed tree method is similar to the shelterwood seed cut method described above except only few trees are left to provide seed. Less shading and further seed cast distances can result in regeneration that is spotty and clumpy. However, resulting irregular stand structure can have positive effects for some resources such as wildlife or inhibiting fire spread.

Shelterwood Overstory Removals

Shelterwood Overstory Removals with non-commercial thinning will occur on 602 acres. The overmature overstory stands have reached culmination of mean annual and periodic annual growth (CMAI) and is no longer needed for seed and shade. The removal of the pine overstory will release the established understory from competition for light, water and nutrients. All overstory pine 5" dbh and greater will be removed retaining only pine necessary for snag replacements or other resource needs. The effect will be an increase in growth of both the remaining pine, the establishment and production of forage for both cattle and wildlife, and a reduction of aerial fuels inhibiting fire spread.

Special Cut – Pactola Work Center

There will be approximately 6 acres of pine harvested within the Pactola Work Center administrative site. The treatment will remove hazard trees, pine adjacent to buildings and increase the spacing of pine within the site to develop a defensible space around buildings and improvements. In the event of a wildfire, fire crews protecting structures will have a greater margin of safety for themselves and a higher probability of success in their efforts. This is a special cut and with the removal of commercial and non-commercial pine and pruning.

Hardwood Release & Restoration

The release of 736 acres of hardwoods (aspen/birch and oak) from pine competition and the restoration of 48 acres of hardwoods that have been taken over by pine will occur in this alternative. Commercial treatments and non-commercial treatments removing all of the pine from hardwoods will occur on the 432 acres of retention and the 48 acres of restoration. The remaining 304 acres of hardwood retention will be treated non-commercially. Small inclusions of established hardwoods that are scattered throughout the stands in the project area will be enlarged by removing pine from within and adjacent to the hardwood inclusions. In other areas hardwood stands will be enlarged to include adjacent pine stands that have encroached upon them. Pine will be removed from the area within 33 feet of the edge of the inclusion or, in the case of draws where there is remnants of past hardwood occupation, the pine will be removed to the boundary of the original stand which will normally be 33 feet to 100 feet. Since most of these areas will be small (0.1 to 1 acres in size or narrow linear bands adjacent to existing hardwood stands), the amount of increase in acreage is estimated to be approximately 100 to 150 acres or 0.3% to 0.5% of the pine type. Currently there are 1,584 acres of hardwood stands. Upon completion of this alternative, hardwood acreage will increase by not more than 198 acres or 0.7% of National Forest System lands in the project area to approximately 1,782 acres. If 198 acres are restored, there will be an increase of 12% in hardwood communities. This will more than achieve the Forest Plan goal of conserving existing hardwood communities and restoring historic hardwood communities by 10% (LRMP I-10 - 201). The effects of this treatment will be an increase in vegetative diversity and increased vigor of hardwood communities by release from the competition of pine. Indirectly, the hardwood dependent wildlife species will have increased habitat. An additional indirect benefit would be the value of hardwood stands as fuel breaks. This alternative treats 40 acres more than Alternative B and 33 acres more than Alternative D. Hardwood release and restoration is more effective under Alternative C compared to Alternative D because all pine are removed in Alternative C not just small diameter pine.

Aspen Regeneration

Aspen stands specified in the project area for hardwood regeneration will be regenerated using the coppice method of regeneration. That is, the aspen in the sites will be clearcut and allowed to regenerate vegetatively. Regenerating aspen stands will increase the age class distribution throughout the project area. One hundred seventy-five acres will be treated in each of the three action alternatives.

Meadow Retention & Restoration

Pine encroaching in meadows and draw bottoms will be removed on 730 acres and an additional 49 acres of historical meadows that have been successfully invaded by pine will be restored to their previous condition. Commercial treatments and non-commercial treatments removing all of the pine from meadows will occur on the 209 acres of retention and the 49 acres of restoration, the remaining 521 acres of meadow retention will be treated non-commercially. This will move the area toward the Forest Plan goal of conserving existing meadow acreage and restoration of some historic meadows. Currently there are 3,018 acres of meadow sites within the project area. Upon completion of this alternative, meadow acreage will increase by 49 acres or 2% to 3,067 acres. The effects of this treatment will be an increase in vegetative diversity and an increased in grass production in the meadow communities by the release from the competition of pine. Indirectly, meadow dependent wildlife species will have increased habitat. An additional indirect benefit would be the value of meadows as fuel breaks. This alternative treats 99 acres more than Alternatives B and D. Meadow treatment is more effective under this alternative than Alternative B because it removes all pine, not just the small pine.

Patch Clearcutting

Patch clearcuts (2 to 22 acres in size) will occur on 85 acres of the area, with 76 of those acres harvested commercially and non-commercially and 9 acres treated non-commercially only. This will be followed by removal of the slash by broadcast burning and/or piling and burning. The openings created will provide forage and habitat diversity for wildlife until the sites seed in naturally. The openings will be created for other than timber management purposes and therefore do not have to be at culmination of mean annual and periodic annual increment. (36 CFR 219.16(2)(iii)). Regeneration of these small openings will occur from adjacent pine stands. The Black Hills Land and Resource Management Plan specifies “Only use clearcutting to meet ecosystem management objectives w/ patch clearcuts limited to 10 acres or less in size. (LRMP pg. I-19 - 306)”. One site is 22 acres in size and is larger than recommended as an objective in the Forest Plan yet smaller than the maximum size of 40 acres specified in the R2 Guide. The larger size clearcut provides additional bighorn sheep habitat. Regeneration of these small openings will occur from adjacent pine stands. This alternative will treat the same amount of acreage as Alternative B and 41 acres more than Alternative D.

Prescribed Burning

Moderate intensity broadcast prescribed burning will occur on 4,224 acres, reducing ground fuels and increasing vegetative diversity in the understory. In some of the stands, the understory vegetation is lacking due to needle cast and a closed canopy cover. A moderate intensity prescribed fire will reduce inhibiting duff and stimulate residual grasses and forbs. Stands that will be seed cut generally will not be prescribed burned unless other resource needs dictate otherwise. Broadcast prescribed burning should be designed to limit mortality in the polesize and sawtimber size pine stands within the suitable land base to 10% or less with seedling/sapling mortality less than 75%. Seedling/sapling size pine stands will not be burned or burned at a time of the year when mortality will be less than 75%. Burning in stands to be regenerated will favor grass establishment and reduce regeneration. The effects of prescribed burning on the timber

resource will be a short-term increase in growth from the nutrients released into the soil. Total yield in the project area will be reduced by the mortality. The reduction in yield should be in the magnitude of 85 mbf per year for the project area if burn mortality is 10%. Other effects are described in Alternative B above. There will be 3,278 acres less prescribed burning in this alternative than in alternative B.

Storm Damage Treatment

Storm damaged pine occurs throughout the project area. Treatments and effects will generally be the same as in alternative B and D.

Stand Structure

Stand structure within the project area generally will be even-aged with the majority of the trees in the stands having an age within a range of 20 years of one another. Most of the pines will be either dominant or co-dominant. Most of the intermediate and suppressed pine will be removed in treatment areas to raise crown heights and reduce ladder fuels for crown fire risk reduction. This alternative will have fewer stands with multiple age classes than Alternatives B and D.

Plant Species Composition

Plant species composition and diversity will increase in this alternative, as with all action alternatives. Hardwood and meadow treatment (removal of pine) will increase plant species diversity. The largest increase in plant species composition will occur in the understory of pine stands. As pine is thinned out and prescribed burning occurs there will be a large increase of grasses, forbs, and inclusions of hardwoods. Compared to the other alternatives this alternative will generate more species diversity than Alternatives A, B or D.

Stocking Levels

In this alternative, stocking levels will be decreased considerably compared to all other alternatives. The alternative was designed to reduce crown fire risk within large portions of the project area by increasing the spacing between trees. Fire managers have determined lower basal areas and associated reduced bulk density of crown fuels reduce the potential for catastrophic wildfires. The effect will be an increase in the quality of the timber through the removal of damaged, diseased, and poorly formed trees and an increase in individual tree growth by releasing the remaining trees from competition for light, water and nutrients. Trees will develop larger diameters due to a reduction of competition, which concentrates the stand growth on the fewer stems. A reduction of mountain pine beetle risk to the pine stands will occur due to the reduction of basal area below the level of susceptibility to pine beetle attack. Total yield will be lower, over time, than all other alternatives that leave more basal area. The reduction in yield is because the trees will not fully occupy the stand. This alternative will contribute to the Forest Plan goal of providing for sustained commodity uses while using acceptable silvicultural systems. This alternative will also provide adequately stocked pine stands for future management. See the Silviculture Report in the Project File for further discussion and tabular illustration of projected basal area distribution for this alternative.

Regeneration

The natural regeneration of pine and other native species of trees within the project should be good with the treatments in this alternative. However, prescribed burning will have an adverse effect on pine regeneration. Existing pine seedlings will be killed resulting in a loss of up to 10 years of growth. Burning will encourage grasses and forbs crowding out new regeneration and reducing the initial stocking levels of pine seedlings. Past prescribed burning in the area has resulted in lower initial stocking levels but has not prevented successful regeneration within 5 to 10 years.

Age Class Distribution

See Alternative B above.

Growth & Yield

See Alternative B above.

Mechanical Damage

Storm damaged pine from the spring of 2000 storm will be reduced by a combination of thinnings, prescribed burning and storm damage treatments. Generally, there will be a positive effect to the timber resource under this alternative by mitigating the potential of insect buildups, and reducing ladder and aerial fuels that could lead to mortality from wildfire. Differences between alternatives generally will be small.

Insects & Disease

Current losses from insect and disease are at an endemic level. The effect of Alternative C on the current risk of Mountain Pine Beetle (MPB) infestation will be very positive and further improve the overall risk rating to low. The protection provided for the area will extend into the next two decades and will remain low for much of that time. The lower mountain pine beetle risk is a result of reducing basal areas well below the levels preferred by pine beetle. Alternative C is more favorable than all other alternatives in reducing MPB risk both immediately after treatment and after 20 years. There will be a reduction of 6,534 acres of stands from a risk rating of high/moderate to low/none. There currently is 32% of the area in a moderate, and 14% in the high-risk rating. Upon completion of the treatments, there will be 17% of the area in a moderate and 6% in the high-risk rating. See Figure 3-5 under Alternative B, which displays the comparative difference in MPB risk by alternative both currently and after 2 decades.

Slash buildup from treatments, if not treated properly, could encourage Ips Beetle (*Ips pini*) buildup and mortality in residual stands of pine. Past practices of lopping, scattering, and burning of slash piles within a year of treatment has reduced Ips infestation to less than a few trees per acre. Additional fuel treatments for fire risk reduction will also reduce the probability of insect infestations. Scattering slash facilitates the rapid drying of fuels, which reduces conditions favorable for Ips buildup. Other insects and diseases affecting both pine and other

species of trees in the project area that are present are having minimal impact on the area and will probably continue to have a low impact under this alternative.

ALTERNATIVE D

Direct and Indirect Effects

Under this alternative approximately 7,112 acres of forestland would be treated (see Appendix E, Map 6). Many of the stands in the project area have inclusions of less than 10 acres in size that may have basal areas, age classes, size classes and tree species that differ from the majority of the stand. Treatments specified generally apply to 80% and more of the stand. As these stands are laid out and marked, these inclusions may not be prescribed and marked as specified in the stand treatment table, but rather prescribed using criteria developed for other stands with similar characteristics (i.e. an inclusion of polesize pine may be thinned if located within a stand scheduled for a seed tree cut). See Silvicultural Report held in the Project File.

Right-of-Ways

Right-of-way clearing along state and county roads will occur in this alternative as described in Alternative B.

Commercial Thinning

Commercial thinning will occur on approximately 1,416 acres of the area, with 1,184 of those acres also having non-commercial thinning done. The effects within individual stands treated will be similar to those in alternative C. Thinning methods will be the same as in alternative C with the exception that leave densities will be greater. Stands identified for treatment were selected if they did not meet desired future conditions as outlined in the Forest Plan. Stands will be harvested to a leave basal area of approximately 80. This alternative commercially thins 76% less acreage than Alternative C. Effects are similar to those described in Alternative C, with proportionately less of an overall effect.

Fuel Breaks

Fuel Breaks using both commercial thinning and non-commercial thinning will occur on approximately 505 acres of the area, with about 139 of those acres receiving non-commercial treatments only. The effects will be similar to commercial thinning as described above except for the amount of acres treated. There will be 48 fewer acres thinned in this alternative than alternative B and 187 acres less than alternative C.

Liberation Cuts

Liberation Cuts will be utilized on 71 acres. The purpose of the liberation cut is to remove competing pine over an established understory allowing increased growth in the understory pine.

Sanitation Cuts

Sanitation cutting will occur on 12 acres within this alternative. This is the same treatment and will have the same effects as described in alternative C.

Shelterwood Seed Cuts

Shelterwood Seed cuts will begin the regeneration process on 257 acres of pine. This alternative treats 76% less acreage than Alternative C. Effects are the same as those described in Alternative C with proportionately less of an overall effect. There will be 212 fewer acres treated in this alternative than Alternative C.

Seed Tree Cuts

Seed Tree cuts will begin the regeneration process on 285 acres of pine. This alternative treats 55% less acreage than Alternative C. Effects are the same as those described in Alternative C with proportionately less of an overall effect. There will be 345 fewer acres treated in this alternative than Alternative C.

Shelterwood Overstory Removals

Shelterwood Overstory Removals with non-commercial thinning will occur on 972 acres. This alternative treats 61% more acreage than Alternative C. Effects are the same as those described in Alternative C with proportionately more of an overall effect. There will be 370 more acres treated in this alternative than Alternative C.

Special Cut – Pactola Work Center

There will be approximately 6 acres of pine harvested within the Pactola Work Center administrative site. This is the same treatment and will have the same effects as described in alternative C.

Non-commercial Thinning

Non-commercial thinning will occur on 4,165 acres of the area. Of that, 1,708 acres will be non-commercially thinned only, 230 acres will be thinned and pruned and 2,227 acres will have non-commercial thinning done in conjunction with other commercial treatments. Non-commercial thinning will occur in pine stands and consists of the removal of pine one foot in height up to 8.9 inches in diameter leaving the largest pine at a rate of 302 trees per acre. Spacing of leave trees will vary from 10 to 22 feet apart to create a more natural appearing stand. Pruning will consist of removal of the lower branches of the leave trees to a height of approximately 6 to 8 feet to increase crown height and reduce ladder fuels in specified stands. The thinning will reduce the stocking levels in overstocked stands and bring those stands into Forest Plan condition. The effect will be as described in Alternatives B and C. The exception will be the density of thinning. This alternative will leave more trees per acre. Thinning in Alternatives B and C leave fewer trees per acre for a reduction in crown fire risk while a greater density of trees are left in

this alternative so that trees will develop better form and have increased height growth. Diameter growth however, will be lower than alternatives B and C. There will be 344 fewer acres treated than Alternative B and 2,075 fewer acres than Alternative C.

Hardwood Retention & Restoration

The release of 703 acres of hardwoods (aspen/birch and oak) from pine competition and the restoration of 48 acres of hardwoods that have been taken over by pine will occur in this alternative. Commercial treatments and non-commercial treatments removing all of the pine from hardwoods will occur on the 398 acres of retention and the 48 acres of restoration, the remaining 305 acres of hardwood retention will be treated non-commercially. This treatment will have effects very similar to those disclosed under Hardwood Release and Restoration in Alternative C. This alternative treats 7 acres more than Alternative B and 33 acres less than Alternative C. Alternative D is also more effective than Alternative B in promoting hardwoods because it removes larger pine too.

Aspen Regeneration

Aspen stands specified in the project area for hardwood regeneration will be regenerated using the coppice method of regeneration. That is, the aspen in the sites will be clearcut and allowed to regenerate vegetatively. Regenerating aspen stands will increase the age class distribution throughout the project area. One hundred seventy-five acres will be treated in each of the three action alternatives.

Meadow Retention & Restoration

Pine encroaching in meadows and draw bottoms will be removed on 680 acres and an additional 13 acres of historical meadows that have been successfully invaded by pine will be restored to their previous condition. Commercial treatments and non-commercial treatments removing all of the pine from meadows will occur on the 198 acres of retention and the 13 acres of restoration, the remaining 469 acres of meadow retention will be treated non-commercially. This will move the area toward the Forest Plan goal of conserving existing meadow acreage and restoration of some historic meadows. Currently there are 3,018 acres of meadow sites within the project area. Upon completion of this alternative, meadow acreage will increase by 13 acres or .4% to 3,031 acres. The effects of this treatment will be an increase in vegetative diversity and an increase in grass production in the meadow communities by the release from the competition of pine. Indirectly, meadow dependent wildlife species will have increased habitat. An additional indirect benefit would be the value of meadows as fuel breaks. This alternative treats the same acreage as Alternative B and 99 acres less than Alternative C. Meadow treatments are also more effective than Alternative B because it removes all pine, not just small diameter pine.

Patch Clearcutting

Patch clearcuts (2 to 22 acres in size) will commercially be treated on 44 acres of the area. This will be followed by removal of the slash by broadcast burning and/or piling and burning. The openings created will provide forage and habitat diversity for wildlife until the sites seed in

naturally. Effects and applicable direction regarding clearcutting is the same as discussed under Alternative C. This alternative will treat 41 acres less than Alternatives B and C.

Storm Damage Treatment

Storm damaged pine occurs throughout the project area. Treatments and effects will generally be the same as in Alternatives B and C.

Stand Structure

Stand structure within the project area generally will be even-aged with the majority of the trees in the stands having an age within a range of 20 years of one another. Most of the pines will be either dominant or co-dominant. Most of the intermediate and suppress pine will be removed in treatment areas to raise crown heights and reduce ladder fuels for crown fire risk reduction. This alternative will have more stands with multiple age classes than Alternatives C and less than B.

Plant Species Composition

Plant species composition will increase in this alternative. The amount of hardwood and meadow acreage will increase a minor amount with the largest increase in plant species composition increasing in the understory of the pine stands. Compared to the other action alternatives that include prescribed burning the amount of understory species diversity will not be as great since burning, which stimulates grass and forb production, will not occur in this alternative.

Stocking Levels

In this alternative, stocking levels will be decreased. The alternative was designed to bring stands into Forest Plan condition while concurrently emphasizing fire risk reduction to the degree possible. The effect will be an increase in the quality of the timber through the removal of damaged, diseased, and poorly formed trees and an increase in individual tree growth by releasing the remaining trees from competition for light, water and nutrients. Trees will develop larger diameters due to a reduction of competition, which concentrates the stand growth on the fewer stems. A reduction of mountain pine beetle risk to the pine stands will occur due to the reduction of basal area below the level of susceptibility to pine beetle attack. This will contribute to the Forest Plan goal of providing for sustained commodity uses while using acceptable silvicultural systems. This alternative will also provide adequately stocked pine stands for future management. See the Silviculture Report in the Project File for further discussion and tabular illustration of projected basal area distribution for this alternative.

Regeneration

The natural regeneration of pine and other native species of trees within the project should be good with the treatments in this alternative. Past regeneration, treatments have resulted in no regeneration failures. Under this alternative, similar silvicultural treatments will be used and regeneration results should be the same. The seed tree cut method has not been used extensively

in this area and may produce less regeneration than Shelterwood Seed Cutting. Patch clear-cuts that create harsher microclimates for regeneration have been successful in regenerating so the probability of regeneration success with seed tree cuts should be high.

Age Class Distribution

See Alternative B above.

Growth & Yield

See Alternative B above.

Mechanical Damage

See Alternative B above.

Insects & Disease

Current losses from insect and disease are at an endemic level. The effect of Alternative D on the current risk of Mountain Pine Beetle (MPB) infestation will be very positive and further improve the overall risk rating to low. The protection provided for the area will extend into the next decade and will remain low for much of that time. The lower mountain pine beetle risk is a result of reducing basal areas below the levels preferred by pine beetle. Alternative D is less favorable than Alternative C and more favorable than Alternative B in reducing MPB risk, especially in out years. There will be a reduction of 2,267 acres of stands from a risk rating of high/moderate to low/none. There currently is 32% of the area in a moderate, and 14% in the high-risk rating. Upon completion of the treatments, there will be 27% of the area in a moderate and 11% in the high-risk rating category. See Figure 3-5 under Alternative B which displays the comparative difference in MPB risk by alternative both currently and after two decades.

Slash buildup from treatments, if not treated properly, could encourage Ips Beetle (*Ips pini*) buildup and mortality in residual stands of pine. Past practices of lopping, scattering, and burning of slash piles within a year of treatment has reduced Ips infestation to less than a few trees per acre. Additional fuel treatments for fire risk reduction will also reduce the probability of insect infestations. Scattering slash facilitates the rapid drying of fuels, which reduces conditions favorable for Ips buildup. Other insects and diseases affecting both pine and other species of trees in the project area that are present are having minimal impact on the area and will probably continue to have a low impact under this alternative.

Cumulative Effects on Silviculture/Timber

ALTERNATIVE A:

Past Activities and Their Effects on Silviculture/Timber:

Much of the area has had vegetative treatments within the past 20 years. Commercial harvests and non-commercial thinnings from the late '70's through the early '90's have taken place on about 54% of the project area. Many treatments were designed to lower the basal area to promote increased growth and vigor as well as lessen susceptibility to Mountain Pine Beetle attack.

The effect of past treatments has been an increase of merchantable volume growth; increase in the quality of timber and a reduction in the amount of insect and disease infestations. The commercial thinning has reduced the stocking levels in overstocked stands. The effect has been an increase in the quality of the timber through the removal of damaged, diseased, and poorly formed trees. There has been increase in individual tree growth by releasing the remaining trees from competition for light, water and nutrients. Trees have developed larger diameters due to a reduction of competition. A reduction of the risk to the pine stands due to the reduction of basal area below the level of susceptibility to pine beetle attack has also occurred.

Present Activities and Effects on Silviculture/Timber:

There are no major activities occurring, at present, on National Forest lands within the project area. Very little harvesting (approximately 490) acres has occurred on private land within the project area. Since private land comprises 22% of the project area (6,301 acres) and approximately half of that is timberland, the effects of timber harvesting practices could affect the project area. The amount of timber harvesting during any one decade, however, has been small and its effects on National Forest timberland should be minimal.

Proposed and/or Reasonably Foreseeable Activities and Their Effects on Silviculture/Timber:

Anticipated future silviculture activities, not connected to this analysis, that will occur within the area are as follows:

Within the planning area another timber sale is occurring. The Buffalo Timber Sale, which is 90% harvested, will be completed within one year. This analysis incorporated and considered the treatments within the Buffalo Sale and its associated effects.

Firewood gathering and Christmas tree cutting by permit will continue to occur within the area.

Other silvicultural treatments such as small salvage sales for the removal of storm damage, road and powerline right-of-way clearing, pine encroachment removal, hardwood regeneration and release may occur within the project area. The size of these projects would generally be small (less than 10 acres) and the cumulative effects of these projects should not be of any measurable significance.

Activities that have a good probability of occurring on land within the project area other than National Forest System Lands are as follows:

With an increasing interest from landowners to manage their forested land for profit and fire protection, an additional 400 acres may be treated within the next decade. However, lower timber prices may cause landowners to defer treatments until they can get a better price for their timber.

Since the amount of silvicultural activities not connected to this analysis will be minimal, the cumulative effects of these activities under any of the alternatives will also be minimal.

Treatments on private land for fire risk reduction will contribute to both a reduction of risk from catastrophic wildfire and mountain pine beetle. This will reduce the risk on private land. However, the positive effect will be minimal since adjacent Forest System lands are not treated in this alternative.

ALTERNATIVES B, C and D

Past Activities and Their Effects on Silviculture/Timber:

Past activities are listed under Alternative A above. Cumulative effects of past treatments and treatments proposed in this alternative generally will be positive. Thinning of stands created with regeneration harvests will bring those stands into desired condition. Mountain Pine Beetle risk that was lowered with past treatments will again be lowered. Fire risk to pine stands reduced with past treatments will be further reduced. Plant species diversity was increased with past treatments and will be increased further, especially with increased prescribed burning.

An additional cumulative effect resulting from past treatments is a reduction in merchantable volume recovery applicable to Alternatives C and D. Volume removed in past harvest operations is not available for removal. Increased growth has made up for some of this but not entirely.

Present Activities and Effects on Silviculture/Timber:

Present activities are minimal and their effects are listed under in Alternative A above. Alternative B, C and D treatments will have a minimal effect over those discussed under direct and indirect effects.

Proposed and/or Reasonably Foreseeable Activities and Their Effects on Silviculture/Timber

Future silvicultural activities will be minimal and their effects are listed under in Alternative A above. Alternative B, C and D treatments will have a minimal cumulative effect over those discussed under direct and indirect effects.

Activities that have a good probability of occurring on land within the project area other than National Forest System Lands are as follows:

Silvicultural activities on other than National Forest System lands will be minimal and their effects are listed under in Alternative A above. Alternative B, C and D treatments will have a minimal cumulative effect over those discussed under direct and indirect effects. Treatments on private land for fire risk reduction will contribute to both a reduction of risk from catastrophic wildfire and mountain pine beetle.

FIRE and FUELS

Affected Environment

Historically, fire was a major force in shaping and determining the structure and composition of the ponderosa pine forests of the western United States, including the Black Hills. Frequent low to medium intensity ground fires thinned the forest and removed most of the ladder fuels. The composition and structure of today's vegetation is more the result of a combination of aggressive fire suppression and past management activities than from the effects of fire. Photos and records from the late 1800's and early 1900's indicate that today's forests are more continuous, uniform and dense than what has historically occurred. Fire regimes have changed from that dominated by frequent low to moderate intensity surface fires to one dominated by large intense stand replacement fires.

There is now a greater potential for large, catastrophic fires that are more intense and harder to control than what has historically occurred. These fires can have a significant impact on our environment, economy and personal lives. Vegetation can be consumed on entire landscapes. Crown fires can occur over large areas affecting thousands of acres. Without a seed source, it can take centuries for these forest to regenerate unless extensive tree planting occurs. Flash flooding can occur resulting in severe erosion. Homes and improvements such as roads, bridges, and reservoirs can be destroyed or threatened. Water sources for large cities can be sometimes affected.

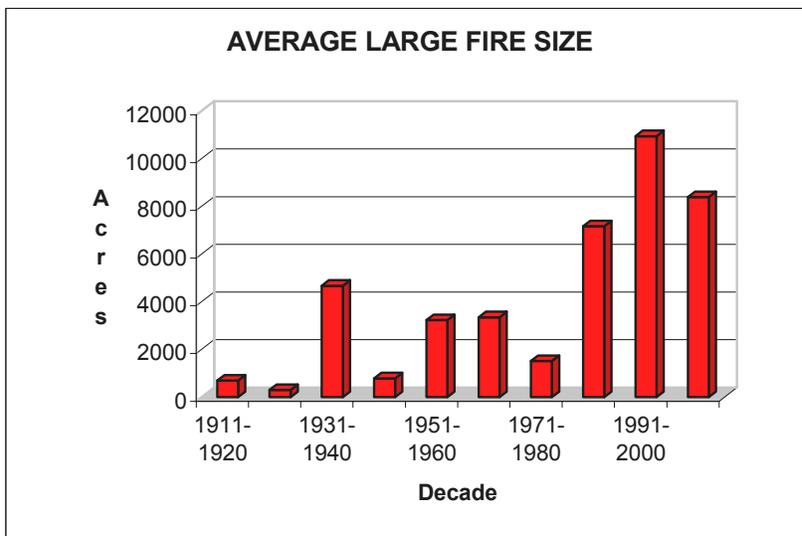
Unfortunately, we are beginning to see the same trend in the Black Hills. The timber inventory on the Black Hills National Forest has increased from 1.5 billion board feet in 1897 to 2.3 billion in 1948 to 4.5 billion in 1977 to 6.1 billion board feet in 1999 (Cook, 2003). As illustrated in Table 3-6 (Cook, 2003), much more of the landscape is forested and we are losing our openings and our natural fuelbreaks.

Table 3-6 Landscape Vegetation

Percent of the Black Hills National Forest with:				
Year	Trees >9"	5-9" in Diameter	Trees < 5"	Meadows/Seedlings
1875	20.0%	40.0%	0.0%	40.0%
1953	48.9%	19.7%	17.9%	13.5%
1973	63.8%	22.0%	13.9%	0.3%
2000	69.8%	21.8%	2.3%	6.1%

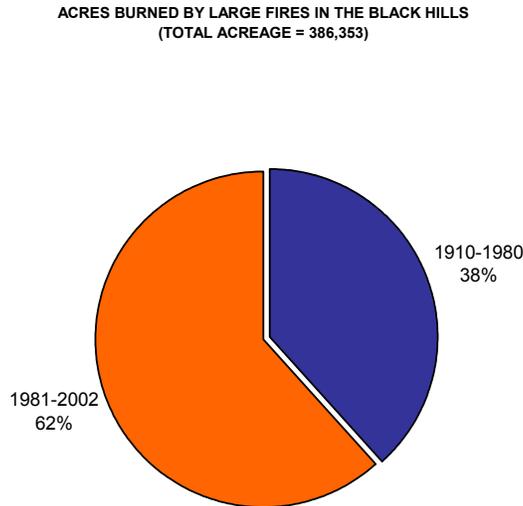
This dense, continuous forest with few openings has resulted in more of the Black Hills being affected by large, intense forest fires. The number of fires on the Black Hills National Forest has remained fairly constant at 65–130 starts per year. The number of fires that have escaped initial attack has also remained constant. However, these “escaped” fires have become larger and are more difficult to control. When looking at fires over 300 acres, average fire size has increased from under 1000 acres per fire in the early 1900’s to over 8000 acres in recent years as illustrated in Figure 3-6 below.

Figure 3-6 Average Large Fire Size



This has resulted in a significant increase in the impact that fire is having on the Black Hills. Large fires, fires greater than 300 acres, burned approximately 147,863 acres from 1900 until 1980. Recent fires, including but not limited to the Jasper Fire, Rogers Shack, Elk Mountain, Grizzly Gulch, Galena, Flagpole, Westberry Trails, and Battle Creek, have burned approximately 238,490 acres since 1980. Figure 3-7 shows the dramatic increase in acreage burned in the recent decades.

Figure 3-7 Acres Burned by Large Fires in the Black Hills



These fires are having an impact on our environment, economy and personal lives. The Grizzly Gulch fire and subsequent landslides have threatened the town of Deadwood. Three homes were burned in the Battle Creek Fire but the number burned could have been significantly higher. The Jasper fire burned 82,688 acres of forested land including 48,555 acres when it made an eleven-mile run in a single day. Luckily, the fire occurred in a fairly remote area of the forest. The same fire in a different location could have been a catastrophe. All of these fires have cost millions to suppress with rehabilitation costs often exceeding suppression costs. Millions of board feet of timber have been destroyed as well as important wildlife habitat. These fires have negatively impacted tourism, affecting the local economy. The Prairie Project Area has the same vegetative types and fire potential as the rest of the Black Hills, but it is in the urban interface adjacent to Rapid City. The vegetation in the project area has deviated from its historical fire frequency by multiple fire return intervals and can be classified as either in Condition Class 2 or 3. Forest in these classes need moderate to high levels of treatments to be restored to the historical fire regime.

A Fire Protection Assessment completed by the Black Hills National Forest evaluated the risks, hazards and values on the Forest and determined that the project area has a “*Risk-Value-Hazard*” rating of High-High-High. *The risk of an ignition is high.* This rating is based upon the fire history of the area. Approximately 5-10 wildland fires occur annually within or adjacent to the study area. Most of the starts are due to the frequent lightning storms that occur throughout the summer. Person-caused fires are also a problem. Ignition sources include but are not limited to brush and debris burning, abandoned campfires and power lines. Most of the fires have been small and suppressed with initial attack resources. However, large project fires have occurred in

or adjacent to the project area within the past 20 years. These fires include the Westberry Trails, Battle Creek and Boone Draw fires.

The area has a *high value rating* because it is within an urban interface. The project area is located west of Rapid City and contains the communities of Hisega and Johnson Siding. These communities, including Rapid City, have been designated as communities at risk, as published in the Federal Register. In addition, there are numerous private inholdings scattered throughout the area. Most of these inholdings have been subdivided and are part of the urban interface that surrounds Rapid City. Values associated with these developments that could be directly or indirectly damaged or destroyed by an intense fire include houses, outbuildings, fences, highways and roads, transmission lines, municipal watershed and reservoirs such as Canyon Lake.

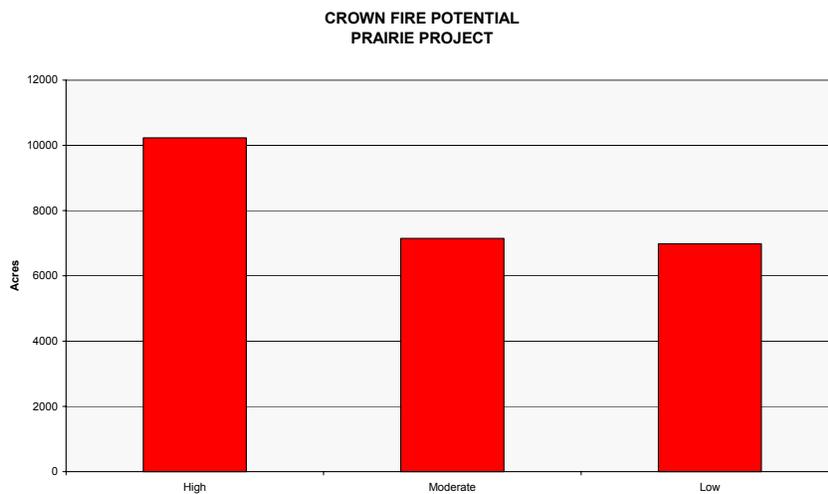
The area receives significant recreational use from local people using the area for dispersed recreation and from people using the recreational improvements associated with Pactola Lake and the Centennial and Deerfield Trails. A forest fire in the project area has the potential to damage these facilities or the aesthetics associated with these facilities. A significant portion of the area is also considered as suitable for timber production and has been managed in the past for wood fiber. The Forest Service has invested money in at least 25 separate thinning projects that are scattered throughout the project area. Crown fires in a ponderosa pine forest can travel 1-3 miles/ hour with flames advancing 15 miles in a single day. If a Jasper type fire occurred within the study area it would threaten hundreds to thousands of homes and possibly destroy several subdivisions and communities within a single burning period.

The project area also has a *high hazard rating*. The 1997 Black Hill National Forest Land and Resource Management Plan indicated that over 75% of the area within the Prairie Project Area had a high fire hazard rating. The high hazard rating is because ponderosa pine is the dominant vegetative type in the area. The ponderosa pine stands in the project area are more dense, multi-storied and continuous than what has historically occurred. Fuels loadings are heavier and more continuous with fewer openings and natural firebreaks. We now have a greater potential for large, intense forest fires that are difficult to control and have the potential to threaten people, private property and significantly affect the ecosystem. Storm damage from the spring snowstorm of 2000 and a severe hailstorm in August, 2001 has significantly increased fuel loadings on at least 1000 acres of National Forest lands located within the project area. The storm damage can be found mostly on south facing slopes as scattered pockets throughout the project area and has exacerbated the fuel problem.

Ground fuels can generally be categorized as duff and litter from natural ponderosa pine stands. Except for areas with storm damage and/or thinning slash, most of the fuel loadings average 4-6 tons/acre with most of the fuel in the 0-3" class. The fuel loading is represented by photos 1-PP-2 and 2-PP2 of the "Photo Series for Quantifying Forest Residues in the Black Hills". Fuel loadings are higher in the old non-commercial thinning units and in storm damage where average fuel loadings increases to 12-18 tons/acre. These areas pose an increased fire hazard in that there are sufficient ground fuels to cause some torching and spotting even under moderate fire conditions.

Past disturbances have created large openings in the Bald Hills area and within the Horse Creek Fire. These openings are large enough to break up the horizontal continuity of the fuels and provide an excellent firebreak on the western portion of the project area. Recent management activities such as the Buffalo, Tamarack, Sisters, McGee, Whisper and Norris Timber Sales have reduced the crown fire potential in some areas. Analysis for the Prairie Project Area indicates that 17,382 acres, or 71%, of the ponderosa pine has a high or moderate crown fire potential as illustrated in Figure 3-8.

Figure 3-8 Crown Fire Potential



Environmental Consequences

Analysis Methods

The following factors were considered when evaluating the alternatives: acres treated, crown bulk density, basal area of the stand, the number of trees per acre, diameter of the residual stand, spacing between trees and their crowns, minimum crown heights and surface fuel loadings. Basal area is a common measurement that is often used to estimate the biomass or stocking level of a stand. In this study, stands with a low crown fire potential usually had basal areas less than 60 ft.²/acre. Stands with a moderate potential had basal areas of 60-90 ft.²/acre and stands with a high crown fire potential usually had a basal area greater than 90 ft.²/acre. Even though there is not much research correlating basal area to crown fire potential, these figures are consistent with what interdisciplinary team members Henry Goehle and Gale Gire have experienced in a combined 50 years of experience in silviculture and wildland fire.

Current models often use crown bulk density as a variable in estimating crown fire spread. Alexander (1988) illustrated by using Van Wagner's models, that crown fire spread was unlikely with a crown bulk density under .05 kg/m³. In this analysis, stands with a low crown fire potential usually had crown bulk densities less than or equal to .05, a moderate rating had bulk density ranging from .06-08 kg/m³ and stands with a high rating had bulk densities greater than .08 kg/m³.

Van Wagner (1977) has stated that active crown fires typically occur in stands where tree crowns are less than 20 feet apart and tree densities in the overstory are greater than 100 trees/acre. This is supported by the University of Nevada's publication "Living With Fire" which suggests a spacing of 10 feet between crowns for slopes of 10-20% and 20 feet for slopes 20-40%. Stand densities were not used as a sole factor in determining crown fire potential because the size of the tree would greatly influence the biomass of the stand and the continuity of the aerial fuels. The distance between crowns is probably a better variable in determining crown fire potential. In this analysis, sites with a high crown fire potential tended to have crowns that were less than 5 feet apart. Stands with moderate potential had crowns 6-11 feet apart and the crowns with low crown fire potential were over 12 feet apart.

It was assumed that canopy heights are low enough and surface fuel loadings are great enough in the project area to initiate a crown fire. This is based upon the fact that crown fires have occurred in the past and the fuel profiles have not changed enough to prevent future crown fires. This analysis would concentrate on the effects that the various treatments would have on crown fire initiation. The following tables summarize how the alternatives affect the key elements of the fuel profile.

The ponderosa pine sites in the project area were grouped into three broad categories based upon the site's crown fire hazard. Sites with a low crown fire hazard do not have sufficient aerial fuels to support an active crown fire even under extreme conditions. An active crown fire is possible in sites with a moderate rating but only under extreme conditions including dry fuels, high temperatures, low relative humidity and high wind speeds. Crown fire initiation and spread is possible in sites with a high crown fire hazard under hot and dry conditions but does not require a wind event to sustain the crown fire. Table 3-7 and Table 3-8 summarize the effects on the key elements of the aerial fuels for each of the alternatives. It should be noted that other vegetation types like hardwoods and meadows have low crown fire potential. Thus, they function well as natural fuel breaks.

Table 3-7 Summary of Crown Fuels after treatment

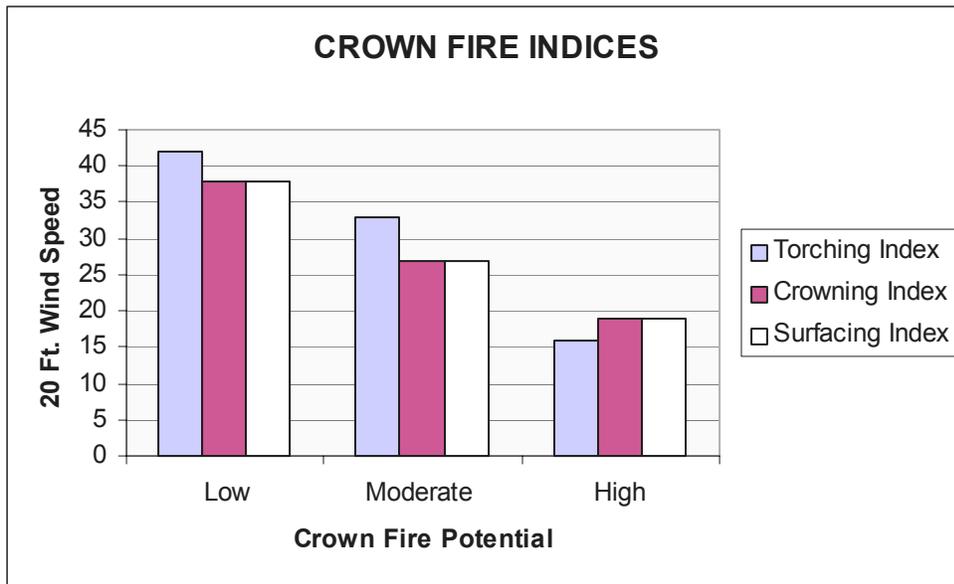
Crown Fuel Elements		A	B	C	D
Low	Acres	6602	9361	14,649	9058
	Crown Bulk Density	.05	.05	.04	.04
	Basal Area	50	50	46	41
	Trees/Acre	79	76	76	65
	Average Diameter for Trees 5" +	10.7	10.9	10.5	10.8
	Crown Fuels (lbs/acre)	3483	3380	3291	2821
	Average Spacing Between Trees	24	24	24	26
	Average Spacing Between Crowns	>12	>12	>12	>12
	Minimum Crown Heights	25	27	27	29
Moderate	Acres	7211	7771	4746	6892
	Crown Bulk Density	.08	.08	.08	.08
	Basal Area	79	82	80	82
	Trees/Acre	135	133	135	135
	Average Diameter for Trees 5" +	10.7	10.6	10.4	10.6
	Crown Fuels (lbs/acre)	5927	5826	5926	5918
	Average Spacing Between Trees	18	17	18	18
	Average Spacing Between Crowns	6-8	6-8	6-8	6-8
	Minimum Crown Heights	22	22	22	22
High	Acres	10783	7441	5109	8590
	Crown Bulk Density	.12	.11	.13	.12
	Basal Area	115	114	111	115
	Trees/Acre	236	224	239	233
	Average Diameter for Trees 5" +	9.5	9.7	9.2	9.5
	Crown Fuels (lbs/acre)	8815	8302	9143	8873
	Average Spacing Between Trees	14	14	14	14
	Average Spacing Between Crowns	2-4	2-4	2-4	2-4
	Minimum Crown Heights	18	19	16	17

Table 3-8 Summary of Crown Fuels Twenty-Years after Treatment

Crown Fuel Elements		A	B	C	D
Low	Acres	2653	5625	8648	5696
	Crown Bulk Density	.05	.04	.04	.04
	Basal Area	50	49	42	38
	Trees/Acre	74	67	58	54
	Average Diameter for Trees 5" +)	11.1	11.6	11.5	11.4
	Crown Fuels (lbs/acre)	3869	3461	3011	2815
	Average Spacing Between Trees	24	25	28	28
	Average Spacing Between Crowns	>12	>12	>12	>12
	Minimum Crown Heights	26	28	30	30
Moderate	Acres	4722	6372	6346	4991
	Crown Bulk Density	.08	.08	.07	.07
	Basal Area	77	80	77	78
	Trees/Acre	116	116	122	122
	Average Diameter for Trees 5" +	11.0	11.2	10.7	10.8
	Crown Fuels (lbs/acre)	5938	5945	5401	5364
	Average Spacing Between Trees	19	19	19	19
	Average Spacing Between Crowns	6-8	6-8	6-8	6-8
	Minimum Crown Heights	22	23	22	22
High	Acres	17,222	12,575	9510	13,853
	Crown Bulk Density	.11	.10	.10	.11
	Basal Area	108	109	102	110
	Trees/Acre	189	184	181	190
	Average Diameter for Trees 5" +	10.2	10.4	10.2	10.3
	Crown Fuels (lbs/acre)	8563	8283	9335	8545
	Average Spacing Between Trees	15	15	15	15
	Average Spacing Between Crowns	2-4	2-4	2-4	2-4
	Minimum Crown Heights	11	12	11	11

The NEXUS crown fire model (below) was used to help illustrate the crown fire hazard for stands with a low, moderate or high rating. Torching Index is the 20-foot wind speed at which the surface fire intensity is hot enough to initiate a crown fire. Surfacing Index is the wind speed in which fire would leave the crowns and become a surface fire. Crowning Index is the wind speed at which an active crown fire is possible. Based upon this model, stands with a low crown fire potential would require wind speeds in excess of 35 mph to initiate and sustain a crown fire. Crown fires are possible in the moderate category with wind speeds in the mid twenties. Forests with a high crown fire potential could have torching and crown fires with wind speeds in the high teens.

Figure 3-9 Crown Fire Indices



ALTERNATIVE A

Direct/Indirect Effects

Alternative A would meet the Forest Plan guidelines for surface fuels. This alternative does not meet the objective of reintroducing fire to the ecosystem nor does it meet the direction to reduce the threat of wildfires. Currently (year 1) there are approximately 17,382 acres of the ponderosa pine dense enough to sustain an active crown fire and the potential for a catastrophic fire would increase with time. Changes should be gradual and would not be apparent in the short term unless a major disturbance occurs. Ground fuels would continue to accumulate from annual needle cast, dieback and breakage. Mortality of trees is likely to continue, adding to the surface fuel loadings. Natural tree growth and succession would gradually create a forest that is more dense and multi-storied in nature. Stand biomass would increase including the bulk density of the crowns. Natural regeneration of pine would continue, resulting in multistoried stands with ladder fuels. These stands would become more susceptible to large-scale disturbances such as insect outbreaks that could significantly alter the fuel profile. It is estimated that within 20 years, 21,944 acres or 89% of the forested acreage in the Prairie Project Area would be susceptible to crown fire initiation and spread. Appendix E, Maps 10 - 17 shows how the project area would become more susceptible to crown fires over time.

This alternative would provide the best access for fire protection. There are over 250 miles of roads that could be used to access the fire. The road system is dense enough that suppression forces could drive within a quarter-mile of most fires. Additional routes would be established from motorized use of the area, improving fire access.

Cumulative Effects

Wildfires are expected to remain at the same frequency and size for the short term. Fire risk or hazard is not expected to change significantly in the short term. Most fires would continue to be low to moderate intensities with flame lengths ranging from 1 to 4 feet. Fires with these intensities can be suppressed with initial attack resources. However, fires occurring during more extreme weather conditions would have the potential to develop into crown fires and make runs of 5-15 miles in a single day. A fire of this magnitude would threaten land both inside and outside of the project area, private property and possibly several subdivisions and/or communities.

Crown fire potential would gradually increase with time. The potential for crown fire initiation would significantly increase with the development of multi-storied stands with ladder fuels and greater surface fuel loadings. The forest would become more susceptible to an active crown fire as the forest becomes denser and more continuous with fewer natural fuel breaks. History has shown that these forests are usually not sustainable over time and would eventually be affected by landscape disturbances such as fire and/or insects.

ALTERNATIVE B

Direct/Indirect Effects

This alternative would meet the Forest Plan objective of reintroducing fire to the ecosystem and the standard for reducing the threat of a wildfire damaging public and private developments. This alternative would treat 965 acres of storm damage, an additional 4,509 acres would be non-commercially thinned from below, a low-moderate intensity prescribed fire would be used to treat approximately 7,502 acres and fuelbreaks would be developed on 553 acres of land adjacent to private lands. Appendix E, Map 7 shows the prescribed burn sites and areas that storm damage would be treated. The effectiveness of the thinning would be limited because of the limitation on commercial saw timber harvest. The proposed activities would tend to reduce the potential of a severe crown fire for 15 to 20 years. Models indicate that within 15-20 years there would be sufficient growth to increase stand density enough that 12,575 acres would have a high crown fire susceptibility or a 17% increase over existing conditions. Appendix E, Maps 12 and 13 shows the effects that Alternative B would have on the crown fire hazard in the project area.

The storm damage would be treated by mechanical slashing or crushing the fuels so that they lie within a foot of the ground or by piling and burning the fuels in the more sensitive areas. Crushing would reduce fuel height and increase the bulk density of the fuel, resulting in lower fireline intensity. An additional benefit is that more of the fuel would be in contact with the ground. This would cause higher fuel moistures and increase the rate of decay.

Fuelbreaks would be completed adjacent to approximately 23 miles of private property. The fuelbreaks would be 2-300 feet in width and would be created by thinning the stand from below to minimum spacing of 18x18 feet. This would thin the forest to a density that would not support an active crown fire but not enough to encourage grass from becoming established in the

understory. Minimum canopy heights would increase 5-10 feet decreasing the possibility of torching and spot fires. Activity fuels would either be removed from the site or piled. Piles would be disposed of by burning or by chipping. The purpose of these fuelbreaks is to provide an area where crowning is not likely and give firefighters the opportunity to suppress or divert a fire before it reaches the private land or to help suppress a fire that starts on private property from moving onto National Forest Lands.

Hardwoods and meadows provide diversity and also provide natural fuelbreaks under most conditions. Where it occurs, grazing would remove much of the fine fuels in these areas enhancing their effectiveness as fuelbreaks. Alternative B would help maintain or create 680 acres of meadows and 919 acres of hardwood stands by removing the non-commercial conifers that are encroaching into these areas.

Non-commercial thinning would be used to thin 4509 acres from below. The proposed thinning would only remove stems that are less than 9" in diameter so some portions of the stand would still maintain higher densities. This would decrease the fire potential by reducing the bulk density of the crown, increasing the distance between the crowns and by increasing minimum crown heights. The thinning operation has the potential to increase surface fuel to 10-17 tons/acres. This amount of slash can negate many of the benefits of the thinning and fuels would need to be treated to reduce surface fire intensities.

Lopping and scattering the slash to a 12" standard would reduce fire intensities by decreasing fuel heights and increasing the bulk density of the fuels. Figures from the "Black Hills Fuels Guide indicate that these actions would reduce fire intensities to 80-160 BTU/sec/ft. (based on 90% cumulative probability of fire days). These figures are below the Forest guidelines. However, the fuels remain on site and can be a problem in droughty conditions. Removing the fuels by prescribed fire or mechanical means would be more effective and is recommended over lopping and scattering if expected fire intensities in the activity fuel are over 200 BTU/sec ft at the 90th percentile.

Prescribed fires would be completed on 5,823 acres of natural fuels and 1,679 of activity fuels. The proposed burns would reduce crown fire potential by decreasing surface fuel loadings by 50-80% to an estimated 2-5 tons/acre of fine fuels and by increasing minimum canopy heights to 25-30 feet. Prescribed burning has not been an effective tool in thinning ponderosa pine on the Black Hills. Ponderosa pine has thick bark that insulates the cambium. Tree mortality from basal scorching is minimal and most mortality occurs from crown scorch. Approximately 1-3% of the trees in the overstory would be killed. Trees would be killed in small groups and patches and mortality usually would not occur uniformly throughout the stand. Prescribed fire can be effective in killing smaller seedlings and saplings that can create a multi-storied forest that serves as ladder fuels. Again, the effects of the prescribed burn would be patchy and minimum canopy heights would not be affected on all areas.

This alternative would manage approximately 2,743 acres for thermal cover. These stands tend to be very dense, multi-storied with low canopy heights. Past experience and fire spread models indicate that these stands are susceptible to stand replacement fires under moderate fire conditions.

Alternative B would provide the poorest access for fire protection. This alternative would provide 197 miles of roads that could be used to access a wildland fire. The road system would still be dense enough that fire crews can drive within a quarter-mile of most fires. However, there would be more fires that initial attack forces would need to walk to. This would decrease the response time to the fire, increasing fire size and the potential for a large fire.

Cumulative Effects

Alternative B would be effective in reducing the potential of large catastrophic fires for at least 3-5 years. Research and recent fires such as the Hayman and Hi Meadows fires in Colorado and the Star Gulch fire in Idaho have shown that recent prescribed burns can be effective at either stopping or reducing the effects of large wildland fires. Benefits from prescribed fire would decrease with time as natural fuels begin to build up from needle cast, mortality and in-growth. This is supported by the fact that studies of the Hayman fire showed mixed results when comparing fire intensities in areas prescribed burned approximately 10 years ago to adjacent, untreated areas. It is anticipated that the treatments proposed in Alternative B would lose their effectiveness and additional treatments would be needed in approximately 20 years. This estimate is supported by research (Shepperd and Battaglia, 2002), which suggests a mean fire interval of 20-24 years for Jewel Cave National Park. Future management would be needed to maintain forest conditions that would reduce the long-term potential of a severe, crown fire occurring within or adjacent to the Prairie Project Area.

ALTERNATIVE C

Direct/Indirect Effects

Alternative C is the most aggressive alternative in treating forest vegetation to reduce the potential for catastrophic fire. This alternative would treat the 965 acres of storm damage and create 29 miles of fuelbreaks. Approximately 1,776 acres would be non-commercially thinned from below and commercial treatments would be used to thin an additional 7,590 acres of ponderosa pine. Commercial and non-commercial treatments would be used to create or maintain 959 acres of hardwoods and 779 acres of meadows. Low to moderate intensity prescribed fire would be completed on the 4,224 acres that are shown in Appendix E, Map 8. The purpose of the commercial treatments proposed under this alternative would not be to maximize tree growth and yield but to reduce the fire hazard. Differences from traditional timber sales would include the following:

- The Forest would be managed at a lower density than in the past.
- Whole tree logging would be required wherever feasible. This would remove most of the activity fuels and maintain fuel loadings at or near natural levels.
- Purchasers or contractors would be required to remove the stems 5-9 inches in diameter. This would insure that the stand is thinned from below to reduce stand densities and increase canopy heights.

- Timber Stand Improvement guidelines would be to reduce fire hazard and not to maximize tree growth. More emphasis would be placed on either removing or treating the activity fuels with the goal of maintaining fuel loadings near natural levels.
- Emphasis would be on expanding meadows and hardwoods, not just on maintenance.
- Less emphasis would be placed on hiding and thermal cover.

Treatments for fuelbreaks and storm damage are similar to Alternative B and are discussed in this section. Non-commercial thinning would be used to thin 1776 acres. Bulk densities in the treated sites would be below $.05 \text{ kg/m}^3$ and average distances between crowns would be greater than 12 feet. Models indicate that these stands would have low enough stocking levels that they would not be able to sustain an active crown fire for at least 20 years. Estimates from similar activities and the Black Hills Photo Series indicate that the non-commercial thinning could increase surface fuel to 15-20 tons/acre. This amount of slash would negate many of the benefits by increasing surface fuel loadings surface fire intensities. The fuels will be treated by prescribed fire, removed from the site, lop and scattered or chipped so that expected fire intensities at the 90th percentile are less than 200 BTU/sec/ft. three years after the treatment. This would maintain fuel loadings at or near natural levels.

Commercial size timber would be harvested on an additional 7,590 acres of ponderosa pine. Commercial treatments would be used to thin approximately 5,034 acres to 40-60 ft² of basal area per acre. Non-commercial thinning would be needed in addition to the commercial treatments on 3,385 of these acres in order to meet the silvicultural prescriptions. The main objective of these treatments would be to thin the forest to a density such that it would not sustain an active crown fire, but dense enough to shade out the grasses and prevent a flourish of undergrowth. The proposed treatments would increase crown base heights to 24 feet, increase the average distance between crowns to over 12 feet and reduce the crown bulk density to less than $.05 \text{ kg/m}^3$. Modeling indicates that most of these stands would not be susceptible to crown fires even 20 years after the initial treatment. However, a second entry may be desirable within 15-25 years to reduce stand densities and treat ladder fuels.

Whole tree logging would be required where feasible. This would remove most of the activity fuels and help maintain fuel loadings at or near natural levels. Activity fuels could be created on sites that are too steep or rugged for whole tree logging or by the non-commercial thinning. Fuel in these areas would be treated in order to maintain fire intensities below Forest Plan guidelines of 200 BTU/sec/ft.

Approximately 2,519 acres would be managed for basal areas under 40 ft². Trees in these areas would be far enough apart to prevent an active crown fire. However, an increase in grass and understory vegetation including ponderosa pine regeneration would be expected. In these stands grass would be the primary carrier fuel. Flashy fuels such as grass, increased solar radiation and exposure would result in surface fires with higher intensities and rates of spread. Torching of individual and small groups of trees would be more prominent but the stand density would not be great enough to sustain a crown fire. High live fuel moistures in the grasses would help retard fire behavior during the growing season and grazing could be used where permitted to further reduce fuel loadings and fire intensities. Another benefit is that fire engines and air support would be more effective in these open stands when compared to a more dense forest.

Unless treated, regeneration would develop in these more open stands. The conifers would eventually shade out the understory vegetation and litter/duff would become the primary carrier fuel. This regeneration would be susceptible to crown fires and can act as ladder fuels for the larger trees. Non-commercial thinning may be needed in the future to reduce stand biomass and fire intensities. Plans are to use prescribed fire to treat 465 acres. The prescribed burn would kill most of the ponderosa pine seedlings on these sites. A 15-20 year prescribed fire interval would be effective in killing future regeneration and help maintain more park like stands.

Commercial and non-commercial activities would be used to restore or maintain 779 acres of meadows and 959 acres of hardwoods. Prescribed fire would be completed on 4,224 acres. The prescribed burns would treat approximately 2,122 acres of activity fuels and 2,102 acres of natural fuels. All of the prescribed burns proposed in Alternative C would have a moderate complexity. Three units totaling 1,528 acres are located away from private lands and existing terrain and fuels make it unlikely that a spot fire or an escaped fire would threaten any sensitive or high value resources. Effects of the prescribed burn would be similar to Alternative B. The remaining units are located on south slopes that can be burned when there is snow or wet fuels on the north facing slopes. This would allow the Forest Service to complete the proposed burns with a hotter prescription and still have very little potential for an escaped fire. The south slope burns would be more effective in raising canopy heights and thinning out the forest. These prescribed burns would kill 3-5% of the overstory vegetation and should be effective in thinning out the seedlings and saplings that could serve as ladder fuels. The downside of the cool season burns is that they would not be as effective in treating fuels located on north facing slopes or in shaded areas.

Thermal cover and potential thermal cover would be provided with isolated stands that are surrounded by a less flammable fuel type. This alternative would provide 1,274 acres of thermal cover or future thermal cover compared to the 3,492 acres in Alternative D. Thermal cover tends to be very susceptible to crown fire initiation and spread. Bulk densities tend to be over .10 kg/m³ and the average spacing between crowns is usually less than 5 feet. Ladder fuels are often present with pockets of heavy dead and down fuels. Modeling supported by past experience shows that crown fires are possible in these stands even under more moderate conditions. These dense stands can provide the heat pulse that is needed to initiate crown fire in stands that are located downwind or uphill from the thermal cover even though they are not usually susceptible to a crown fire.

This alternative treat fuels on a landscape basis reducing acreage with high fire potential from 10,783 acres to 5,109 acres and increasing acreage with low fire potential from 6,602 to 14,649. Models indicate that even after 20 years this alternative would still reduce the fire potential in the project area but additional treatments may need to be considered. The effects of this alternative on crown fire potential are illustrated in Appendix E, Maps 14 and 15.

Approximately 223 miles of roads would be available for fire suppression access in Alternative C. The alternative would decommission approximately 60 miles of roads that could be used for fire access and convert an estimated 11 miles to non-motorized trails. Most of the roads being closed are either too rough or steep to be used by engines or are short spurs that can be closed without significantly affecting access for fire suppression. Alternative C could reduce response

time to some fires, which may result in larger fires. However, there is still sufficient access to drive within quarter mile of most fires and the effects should be minor. This alternative would not have a significant effect upon fire suppression.

Cumulative Effects

Alternative C would be the most effective alternative in reducing the likelihood of large catastrophic fires that could threaten land and resources within and adjacent to the project area. Given the magnitude of vegetation treatment and maintenance planned, Alternative C will afford greater effectiveness in reducing large wildfire potential over a larger area and longer period of time than other alternatives. Management is needed at a 20-25 year interval to maintain these benefits. Otherwise, there will be a gradual increase in stand density and biomass. In 35-50 years the project area would again be susceptible to a large catastrophic fire that could threaten resources in and adjacent to the project area.

ALTERNATIVE D

Direct/Indirect Effects

Alternative D would manage the forest with the emphasis on meeting the Project's purpose and need within the Standard and Guidelines of the Forest Plan. This alternative would treat the storm damage, create 21 miles of fuelbreaks and non-commercially thin 1,938 acres. It would manage 3492 acres of forested land for thermal cover and would remove commercial products in thinning an additional 3,019 acres of coniferous forests. Fuels would be treated mechanically without any prescribed burning.

The forest would be managed at a higher density than Alternative C. This alternative would commercially thin 1,084 acres to a basal area of 60-80 ft² versus the 40-60 ft.² of basal area prescribed in Alternative C. Residual crown bulk densities would be .07 instead of .04 kg/m³ and stand density would increase from 95 to 142 stems. This would lower crown fire potential in the short term but the higher stand densities would moderate some of the benefits. It is estimated that within 20 years most of these stands would have developed to a point where they could sustain an active crown fire.

More emphasis would be placed on removing the overstory on stands that have reached their rotation age. This alternative would manage 1,904 acres for basal areas less than 40 square feet. These stands would not pose much of a crown fire threat immediately but they would develop into a dense stand of saplings that within 15-20 years would be susceptible to high intensity fires.

Whole tree logging would be required where appropriate with this alternative to minimize an increase in surface fuel loadings. There may be some sites where whole tree logging is not feasible and fuel loadings will increase 3-7 tons/acre. On these sites, mechanical fuel treatment would be used to reduce fire intensities to 200 BTU/sec/ft at the 90th percentile. Lopping and scattering the activity fuels would be effective in meeting this guideline. However, the increased fuel loadings could result in more torching and possibly active crown fires, especially during

periods of elevated fire danger caused by hot, dry weather or droughty conditions. Removing the fuel from the site and/or chipping the fuels would be more effective at reducing fire behavior but more expensive.

While not as effective as Alternative C, it would meet the forest plan direction and objective of reducing the threat of a wildfire to public and private lands. This alternative reduces the number of acres with a high crown fire hazard from 10,783 acres to 8,590. Additional treatments will be needed in 15-20 years to maintain any benefits. Appendix E, Maps 16 and 17 illustrate the effects that this alternative would have on the crown fire potential. This alternative would not contribute to the Forest Plan objective of reintroducing fire to the ecosystem.

Approximately 223 miles of roads would remain open in Alternative D. The effects for this alternative are similar to Alternative C. Alternative D could increase response time on some fires, which may result in larger fires. However, there is still sufficient access for suppression and the effects should be minor. This alternative would not have a significant effect upon fire suppression.

Cumulative Effects

While not as effective as Alternative C, Alternative D would reduce the threat of a large catastrophic fire that could threaten land and resources within and adjacent to the project area. Management is needed at a 15-20 year interval to maintain these benefits. Otherwise, there will be a gradual increase in stand density and biomass and the project area would become susceptible to a large catastrophic fire.

Prescribed Fire

Affected Environment

Prescribed fire is planned to treat about 7,500 acres in Alternatives B and just over 4,200 acres in Alternative C. A low intensity broadcast burn would be prescribed with the objective of reducing ground fuels, removing ladder fuels and increasing canopy base heights. The prescribed burns have been designed to minimize line construction by using roads, trails and natural firebreaks where feasible.

South Dakota has two Class 1 airsheds. Wind Cave is located 28 air miles south southeast of the project area and the Badlands National Park is located approximately 55 air miles to the east. The State of South Dakota currently does not require burn permits or provide direction for smoke produced from prescribed fire. Rapid City is not currently listed as a non-attainment city but has had problems with particulate matter. Most of the problems have been associated with dust resulting from high wind events and not from prescribed burning. However, it is important that the alternatives do not exacerbate the situation or cause any problems with the air quality in Rapid City or the surrounding communities. Local Forest Service personnel work with the Rapid City Air Quality Division and the National Weather Service to avoid exceeding air quality

standards in Rapid City from a broadcast burn or with pile burning. The following practices are often used to help mitigate possible impacts from smoke:

- Limit acres or piles burned in a day.
- Stagger ignitions to reduce the amount of smoke produced at one time.
- Specify wind directions that disperse the smoke away from a receptor.
- Specify minimum mixing heights
- Prescribe acceptable wind speeds.
- Specify time of the day that ignitions can occur.
- Mop up smoldering fuels.

The Mystic Ranger District will prepare approved Burn Plans before completing any prescribed burns. Smoke emissions are modeled and all of the plans contain smoke management guidelines to either avoid or mitigate possible effects. Prescribed burns are expected to be completed in the fall, winter or spring. This is outside the normal tourist season so impacts on tourism should be minimal. Sensitive receptors discussed in the burn plans are local communities such as Hill City, Rapid City, Johnson Siding, Hisega and Keystone, Class 1 airsheds, major roads and subdivisions.

Effects of the Alternatives

ALTERNATIVE A

Direct Effects/Indirect Effects

Alternative A would have no direct effects upon the existing air quality. The potential of a large catastrophic fire is greater with Alternative A. A large wildfire in the project area would probably disperse smoke into Rapid City's airshed at a level that would exceed National Air Quality Standards. Effects would be short term and probably occur during major runs of the fire.

Cumulative Effects

Alternative A would not have any cumulative effects.

ALTERNATIVE B

Direct Effects/Indirect Effects

Prescribed fire is planned for 7,502 acres. Broadcast burns would be completed on 1,952 acres of activity fuels created by the non-commercial thinning. Fuel loadings on these sites would range from 10 to 17 tons/acre. The remaining acreage would be natural fuels, mostly ponderosa pine needles with fuel loadings ranging from 3-5 tons/acre. Approximately 14 miles of fireline would need to be constructed. Most of the fireline would be constructed with bulldozer. The fireline would average 3-5 feet in width and would be deep enough to expose the mineral soil.

Approximately one mile of hand line would be needed where the terrain is too steep or rocky to construct with the dozer. Hand lines are usually 2-3 feet in width and are deep enough to expose the mineral soil. Firelines would be rehabbed and seeded after the prescribed burn is completed.

The complexity of the proposed burns would be based upon criteria published by the National Wildfire Coordinating Group in the “Prescribed Fire Complexity Rating System Guide”. Initial analysis indicates that 5482 acres would be high complexity or level I burns. These burns have a high complexity rating for the following reasons:

- They need to be completed in the spring or fall when adjacent fuels are dry, increasing the potential of an escape.
- There are homes and private property adjacent to or downwind wind from the burn that could be threatened by an escape or spot fire.
- The proposed burns would require a large complex fire organization to ensure that an escaped fire does not occur.
- The prescribed burn is highly visible and an escape or an adverse event would attract significant attention.
- Major smoke intrusions may occur in Rapid City or other smoke sensitive areas.

The remaining 2,020 acres are considered to be of moderate complexity. The moderate complexity burns are located away from private lands and existing terrain and fuel make it unlikely that a spot fire or an escape would threaten any sensitive or high value resources.

Preliminary modeling with the “SASEM” smoke dispersion model indicates that approximately 1065 tons of total suspended particulates (TSP) would be produced from prescribed fire. SASEM indicates that burning can occur on up to 300 acres of natural fuels and at least 75 acres of activity fuels in a single day without violating EPA standards for TSP, PM-10 or PM-2.5. The SASEM model also indicates that prescribed fire has the potential to reduce visibility at Mount Rushmore, Wind Cave and Rapid City. Badland National Park would not be affected by prescribed burning. It is far enough away from the project area that the smoke would be dispersed before it reaches the Park.

The SASEM model is designed to give the worst-case scenario and managers can reduce or mitigate possible impacts with proper smoke management techniques. Limiting the acceptable wind direction from northeast to northwest would disperse the smoke away from and mitigate any effects on Mount Rushmore or Wind Cave. It is not possible to avoid the Rapid City airshed because almost all of the acceptable burn days would have winds from a westerly direction. Possible impacts can be mitigated by limiting the acres burned in a day and by burning under atmospheric conditions that would loft the smoke over the sensitive receptors. However, smoldering would occur and one can expect nighttime drift of some smoke down Rapid Creek and possibly into Rapid City. Effects should be short term and should not violate any air quality standards. However, the smoke may be noticeable both visually and by smell.

Burning activity fuels from fuelbreak construction and non-commercial thinning would add an additional 591 tons of TSP to the airshed. Chipping or removing the activity fuels from the area would reduce the amount of TSP but would increase project costs. A combination of chipping

and burning would probably be used with debris in less sensitive areas and chipping occurring in the more sensitive areas.

There are always risks associated with prescribed burning. Most problems occur with smoke either from nighttime drift or when an unexpected subsidence causes the smoke column to surface. Based upon daily production rates of previous prescribed burns and on limitations imposed by burning in and/or adjacent to the urban interface, it would take 40-45 days of burning and probably 3-5 years to complete the prescribed burns planned in Alternative B. The additional burn days needed to implement Alternative B would increase the potential for possible impacts from the smoke.

There is also the threat of an escaped fire. The potential of an escape can be minimized by prescribing fuels and moisture conditions that limits fire behavior and by completing the burn with skilled and experienced personnel. However, there is always the chance that unexpected weather or fuels may cause the fire to escape and create a wildfire similar to the 1991 Horse Creek fire that escaped control lines, burning 2,673 acres and threatening several residences.

Cumulative Effects

Prescribed burn impacts on air quality would be short term and their influence on air quality is temporary. Activities that may affect air quality on the Mystic District include approximately 400 miles of road maintenance (Based on 2001 accomplishments), 1,500-2,000 acres of prescribed burning (District-wide), debris burning from private land, timber sales, fuels projects and wildfire. These events are scattered throughout the year and generally do not occur at the same time. It is possible that multiple activities occurring on the same day would have some cumulative effects. However, by implementing smoke management guidelines and proper scheduling of activities, Alternatives B, C and D can be implemented without any violations of the Clean Air Act. This is supported by the fact that the 2001 monitoring of the Black Hills Resource and Land Management Plan did not report any violations of the Clean Air Act. There would be no cumulative effects over time because once an activity is completed, the effects on air quality would desist and would not affect the next activities or group of activities.

ALTERNATIVE C

Direct Effects/Indirect Effects

Prescribed fire would be completed on an estimated 4,200 acres. The proposed burns would treat approximately 2,122 acres of activity fuels and about 2,100 acres of natural fuels. All of the prescribed burns proposed in Alternative C would have a moderate complexity. Three units totaling about 1,500 acres are located away from private lands and existing terrain and fuels make it unlikely that a spot fire or an escaped fire would threaten any sensitive or high value resources. The remaining units are located on south slopes that can be burned when there is snow or wet fuels on the north facing slopes. This would allow the Forest Service to complete the proposed burns with a hotter prescription and still have very little potential for an escaped fire. Approximately 4 miles of fireline would need to be constructed for Alternative C. A

bulldozer would put in most of the line. Approximately ½ mile of hand lines would be needed where the terrain is too steep for a bulldozer. Line construction would be similar to what was discussed in Alternative B and would be rehabbed when the prescribed burn is completed.

It would take 20-25 days of burning over a 2-3 year period to complete the prescribed burning with this alternative. Effects would be similar to those in Alternative B. The main difference is that approximately one half the acres would be burned and it would require fewer days to complete the project. This would result in less smoke and fewer days that people would be exposed to the smoke.

Prescribed fire would produce an estimated 600 tons of TSP in Alternative C. Pile burning could produce an additional 1400 tons of particulates if activity fuels from the mechanical treatments are burned. This estimate would be the maximum amount of particulates produced. Currently, material from some logging piles is being chipped and utilized as a product. This would remove up to one half of volume of the fuels produced with the timber sales and reduce the particulates by 450-500 tons. Activity fuels from the fuelbreaks and non-commercial thinning can also be mechanically treated to reduce the amount of particulates introduced into the air shed.

Alternatives B and C may indirectly affect other planned projects. There are limited opportunities or windows to complete a burn because prescribed burns require specific weather, fuel and atmospheric conditions. The Mystic District currently has the workforce and ability to burn between 1,500 and 2,000 acres annually. Prescribed burns completed in the Prairie Project would affect the District's ability to complete burns in different locations. Under Alternative C, the potential for a prescribed fire escaping is less than in Alternative B because fewer acres are treated and all planned burns are of moderate complexity.

Cumulative Effects

Cumulative effects would be similar to Alternative B. Management activities could be coordinated so there would be no significant impacts on the airshed. Any impacts would be short term and would not accumulate over time.

ALTERNATIVE D

Direct /Indirect Effects

Prescribed fire is not planned in Alternative D. Therefore, there would be no impacts on the airshed from prescribed fire. Pile burning and the slash created by fuelbreak construction, logging and thinning could add an estimated 900 tons of particulate matter into the atmosphere. Up to one half of the logging debris could be chipped and removed from the site. This would reduce the amount of particulates emitted in the atmosphere by 350-400 tons. Chipping or removing fuel from the fuelbreak construction and thinning can further reduce impacts to the airshed. Models indicate that the slash could be burned without violating any air quality standards by limiting the number of piles burned at one time.

Cumulative Effects

Alternative D would have no cumulative effects. Effects noted above would be short term and burning could be coordinated with other activities to avoid any significant impacts on the airshed.

RANGE

Affected Environment

The Prairie Project Area overlaps three grazing allotments on the Mystic Ranger District. These are the Pactola, Silver City and Bald Horse Allotments (see Table 3-9). Silver City and the Collins/Work Center units of Pactola are managed under deferred-rotation systems. Bald Horse is a rest-rotation system. Cattle in the Stuck unit of Pactola are rotated into individual drainages using fences, salt, water, and riders. The Sawmill unit of Pactola is used the last month of the season by one permittee with 30 cow-calf pairs.

The grazing season on these allotments generally begins on June 1 of each year and ends at variable dates, depending on the pasture, from September 15 to October 30. Approximately 566 cow/calf pairs utilize the three allotments. Numbers may vary if a permittee chooses to run some yearlings in place of cow/calf pairs or takes non-use. Bulls are generally removed during the month of August. At any given time during the grazing season, all these cattle may be within the Prairie Project boundary. Grazing plans for pasture rotations are revised on an annual basis during winter meetings with the permittees. The timing of use (on-off dates) for each pasture may vary annually. Livestock numbers and/or length of season can be reduced on an annual basis to adapt to climatic conditions. Forage utilization monitoring is done periodically throughout the June through September/October grazing season to ensure Forest Plan Standards are met.

Pactola and Silver City have Allotment Management Plans (AMP) that were approved in 2002. Bald Horse will be reevaluated again and an AMP prepared in 2007.

Table 3-9 Affected Grazing Allotments

ALLOTMENT NAME	GRAZING SYSTEM	PASTURES AFFECTED	DAYS/ SEASON	# OF CATTLE	# OF PERMITS
Pactola	Season-Long, deferred	Stuck	122 days (6/1 – 9/30)	46	1
		Ruby Ridge		23	1
	Three-pasture, deferred	Work Center	(6/1 – 9/15)	30	1
		Sawmill			
		Collins			
Two-pasture, deferred	Merchen	(6/1 – 9/30)	18	1	
			Non-use	50	1
Silver City	4-pasture deferred rotation	Upper Jenny Bear	137 days variable (6/1 -10/15)	93	2
Bald Horse	9-pasture rest Rotation	Prairie North Bald Hills Middle Bald Hills South Bald Hills Middle Horse Creek Middle Victoria Lower Victoria	153 days Variable 6/1 - 10/30	299	1

The Rapid Creek Drainage as encompassed by the Prairie Project boundary provides excellent foraging opportunities for livestock. There are many large and small meadows found on both uplands and in valley bottoms. These areas are designated as primary range because they are accessible by livestock and produce primarily grasses.

The rangelands within this project area are in good to excellent condition with a static or upward trend. Pine encroachment is occurring within the open areas where there is no intervention by man or fire. As pine invades the meadows, the net result is reduced forage available for livestock.

Suitable rangelands are appropriate for grazing considering environmental and economic consequences, and alternative uses. The area within this project-planning boundary is currently under management for livestock grazing.

Livestock use along Rapid Creek, from Pactola Dam to the East Forest Boundary, is incidental. The Rapid Creek drainage below Pactola Dam as fenced is excluded from grazing. Access to the creek down stream is difficult due to steep terrain and private land fencing.

Range structural improvements play a crucial role in the management of livestock on the National Forest within the boundary of the Prairie Project. Improvements include structures such as fences, water developments, corrals, and cattleguards. The following structures exist on the allotments within the Prairie Project Boundary:

- 21 Cattleguards
- 10 Water developments (springs or ponds)

- 2 Private water sources
- 45 Miles of fence

Pasture fences tend to cross roads. There would normally be gates in the fence to restrict cattle movement. Many motorists and ATV operators tend to open closed gates and leave them open after passing through them. Therefore, cattleguards exist in fence lines that cross roads. The cattleguards (autogates) allow motorized traffic, including logging trucks, unimpeded travel across the allotments while restricting cattle movement to within pasture boundaries.

There are few problems associated with permitted livestock getting onto private land, though when it happens, the private landowner is often quick to notify us. State law and court cases dictate that private landowners are responsible for fencing out their land to prevent National Forest permitted cattle from accessing it if they don't want them on their land. This includes private land adjacent to the National Forest Boundary. Most private land within the project area is fenced appropriately. There have been fewer incidents of private livestock getting out onto the National Forest Land in recent years as ranchers within the Forest boundary have sold out and subdivisions have taken their place.

Environmental Consequences

ALTERNATIVE A

Direct Effects

Grazing will continue as permitted and authorized. There will be no change in carrying capacity (AUMs) as currently determined. Pine encroachment will continue to happen in meadows and removal of that pine invasion will continue to be authorized. Range structures will be maintained and improved as necessary to continue management at its current intensity.

Indirect Effects

As per Forest Plan direction, opportunities to convert any season-long grazing systems to a higher level of intensity such as deferred, multiple-pasture, or rest-rotation will be identified and implemented as budget and staffing allow.

Cumulative Effects

There are no anticipated cumulative effects that would impair or unduly influence management of the allotments within the boundary of the Prairie Project.

ALTERNATIVES B, C and D

Direct Effects

Grazing will continue as permitted and authorized. There will be no change in carrying capacity (AUMs) as currently determined. Pine encroachment will continue to happen in meadows and removal of that pine invasion will continue to be authorized. Cattle will continue to use ponds such as Victoria and Prairie Creek reservoirs unless they are fenced. Dredging these reservoirs under Alternatives B and C would increase the amount of water available for livestock. Alternative water sources such as pipeline and stocktanks with floats would be needed if ponds were fenced cow-tight. Reservoir dredging is not planned under Alternative D.

Proposed vegetative treatment could increase livestock distribution by providing more foraging opportunities, increased forage quantity, and quality (change in species composition). Due to proposed vegetative thinning activity, it is anticipated that acres of transitory range will increase within the project area. This activity will not change permitted numbers of livestock. It may, however, provide conditions that will enable those permitted cattle to be distributed into areas not currently used for grazing.

Prescribed burning under Alternative B and C will have an effect on timing and location of permitted livestock. Depending on location of burns and fuel assessment, cattle may be relocated, grazing seasons adjusted, or non-use may be administered. No prescribed burning is planned under Alternative D.

Closing of portions of the area to motorized use would have a detrimental effect to livestock permittees who use ATVs and pickup trucks to monitor their livestock and maintain their assigned range improvements. Range structures may not be maintained and improved as necessary to continue management at its current intensity. It may reduce the number of times permittees inspect the allotments for livestock distribution and delay improvement maintenance because of the increased time necessary for horseback or walking as opposed to ATVs. Getting materials to structural improvements would become more costly and labor intensive.

Indirect Effects

As per Forest Plan direction, opportunities to convert any season-long grazing systems to a higher level of intensity such as deferred, multiple-pasture, or rest-rotation will be identified and implemented as budget and staffing allow.

Creation of bighorn sheep habitat may have an indirect effect on forage utilization by grazing livestock. There are areas where treatments are proposed in designated MA 5.4 (Big Game Winter Range). Some of the areas delineated, however, are on north and east facing slopes. This is not conducive to providing forage for wintering animals. If there is an increase in forage available, the Forest Plan states that proper use guidelines should be followed. The timber treatments proposed as bighorn sheep treatments will not change stocking rates for permitted livestock.

Cumulative Effects

There are no anticipated cumulative effects that would impair or unduly influence management of the allotments within the boundary of the Prairie Project.

There are no foreseen unavoidable adverse effects to the Range Program by implementation of the Prairie Project Alternatives. However, if administrative privileges are not granted to allow permittees to use ATVs to monitor livestock and maintain range structural improvements in those areas closed to motorized use by the public, then their need to conduct permit responsibilities is adversely affected.

Irreversible and Irretrievable Commitments of Resources

There are no irreversible and irretrievable commitments of Range resources within the Prairie Project area.

NOXIOUS AND INVASIVE WEEDS

Affected Environment

Known noxious weed sites within the perimeter of the Prairie Project Area cover approximately 636 Acres. Noxious weed populations include, but are not limited to: Canada thistle, Leafy spurge, Houndstongue, Yellow toadflax, Musk Thistle, Bull thistle, Scotch thistle, Whitetop, Chicory, St. Johnswort, Common tansy, Burdock, Common mullein, Spotted knapweed, and Perennial Sow thistle. Treatment within this area has been done on a yearly basis due to the Canada thistle and Leafy spurge infestations. County and private lands surrounding and interior of the project area have established noxious weed populations that have been identified through mapping and coordination with the Pennington County Weed and Pest Supervisor.

Biological control sites were established in two or more areas within the project area with an Aphthona Flea beetle mix for Leafy spurge control and an additional Canada thistle insect mix on approximately 10 to 15 sites. Aggressive biocontrol methods are maintained in this area to help establish insect colonies, thus controlling the spread of Leafy spurge and Canada thistle.

Fieldwork is conducted on project areas almost on a weekly basis to evaluate biological control measures, determine and document losses of vegetation and determine areas of potential infestations of noxious weeds.

Environmental Consequences

ALTERNATIVE A

Direct/Indirect Effects

Under existing conditions, on and off road activities will increase the chances of the spread of noxious weeds and new invasives introduced into new areas. Known noxious weed sites and new infestations will be managed as funds become available. Through normal use of FS and county roads within the project area the rate of the spread of noxious weeds could be as high as 10 percent of the 636 known noxious weed sites with ground disturbance. Any other off road recreational use could increase the percentage of noxious weed infestations and the possibility of new exotics being introduced. This alternative poses the greatest risk of large scale, intense wildfire and thus has the potential for the wide scale spread of noxious weeds.

Cumulative Effect:

None

ALTERNATIVE B

Direct Effects

With the addition of over 6,900 acres of vegetation treatment and about 7,500 acres of prescribed burning, ground disturbance will potentially increase the presence of noxious weeds over the existing area, if not mitigated. In addition, 7 miles of road reconstruction (54 acres) and 11 miles of pre-use maintenance (88 acres) will have to be added for treatment of noxious weed control. Any ground disturbance will create a favorable seedbed to establish noxious weed populations. Noxious weeds will establish quickly in areas that take native vegetation much longer to establish, taking advantage of the resources (soil nutrients, soil moisture) with little competition. With the emphasis on non-motorized use in this alternative, there is relatively less potential for introduction of noxious weeds from both on and off-road motorized users as compared to Alternatives C and D.

Indirect Effects

During vegetative treatment activities, vehicles and heavy equipment will move throughout the area(s) and through weed infested lands. Many vehicles and heavy equipment used in and around the area have the potential to carry noxious weed seeds and increase the potential for noxious weed infestations by at least 30-40 percent of the known 636 acres with ground disturbance. Ground disturbance such as skidder trails, landing decks and slash piles are expected to further increase the potential for noxious and invasive weed infestations. NFS roads, county roads and NFS trails are expected to continue to contribute to the spread of noxious weeds.

Cumulative Effect

The addition of vegetative treatments and prescribed burning ground disturbance has the potential to cumulatively increase the area of noxious weeds. An additional potential contribution source is the area of disturbance generated by road reconstruction and pre-use maintenance. Weed seed base has been proven to be present in almost all areas in the Black Hills. Any ground disturbance will create a favorable seedbed to establish noxious weed populations, especially in and around skidder areas. Approximately 30-40 percent of the estimated 12,200 additional acres of ground disturbance will be added to the known 636 acres of noxious weeds as potentially needing treatment. Local data such as the Jasper and Battle Creek fires areas has demonstrated that with fire and additional ground disturbance, noxious weed infestations have the potential to increase 30-40 percent of the known disturbance areas.

ALTERNATIVE C

Direct Effects

With the addition of about 11,900 acres of vegetation treatment and about 4,200 acres of prescribed burning ground disturbance will potentially increase the presence of noxious weeds throughout the existing area if not mitigated. In addition 23 miles of road reconstruction (182 acres) and 45 miles of pre-use maintenance (362 acres) and 3 miles of new road construction (24.8 acres) will have to be added for treatment of noxious weed control. Roads leading in and out of the project area need to be treated to help prevent the spread of noxious and invasive weeds. Any ground disturbance will create a favorable seedbed to establish noxious weed populations. With more on and off-road motorized use opportunities, the potential is greater for increased noxious weed infestations relative to other action alternatives.

Indirect Effects

See discussion under Alternative B.

Cumulative Effect

The impact of vegetation treatment and prescribed burning, and roadwork has the potential to cumulatively increase the area infested by noxious weeds. Any ground disturbance will create a favorable seedbed to establish noxious weed populations. Approximately 30-40 percent of the estimated 13,700 additional acres of ground disturbance will be added to the known 636 acres of noxious weeds as potentially needing treatment.

ALTERNATIVE D

Direct Effects

With the addition of about 7,100 acres of vegetation treatment ground disturbance will potentially increase the presence of noxious weeds if not mitigated. In addition 18 miles of road reconstruction (146 acres) and 42 miles of pre-use maintenance (337 acres) and 1 mile of new

road construction (10 acres) will have to be added for treatment of noxious weed control. Roads in the project area need to be treated to help prevent the spread of noxious and invasive weeds. Any ground disturbance will create a favorable seedbed to establish noxious weed populations. Noxious weeds introduced via on and off-road motorized use is a potential impact that warrants monitoring and treatment as needed. Potential for infestation is less than Alternative C but greater than Alternative B.

Indirect Effects

See discussion under Alternative B.

Cumulative Effect

The impact of vegetation treatment and roadwork has the potential to cumulatively increase the area infested by noxious weeds. Any ground disturbance will create a favorable seedbed to establish noxious weed populations. Approximately 30-40 percent of the nearly 7,600 additional acres of ground disturbance will be added to the known 636 acres of noxious weeds as potentially needing treatment.

WILDLIFE HABITAT

Introduction

In very broad, general terms, the goals and objectives for the Prairie Project Area for the wildlife resource are to provide a variety of life through management of biologically diverse ecosystems. These goals and objectives along with Black Hills National Forest Land and Resource Management Plan (Forest Plan) Standards and Guidelines will provide and maintain an appropriate mix and balance of habitats over the long term. This diversity will provide habitats to maintain populations of all vertebrate and invertebrate wildlife and plant species in the area, and will not result in any individual species trending toward or becoming listed as threatened or endangered. The area will provide for a variety of wildlife-related recreational opportunities, ranging from consumptive to non-consumptive activities (e.g. big game hunting to wildlife viewing and education).

Analysis of the No Action Alternative (Alternative A) and the action alternatives (Alternatives B, C, and D) was conducted on the watershed level. Direct, indirect, and cumulative effects of each alternative are disclosed, as well as issues and concerns that were raised during the scoping process.

Affected Environment

The ponderosa pine ecosystem in the Black Hills evolved in dynamic equilibrium with recurrent disturbances, especially fire, insects, and short- and long-term climatic cycles (Parrish et al. 1996). A century of fire suppression has caused widespread alteration and degradation of

wildlife habitat in the Black Hills (USDA Forest Service. 2002). Frequent recurring disturbances like fire and insects maintained a generally open, mature pine canopy with a productive and diverse understory by thinning pine stands and creating open stands with abundant grasses, shrubs and forbs in the understory (Sieg and Severson 1996). In the absence of frequent low-intensity fires, the increase in the density and canopy cover of pine stands has resulted in broad, contiguous expanses of higher density medium age trees with abundant pine regeneration and sparse understories (Parrish et al. 1996). Such stands are vulnerable to large-scale insect epidemics and wildfires. These shifts have increased habitat for species that prefer dense mid-age forests while decreasing habitat availability for wildlife associated with more open forest. Historically, frequent fires created many different age classes of ponderosa pine, thus enhancing diversity across the landscape (Uresk and Severson 1998). Fire suppression has also resulted in conversion of hardwood forest stands such as aspen and bur oak to pine, which has also reduced diversity (Uresk and Severson 1998). Encroachment of pine into meadows has reduced grass, forb, and shrub availability. Fire suppression has thus resulted in diverse negative impacts on wildlife habitats in the Black Hills and the Prairie Project Area.

Topography in the Prairie Project Area consists of gently rolling hills and ridges cut by steep canyons and draws. Vegetation in the area is primarily ponderosa pine, which is encroaching into and replacing hardwoods such as bur oak, aspen and birch, and occasional grassy meadows (see Table 3-10). Hardwood stands generally occur at the pine/meadow interface, and often extend up side drainages. Many of the stands classified as hardwoods in the project area exhibit signs of pine encroachment and old age, and most will soon disappear without treatment. The area also exhibits forest openings of various sizes (<1 acre to 1000 acres), and a variety of age classes of ponderosa pine created by timber harvest in the past several decades as well as several small wildfires. A small timber sale to benefit wildlife is currently underway in the Bald Hills.

A wide variety of wildlife species inhabit the Prairie Project Area including bighorn sheep, turkeys, sharp-tailed grouse, eagles, elk, mule and white-tailed deer, mountain lion, American dipper, and northern goshawk. The Prairie Project Area provides critical wintering habitats for several species of big game, including the Dark Canyon herd of bighorn sheep. Along with winter range, the area provides summer habitat (including calving, fawning, and lambing) for elk, white-tailed and mule deer, and bighorn sheep.

Table 3-10 Existing wildlife structural stages in the Prairie Project Area (29,024 NFS acres)

	SS 0	SS 1	SS 2	SS 3A	SS 3B	SS 3C	SS 4A	SS 4B	SS 4C	SS 5	Total
Developed	30 ¹ (<1)	-	-	-	-	-	-	-	-	-	30 (<1)
Meadow	-	3018 (10)	-	-	-	-	-	-	-	-	3018 (10)
Shrubs	-	-	103 (<1)	-	-	-	-	-	-	-	103 (<1)
Bur Oak	-	0	0	0	67 (<1)	6 (<1)	183 (<1)	94 (<1)	20 (<1)	0	370 (1)
Aspen	-	87 (<1)	0	295 (1)	41 (<1)	0	334 (1)	140 (<1)	0	0	897 (3)
Ponderosa Pine	-	175 (<1)	91 (<1)	3673 (13)	5322 (18)	1191 (4)	4734 (16)	8658 (30)	762 (3)	0	24606 (85)
Total	30 (<1)	3280 (11)	194 (<1)	3968 (14)	5430 (19)	1197 (4)	5251 (18)	8892 (30)	782 (3)		29024

Table 3-11 displays a comparison between existing condition and the Forest Plan DFC for several habitat components. Included are Forest-wide Standards and Guidelines, as well as several Management Area-specific Standards and Guidelines.

Table 3-11 Comparison of existing condition for various landscape vegetative diversity components in the PPA to Forest Plan DFC

HABITAT COMPONENT	EXISTING CONDITION (ALT. A)	FOREST PLAN DFC (Minimums)	FOREST PLAN REFERENCE
Hardwoods	1267 (4) ¹	1394 (5) ¹	Objective 201
Grassland communities	3018 (10) ¹	3419 (12) ¹	Objective 205
Vertical diversity	12243 (47) ²	5175 (20) ²	Objective 206
Grass/forb	262 (1) ²	1294 (5) ²	Objective 209
Snags	Unknown	2-4 ³	Objective 211
Down logs	Unknown	50 linear feet ⁴	Objective 212
Big game screening cover	3%	20%	Guideline 3203 ⁵
Management Area 4.1			
Habitat effectiveness	See Big Game	See Big Game	Guideline 4.1-3201 ⁵
Management Area 5.1			
Habitat effectiveness	See Big Game	See Big Game	Guideline 5.1-3201 ⁵
Management Area 5.4			
Forage production	8736 (45) ⁶	3897 (20) ⁶	Objective 5.4-202
Thermal cover	236 (1) ⁷	3193 (20) ⁷	Objective 5.4-205
Habitat effectiveness	See Big Game	See Big Game	Guideline 5.4-3203 ⁵
Management Area 8.2			
Habitat effectiveness	See Big Game	See Big Game	Guideline 8.2-3203 ⁵

¹ Acres (percent). Based on 29,024 NFS acres.

² Acres (percent). Based on 25,873 forested NFS acres.

³ Hard snags per acre average across the watershed, >10"DBH and >25' tall.

⁴ Minimum diameters of ≥10", lengths of 10 feet

⁵ Guideline treated as standard per Phase I.

⁶ Acres (percent). Based on 19,486 acres MA 5.4.

⁷ Based on 15,965 conifer forested acres in MA 5.4.

Effects Common To All Alternatives

Structural Diversity

Since the majority of the Prairie Project Area is ponderosa pine, structural diversity is important for wildlife species. Some species prefer more open pine stand structure while other species prefer older, more mature and decadent pine stand structure. Table 3-12 displays the changes in

forest stand structure for the pine cover type resulting from the implementation of vegetation treatment for each action alternative as compared to the No Action Alternative.

Table 3-12 Changes in ponderosa pine structure in the Prairie Project Area, by alternative

Structural Stage		Alt. A	Alt. B	Alt. C	Alt. D
1	Grass/forb	175 (<1) ¹	188 (<1)	309 (1)	232 (1)
2	Seedling/sapling	91 (<1)	91 (<1)	91 (<1)	91 (<1)
3A	Young, open canopy	3673 (15)	4910 (20)	5871 (24)	4495 (18)
3B	Young, variable canopy	5322 (22)	4349 (18)	3405 (14)	4586 (19)
3C	Young, closed canopy	1191 (5)	885 (4)	553 (2)	961 (4)
4A	Mature, open canopy	4734 (19)	6736 (27)	9777 (40)	5763 (23)
4B	Mature, variable canopy	8658 (35)	6838 (28)	4360 (18)	7815 (32)
4C	Mature, closed canopy	762 (3)	609 (3)	240 (1)	663 (3)
5	Mature, decadent	0 (0)	0 (0)	0 (0)	0 (0)

¹Acres (percent). Based on 24,606 acres ponderosa pine on National Forest lands.

All action alternatives modify ponderosa pine habitats from mature, variable/closed canopy to young, open canopy structured stands, although to varying degrees.

There is no Forest Plan direction regarding diversity or distribution of structural stages. Structural stage distribution is included as a vegetative diversity monitoring item in the Monitoring Implementation Guide (USDA Forest Service 2001d) to be monitored Forest-wide as directed by the Forest Plan. Refer to the annual Monitoring Reports (USDA Forest Service 1998 through 2001) for monitoring results and additional information.

Vertical Diversity

Vertical diversity, or the complexity of the above-ground vegetation structure, is enhanced by improving successional stage distribution within community types, enhancing understory productivity, or creating openings within the canopy. The Forest Plan provides direction to “maintain or establish a minimum of 20% of the forested areas of a planning unit to provide vertical diversity” (Objective 206). Vertical diversity is included as an indicator of the vegetative diversity and structure monitoring item in the Monitoring Implementation Guide (USDA Forest Service 2001d), to be monitored Forest-wide as directed by the Forest Plan. Refer to the annual Monitoring Reports (USDA Forest Service 1998 through 2001) for monitoring results and additional information.

A stand is considered vertically diverse if there is more than one canopy layer present within the stand. All hardwood stands are considered vertically diverse, and the RIS database was used to determine number of layers within ponderosa pine stands. Table 3-13 displays the acreages and proportions of the Prairie Project Area that provide vertically diverse habitats for each alternative.

Table 3-13 Proportion of the Prairie Project Area that provides vertically diverse forested habitats, by alternative

	Forest Plan	Alt. A	Alt. B	Alt. C	Alt. D
Vertical diversity	5175 ¹ (20)	12243 (47)	9325 (36)	6536 (25)	9508 (37)

¹ Acres (percent). Based on 25,873 forested NFS acres.

Any stand considered vertically diverse in Alternative A that is treated by an action alternative was assumed to no longer be vertically diverse, regardless of the treatment. Alternative C decreases the acreage of stands providing vertical diversity the most, while Alternatives B and D reduce the acreage to a lesser degree than Alternative C (Table 5). Although all action alternatives reduce the acreage of stands providing vertical diversity from Alternative A, all alternatives maintain consistency with the Forest Plan objective for vertical diversity.

Grass/Forb

The Forest Plan provides specific direction to “manage at least 5% of a timber harvest project area for the grass/forb structural stage (Objective 209). Only created grass/forb openings (structural stage 1) within a forested community type is considered when calculating the proportion of grass/forb in the project area. Natural meadows do not contribute towards Forest Plan direction for 5% grass/forb openings. Table 3-14 displays the amount of created grass/forb openings in the Prairie Project Area by alternative. There are currently 262 acres (1%) of grass/forb openings present in the project area. There are 85 acres of patchcuts proposed in Alternative B and C, and 44 acres of patchcuts in Alternative D. These patchcuts were designed primarily to benefit bighorn sheep, but will benefit other big game species in the project area as well (see Big Game section). All action alternatives increase the amount of grass/forb openings as compared to Alternative A, with the largest increase in Alternative C, followed by smaller increases in Alternative D and Alternative B (Table 6). None of the action alternatives meet the Forest Plan objective for 5% grass/forb openings, but all alternatives move toward the objective. Although the Prairie Project Area does not meet Forest Plan direction for grass/forb openings in any alternative, a large proportion of the forested area (9,219 acres or 36%) is currently classified as “open canopy” (structural stages 3A and 4A), with additional increases in all action alternatives. There are currently 3018 acres (10%) of meadows in the project area. These open canopy stands and meadows provide the structural diversity and big game forage intended by the requirement for 5% grass/forb openings in the Forest Plan. It is for this reason additional patch cuts in the Prairie Project Area were deemed unnecessary.

Table 3-14 Proportion of the Prairie Project Area that provides grass/forb (structural stage 1) in forested habitats, by alternative

	Forest Plan	Alt. A	Alt. B	Alt. C	Alt. D
Grass/forb (structural stage 1)	1294 ¹ (5)	262 (1)	275 (1)	412 (2)	319 (1)

¹ Acres (percent). Based on 25,873 forested NFS acres.

Late Successional Forest

The Forest Plan provides direction to “manage at least 5% of the forested landbase for late-succession” (Objective 207). The late succession acreage should include acres in Management Area 3.7, as well as “smaller late-successional patches to meet specific resource elements” (Objective 208). The Forest Plan also provides several Standards and Guidelines specific to Management Area 3.7. Late succession is included as a monitoring item in the Monitoring Implementation Guide (USDA Forest Service 2001d) to be monitored Forest-wide as directed by the Forest Plan. Refer to the annual Monitoring Reports (USDA Forest Service 1998 through 2001) for monitoring results and additional information.

Approximately 3,858 acres (13%) of the Prairie Project Area were designated in the Forest Plan as Management Area 3.7 (late succession landscape). The majority of this acreage is along the Rapid Creek corridor, with additional portions along lower Prairie Creek and lower Victoria Creek. This area is primarily ponderosa pine, although there are numerous inclusions of hardwood and meadow communities. In keeping with the purpose and need for the Prairie Project and alternative themes, selected areas of Management Area 3.7 are proposed for treatment in Alternative B and Alternative C, as summarized in Table 3-15. Per the Forest Plan, there are no treatments planned in Alternative D for Management Area 3.7. Alternative B treats a total of 187 acres (5%) of Management Area 3.7, 115 of which are treated non-commercially, and 26 acres of removal of non-commercial sized encroaching pine from hardwood stands is planned. Thirty-one acres of Management Area 3.7 would be treated commercially in Alternative B to develop fuelbreaks adjacent to private property.

A total of 605 acres (16%) of Management Area 3.7 are proposed for treatment in Alternative C. Non-commercial treatments comprise 261 acres of that total, and 122 acres are treated to remove encroaching pine from hardwood stands and meadows. Seventy-seven acres of Management Area 3.7 are proposed for commercial treatment to develop fuelbreaks. The remaining treatments in Alternative C contribute to landscape-scale fuelbreaks.

Table 3-15 Proposed treatments and acreages in Management Area 3.7 in the Prairie Project Area

Treatment	Alt. B	Alt. C	Alt. D
Fuelbreak (commercial)	31 ac.	77 ac.	--
Fuelbreak (non-commercial)	68	68	--
Hardwood retention (non-commercial)	26	34	--
Patch clearcut (non-commercial)	41	41	--
Patch clearcut (commercial)	--	32	--
Meadow retention/restoration	--	88	--
Commercial thinning	--	172	--
Overstory removal	--	4	--
Seedcut	--	23	--
Non-commercial thinning	21	98	--
TOTAL	187 (5)¹	605 (16)¹	--
Non-commercial	115 ²	261 ²	--
Hardwood and meadow retention	26	122	--
Other	46 ²	222 ²	--

¹Acres (percent). Based on 3,858 acres Management Area 3.7.

²Total area treated is not additive due to some overlap in treatment area.

In addition to the landscape-scale late succession, five stands totaling 179 acres (Table 3-16) in the Prairie Project Area were designated as scattered late successional stands in the Forest Plan. These five stands contribute toward Forest Plan objectives for small-scale late successional stands throughout the forest. Alternative C proposes to commercially and non-commercially thin one of these stands (site 091803-44) to contribute to a landscape-scale fuelbreak. Treatment of this 44-acre site would alter the late succession character of this stand. None of the other stands are planned for treatment in any action alternative.

Table 3-16 Sites in the Prairie Project Area designated to be managed as scattered late successional stands the Forest Plan

LOCATION	SITE	ACRES
091803	39	43
091803	40	18
091803	41	44
091803	44	44
091905	17	30

Non-commercial treatments which remove only pine smaller than 9” DBH, and removal of encroaching pine from hardwoods and meadows would not substantially alter the character of the late succession landscape. Maintenance of meadow and hardwood communities within the Management Area 3.7 landscape is consistent with the Forest Plan DFC for Management Area 3.7. Commercial treatments that remove pine larger than 9” DBH would alter the late succession character of treated stands. Commercial treatment of landscape scale Management Area 3.7 (Alternative B and Alternative C) and scattered late successional stands (Alternative C) prescribed for fire and fuels needs may not be consistent with Forest Plan Guideline 3.7-2103 which states “timber harvest may be used if necessary to move stands toward late successional conditions.” Such treatments are consistent with other Forest Plan Standards and Guidelines for late successional habitats specific to Management Area 3.7, and Forest-wide direction for late succession.

Snags

Standing dead trees, or snags, provide nesting, roosting, or foraging habitat for at least 23 species of wildlife in the Black Hills. Some of these species also serve as important prey for predatory species like the mountain lion or northern goshawk. Large diameter snags are critical for some primary cavity nesters such as Lewis’s woodpecker because they require a large cavity for nesting. Secondary cavity nesters are dependent on the availability of previously excavated cavities, which may be limited by available snag habitat. Large diameter dead or dying trees are lacking throughout the Forest due to past vegetation management practices and unregulated fuelwood gathering, particularly in areas adjacent to populated areas such as Rapid City. Because of the proximity of the Prairie Project Area to Rapid City and other populated areas (e.g. Johnson Siding, Hisega, etc.) fuelwood cutting has likely had a substantial effect on snag numbers in the project area. Wildfire also affects snag densities with an initial increase in snag numbers due to mortality, but through time snag densities are lower because fewer trees are available to become snags.

Refer to the Forest Plan for extensive direction regarding snag density, size, distribution, and retention of green trees for replacement snags. Forest Plan Objective 211 specifies “maintain an average of two hard snags per acre on south facing slopes and four hard snags per acres on north-facing slopes, well dispersed across the watershed.” Standards 2301 and 2302, and Guidelines 2303, 2304, and 2306 (treated as standards) provide additional detailed direction for snag management. Snag retention is included as a monitoring item in the Monitoring Implementation Guide (USDA Forest Service 2001d) to be monitored Forest-wide as directed by the Forest Plan. Refer to the annual Monitoring Reports (USDA Forest Service 1998 through 2001) for monitoring results and additional information.

No snag surveys have been conducted in the Prairie Project Area to determine snag densities because it is assumed that Prairie, similar to many other areas on the district that have been surveyed for snag densities in the past, is deficient in snags and does not meet Forest Plan direction for snags. Since snag densities have not been quantified, it was therefore assumed, for analysis purposes only, that there are currently no snags in the Prairie Project Area although some snags do exist. Results of the analysis are therefore somewhat conservative in estimating the number of snags for all alternatives. It can be assumed, however, that the number of snags has increased in recent years as a result of an April 2000 snowstorm, a June 2000 hailstorm, and an ongoing mountain pine beetle outbreak.

The Landscape Level Snag and Green Tree Retention Model (USDA Forest Service 2001c) was used to estimate the number of green trees, greater than 10” DBH by aspect, in the six, 7th order watersheds in the Prairie Project Area over the next 80 years. It should be noted that data generated by the model for the year 2012 is used for discussion purposes. Previous project analyses have determined that an average of 40 green trees/acre are needed across a watershed to move towards an average of four snags/acre on north and east-facing slopes, and an average of 20 green trees/acre to move towards an average of two snags/acre on south and west-facing slopes, with 25% of these green trees in the largest diameter class available. Although there is no specific Forest Plan direction to maintain these numbers of green trees, project analysis focused on retention at the levels described. Modifications to silvicultural prescriptions for the action alternatives were made during the analysis to move toward the desired levels of green tree retention. The snag analysis and supporting documentation can be found in the Prairie Project File.

Alternative A will leave the largest number of green trees/acre greater than 10” DBH. Refer to Table 3-17 for the number of green trees retained for each alternative. Two of the six watersheds analyzed do not currently meet the threshold of 40 green trees/acre average on north and east-facing slopes, and one of the six watersheds does not meet the threshold of 20 green trees/acre average on south and west-facing slopes. One of the watersheds that is below the threshold in both slope categories encompasses the majority of the Bald Hills, a large (1,800 acre) native prairie in the western portion of the project area. These watersheds will move toward the green tree retention thresholds in Alternative A through in-growth and mortality and will exceed the threshold in the next decade. These watersheds will also move toward Forest Plan Standards and Guidelines for snag recruitment. The remainder of the watersheds meet the 20 or 40 green trees/acre average threshold for Alternative A.

Table 3-17 Average number of snags and green trees per acre greater than 10” DBH, by aspect for all alternatives

Aspect	DFC ¹		Alt. A		Alt. B		Alt. C		Alt. D	
	Green	Snags	Green	Snags	Green	Snags	Green	Snags	Green	Snags
North / East	40 ²	4 ²	46.2 ²	0.58 ²	44.7 ²	1.29 ²	35.2 ²	0.69 ²	42.5 ²	0.52 ²
South / West	20	2	43.4	0.36	40.6	1.76	28.9	0.86	37.6	0.29 (>0.36) ³

¹Desired number of green trees based on previous project analyses. Desired number of snags based on FP Standard 2301.

²Green trees or snags per acre, averaged across the project area.

³Increased density resulting from implementation of mitigation measures.

While all action alternatives decrease the number of existing green trees/acre average available for snag recruitment compared to Alternative A, all action alternatives exceed the 20 or 40 green trees/acre average threshold, with the exception of Alternative C on north/east-facing slopes. This alternative will provide approximately 35 green trees/acre average on north and east-facing slopes by 2012, only slightly below the desired threshold of 40 green/trees acre, and will exceed 40 green trees/acre by 2022. The number of green trees/acre average will be adequate to provide for desired levels of snag recruitment in the Prairie Project Area.

In the absence of prescribed burning, Alternative A will produce fewer snags overtime than Alternative B and Alternative C, but more snags than Alternative D. Refer to Table 3-17 for the number of snags provided in each alternative. Snags will be created through natural processes such as old age, insects, disease, wildfire, and weather damage. Based on in-growth and mortality, Alternative A will produce an average of 0.58 snags/acre on north and east-facing slopes, and 0.36 snags/acre on south and west-facing slopes by 2012 (Table 3-17). It should be noted that while these snag densities are conservative because analysis assumed no currently existing snags, they provide a baseline for comparing the number of snags in each alternative. The number of snags in Alternative A does not meet Forest Plan direction for snag densities as calculated by 2012 (Objective 211, Standard 2301), although as previously stated the analysis assumed no currently existing snags, so resulting snag densities are conservative. Forest Plan direction for snag densities will be met in Alternative A by 2032 on south and west-facing slopes, and by 2042 on north and east-facing slopes.

Compared to the other action alternatives, Alternative B will produce the most snags over time. Snags will be created through natural processes over time in all action alternatives, but the number and size of snags created is directly proportional to the number of green trees available to become snags. Alternative D provides the fewest snags of all action alternatives. This is explained by the fact that there is no prescribed burning proposed in Alternative D to create additional snags, as in Alternative B and Alternative C, and there are fewer green trees/acre average available to become snags in Alternative D as compared to Alternative A. Prescribed burning treatments proposed in Alternative B and Alternative C account for the increase in snag densities in these alternatives as compared to Alternative A. To improve the density of snags in Alternative D in the absence of prescribed burning, mitigation measures to create snags are necessary for Alternative D. Specifically, >1700 snags will be created in pine habitats across the Prairie Project Area to mitigate for deficient snag numbers in Alternative D, and to increase the snag density in Alternative D to a level greater than the snag density in Alternative A.

With implementation of mitigation measures in Alternative D, all action alternatives move toward meeting Forest Plan Standard 2301 in 2012. Alternative B will meet Forest Plan direction for snag densities by 2022 on south and west-facing slopes, and by 2042 on north and east-facing slopes. Alternative C will meet Forest Plan direction for snag densities by 2032 on south and west-facing slopes, and by 2052 on north and east-facing slopes. Alternative D will meet Forest Plan direction for snag densities by 2032 on south and west-facing slopes, and by 2042 on north and east-facing slopes. All existing snags will be retained in treated units in all action alternatives unless deemed a safety hazard, and recent implementation of Forest Plan Guideline 2304 (treated as a Standard) prohibiting cutting of standing dead tree for fuelwood, will result in increased snag densities in the Prairie Project Area in all alternatives.

Down Woody Material

Dead and down woody material (DWM) is important as a foraging substrate for most cavity dependent species. It provides important cover and forage for small rodents such as voles and red squirrels. Piling DWM on treated sites, especially near forest/opening interfaces, provides habitats for rabbits and other small mammals. DWM also provides a substrate for fungal and detrital food webs. Slow composition of DWM has important implications in terms mineral recycling, nutrient immobilization, and nitrogen fixation.

The existing number of down logs in the Prairie Project Area has not been quantified. Field observation indicates that most of the previously treated areas likely do not meet Forest Plan guidelines, although storm damage from the April 2000 snowstorm increased the amount of DWM somewhat in some areas. The storm damage has been cleaned up, piled and burned in some selected locations where concentrations were highest (e.g. some locations along Sheridan Lake Road).

Alternative A would provide the greatest amount of DWM as a result of tree mortality in denser stands, followed by Alternative B and Alternative D. Alternative C would provide the least amount of DWM. In the action alternatives, large woody material would be provided in sites treated in the form of cull logs through mitigation measures. Fuels treatments to reduce fuel loadings will decrease existing levels of DWM and activity fuels in treated areas. Untreated sites in all actions alternatives will continue to accumulate DWM from natural events like tree mortality and blowdown. Prescribed burning will also reduce small diameter DWM, but likely would not eliminate larger down logs.

Forest Plan Objective 212 to provide 5-10 tons per acre of DWM at least 3" in diameter at least once during a rotation (approximately 100 years) would likely not be met during this entry due to the conflict with fire management objectives. Natural and activity fuels treatments planned under all action alternatives would eliminate a large proportion of the smaller diameter DWM on treated sites. Forest Plan Standard 2308 specifying retention of an average of at least 50 linear feet per acre of coarse woody debris with a minimum diameter of 10" where available likely would be met in commercially treated units with implementation of mitigation measures. Down/dead woody material is included as a monitoring item in the Monitoring Implementation Guide (USDA Forest Service 2001d).

Riparian Communities

Riparian habitats are essential for most species that occur in the Prairie Project area, although some species are more dependent on riparian areas than others. Beaver and the American dipper, for example, depend on water and associated riparian areas for most of their habitat needs while other species such as big game use such areas only occasionally to water and perhaps forage, while still other species use riparian areas as migration corridors. Riparian habitats provide water, diverse vegetation, and relatively cool, moist microclimates not found outside riparian areas. Most perennial and some intermittent streams support vegetation such as willow, mixed hardwoods, and various sedges. Many of the sensitive plant species found in the Black Hills are considered riparian species, and are only found at sites with characteristics typical of riparian habitats. Refer to the Forest Plan for extensive direction for riparian communities.

Surface water and riparian habitats in the Prairie Project Area are localized and limited to drainage bottoms where water levels are perennial or intermittent. Perennial streams in the Prairie Project Area include Rapid Creek, Prairie Creek, Victoria Creek, Brush Creek, and Deer Creek, as well as numerous unnamed intermittent creeks that drain into them. The perennial creeks are for the most part healthy but there are impacts to associated riparian areas that cause increased sedimentation. Livestock grazing, illegal motorized traffic, flooding events, road development, and activities on adjacent private land have all contributed to degradation in these stream's character and health. The increased density and extent of ponderosa pine resulting from fire suppression has resulted in declines in water yield and thus negatively affected riparian community extent and health. See the Watershed Report for additional discussion of water, riparian resources, and factors affecting the quality of these resources.

A riparian shrub component is present in many drainages but improperly located roads in many cases have reduced the moist microclimate and resulted in fragmented shrub communities. Most riparian areas have undergone changes in vegetation structure including a reduction in shrub component due to livestock grazing. Because of the proximity of the Prairie Project Area to Rapid City, most riparian areas are heavily impacted by recreational use, especially where these areas are adjacent to roads and terrain allows easy access by motorized vehicles (e.g. Lower Prairie Creek, Victoria Creek).

Historically, beaver may have been the most important biological influence on riparian ecosystems in the Black Hills (Parrish et al. 1996). Dams constructed by beaver act as sediment traps, provide deep pools for fish habitat, alter stream flows, and provide water that supports willow and other riparian vegetation as well groundwater recharge. The presence of beaver is considered an indicator of good riparian health. Beaver are present in the Prairie Project Area but are limited to drainages that have a higher abundance of hardwoods. Beaver can be found on smaller tributaries of Rapid Creek and some of the smaller perennial streams where water flows are less turbulent. There is not an abundance of beaver in the area, and it is unknown whether the population in the Prairie Project Area is increasing or decreasing, but there has been an increase of beaver populations Forest-wide.

Stock dams and developed springs are available for wildlife use but water becomes scarce in some areas during the late summer and during drought conditions. There are approximately 6

wildlife guzzlers that provide water in the uplands. Maintenance and repair of these guzzlers is being accomplished as funding becomes available. Additional wildlife guzzlers are needed in the central portion of the project area on ridge-tops where water is scarce, and construction of four new guzzlers using KV funding generated by timber sale receipts is included as a mitigation measure for all action alternatives.

Two small dams in the Prairie Project Area, Prairie Creek Dam and Victoria Dam, have collected substantial amounts of silt and sedimentation over the years. Both sites also receive high levels of recreational use, and at least one of the sites provides habitat for a sensitive species (leopard frog). Both dams and their associated riparian habitats, but especially Prairie Creek, would benefit from dredging and maintenance of the dam structures, proposed as a mitigation measure in Alternative B and Alternative C. Riparian habitat at Prairie Creek Dam would also benefit from exclusion of livestock. For this reason, a short section of fencing across the Prairie Creek along with a cattle guard located just northeast of the junction of FSR 159 and FSR 158.2 is recommended as a mitigation measure in all action alternatives.

Alternative A represents a continuation of the existing condition of riparian habitats in the Prairie Project Area, including degradation from uncontrolled motorized traffic, sedimentation from improperly located roads, and improper livestock grazing practices, as well as the activities on adjacent private land identified above. Encroaching pine will not be removed from hardwoods and meadows that are in some cases associated with riparian areas.

Numerous watershed improvement projects are proposed for all action alternatives (see Watershed Report). These projects will rehabilitate connected disturbed areas to reduce soil and erosion and sedimentation, stabilize streambanks, improve water quality, etc. Under the action alternatives, the condition of riparian habitats would be directly and indirectly enhanced as a result of the proposed watershed improvement projects. The positive effects of these projects would be the same under all alternatives. Hardwood and meadow restoration and retention treatments proposed under all action alternatives will enhance riparian ecosystems where these treatments occur near riparian habitats. Although not quantifiable, the level of benefits of these treatments is directionally proportional to the number of acres proposed for treatment in each alternative. Negative impacts to riparian areas resulting from proposed activities in the action alternatives will be mitigated (see Watershed Report for specific mitigation, held in the Project File).

Hardwood Communities

Quaking aspen is the most abundant deciduous tree in the Black Hills, and along with paper birch and bur oak, are an important habitat community for big game and many other wildlife species. Hardwood communities provide valuable species and structural diversity within the larger pine ecosystem. Hardwoods also provide habitat for cavity nesting species such as woodpeckers and northern flying squirrels, and provide important forage and fawning/calving sites for big game. Hardwood stands often follow drainage bottoms, and this topographical location combined with the presence of higher moisture levels and less flammable foliage relative to surrounding pine stands, make them valuable as natural fuelbreaks.

Aspen abundance is historically a function of fire that stimulates reproduction by root suckers. Bur oak can regenerate either by seed or vegetatively, and similar to aspen, fire may be an important factor leading to successful oak seedling establishment. Fire suppression of the past century has affected aspen and other hardwood communities in several ways. In the absence of fire, regeneration of old decadent stands to young vigorous stands has not occurred, and stands have become more vulnerable to insects and disease. Prescribed burning and harvest both provide for vegetative reproduction of aspen and bur oak.

In addition, in the absence of disturbance to retard succession, later seral stage conifers have encroached into hardwood stands and will eventually replace them. For these reasons, the abundance, distribution, and vigor of aspen and other hardwood communities has declined dramatically across the Black Hills. The abundance of deciduous forest wildlife has also probably declined in concert with the decline of hardwood communities (Parrish et al. 1996).

There are 1,267 acres (4%) typed as hardwoods in the database; 897 acres (3%) typed as aspen, and 370 acres (1%) typed as bur oak. However, there are numerous drainages and pine/meadow ecotones typed as ponderosa pine that support primarily aspen and oak communities, and many stands are mixed with scattered ponderosa pine. Some of the stands typed as ponderosa pine stands should be managed as hardwoods. Some aspen stands are becoming decadent as evidenced by a lack of regeneration and declining health and vigor. Several stands were clearcut in association with recent timber sales in an effort to facilitate clone regeneration. Some hardwood stands have undergone pine removal but many sites need additional pine removed to reduce competition with dominant ponderosa pine.

Alternative A represents a continuation of the existing condition of hardwood habitats in the Prairie Project Area. The vegetation structure of hardwood stands will continue to change over time through growth, and stands will become further encroached by ponderosa pine resulting in further degradation of hardwood habitats and eventual disappearance of hardwood communities. The area's susceptibility to potential wildfire will remain and even increase as the hardwood community's ability to serve as a natural fuelbreak is incrementally diminished by continued pine encroachment. The decline in health and vigor of many aspen clones will continue, and as more stands age, the proportion of decadent clones and stands throughout the project area will increase.

Treatments proposed for each action alternative are shown in Table 3-18. Hardwood restoration is proposed in all action alternatives on sites that are currently classified as pine but that support primarily hardwood communities (Table 3-18). Commercial and/or non-commercial invading pine would be removed from the site, which would then be typed as and managed as hardwood sites. Hardwood retention is the removal of encroaching pine from sites currently typed and managed as hardwoods. Non-commercial hardwood retention treatments remove the understory of encroaching pine, whereas commercial hardwood retention treatments to remove the overstory of encroaching pine.

In the absence of recurring ground fires to stimulate regeneration, the coppice method of clear-cutting decadent aspen clones (termed aspen regeneration) is the most effective treatment of decadent aspen clones to stimulate suckering and growth of new aspen shoots. Non-commercial

aspen regeneration treatments are proposed on 175 acres in all action alternatives. Specific sites to be treated in the Prairie Project Area have not yet been identified. Decadent aspen clones in need of treatment to stimulate regeneration will be designated through on-the-ground inspection in the future.

Table 3-18 Acres of hardwood treatments by alternative

Hardwood Treatment	Alt. B.	Alt. C	Alt. D
Retention (non-commercial)	728	304	305
Retention (commercial and non-commercial)	0	432	398
Restoration (non-commercial)	16	0	0
Restoration (commercial and non-commercial)	0	48	48
Regeneration (non-commercial)	175	175	175
Total treated area	919	959	926

Alternative B treats a total of 919 acres, Alternative C treats 959 acres, and Alternative D treats 926 acres (Table 10). Treatments shown in Table 3-18 are not necessarily additive because more than one treatment can occur on any given site (e.g. retention and regeneration). A combination of commercial and non-commercial treatments is much more effective in enhancing and maintaining the hardwood community and removing the competition from pine than non-commercial treatments alone. Leaving an overstory of commercial-sized encroaching pine in a hardwood stand continues to provide a pine seed source and competes with hardwood species for light, water, and nutrients. These factors contribute to the ongoing conversion of the site from a hardwood to a conifer community, even if the non-commercial pine understory is removed. A combination of commercial and non-commercial treatments also is the most effective in enhancing the value of hardwoods as a natural fuelbreak and reducing susceptibility to wildfire. For these reasons, harvest treatments proposed in Alternative C do the most to maintain and improve hardwood habitats in the Prairie Project Area, followed by Alternative D and then Alternative B. Additionally, since hardwood species are stimulated by fire, prescribed burning proposed in Alternative B and Alternative C would also enhance hardwood communities and associated herbaceous understories. These benefits would not be realized in Alternative D since there is no prescribed burning planned in this alternative. Alternative A, as the No Action Alt., does not enhance or restore hardwood communities.

Forest Plan direction to conserve and restore hardwood communities by 10% (127 acres in the Prairie Project Area) will be met by all action alternatives. This direction will not be met with the No Action Alternative. Species composition is included as a vegetative diversity monitoring item in the Monitoring Implementation Guide (USDA Forest Service 2001d).

Grassland Communities

The Forest Plan provides forest-wide direction to restore meadow and prairie communities across the Forest by 10%, based on landform and soils (Objective 205). Grasslands and meadows provide unique habitats not found elsewhere within the greater forested ecosystem. Some species found in the Black Hills (e.g. regal fritillary butterfly, sharp-tailed grouse,) depend on meadows for at least a portion of their life cycle. There are 3,018 acres (10%) of natural openings, meadows and prairies in the Prairie Project Area. The Bald Hills in the western portion of the project area is one of only four large native prairies on the Mystic District within

the larger Black Hills forested ecosystem. Many of these meadows are being encroached upon by adjacent ponderosa pine, and without treatment the sites will eventually be converted to pine and the meadow habitats will disappear. The size of pine trees encroaching on meadow habitats varies from seedling (<1 foot tall) to large, mature trees, and density of encroaching pine also varies from site to site.

Alternative A, as the No Action alternative, takes no steps to stem pine encroachment into meadow habitats. There is a currently a small timber sale to benefit wildlife habitat in progress in the Bald Hills area, the purpose of which is to remove encroaching pine on approximately 250 acres. Alternative B proposes non-commercial meadow treatments only, whereas Alternative C and Alternative D propose both commercial and non-commercial treatments (Table 3-19). Meadow restoration is proposed in all action alternatives on sites that are currently classified as a vegetation type other than meadow (e.g. pine), and that have restoration potential based on landform and soils. Encroaching pine would be removed from the site, which would then be typed as and managed as meadow sites. Meadow retention is the removal of encroaching pine from sites currently typed and managed as meadows. Non-commercial treatments would remove pine <9” DBH from meadows, whereas commercial treatments would remove pine >9” DBH.

Table 3-19 Acres of meadow treatments proposed for the Prairie Project Area, by alternative

Meadow Treatment	Alt. B.	Alt. C	Alt. D
Retention (commercial and non-commercial)	0	209	198
Retention (non-commercial)	667	521	469
Restoration (commercial and non-commercial)	0	49	13
Restoration (non-commercial)	13	0	0
Total treated area	680	779	680

Alternative C proposes the most aggressive meadow treatment of the action alternatives, treating a total of 779 acres both commercially and non-commercially. While Alternative B and Alternative D treat the same number of acres (680 in each alternative), Alternative D will be more effective than Alternative B in maintaining and enhancing meadows because commercial-sized trees will be removed from the overstory. If not removed, the large overstory trees continue to serve as a seed source, perpetuating the encroachment problem. Recognizing the importance of unique meadow habitats for certain wildlife species, Alternative C would accomplish the most in terms of enhancing and maintaining meadows, followed by Alternative D, Alternative B, and lastly by Alternative A. Forest Plan direction to restore meadow and prairie communities by 10% (401 acres in the Prairie Project Area) can only be met to the extent that sites with restoration potential based on landform and soils are present in the project area. There are not 401 acres of sites in the Prairie Project Area that are not already classified as meadows, and that have the potential to support a meadow community. Sites that do have restoration potential were identified and proposed for treatment in the action alternatives. Alternative C restores the largest amount of meadows (49 acres), followed by Alternative B and Alternative D (13 acres each).

Management Indicator Species

Management Indicator Species (MIS) or their habitats are representative of a variety of habitats and can indicate overall changes in the forest ecosystem. MIS identified in the Forest Plan (page II-41 to 42) include threatened, endangered, or sensitive species, all of which have been addressed in the Prairie Draft Biological Assessment/Biological Evaluation (BA/BE), and species of special interest. Although the northern goshawk (a sensitive species) is discussed in the Draft BA/BE, it is also included in this report because of the in-depth analysis required by the Forest Plan for the goshawk. Several species of special interest were also selected for analysis in the Prairie Project based on confirmed or likely presence in the area. Species selected are Merriam's turkey, brown creeper, mountain lion, white-tailed deer, mule deer, and elk, brook trout, brown trout, and mountain sucker. The mountain goat, finescale dace, and lake chub are MIS species of special interest but were not selected for analysis because they do not occur in the Prairie Project Area. In-depth discussion of deer and elk can be found in the Big Game Section.

Regulations at 36 CFR 219.19(a)(6) state that "population trends of Management Indicator Species will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with state fish and wildlife agencies, to the extent practicable." The primary objective of monitoring is to obtain population trend information. The Monitoring Implementation Guide (USDA Forest Service 2001d) established monitoring protocols for most of these species, as directed by the Forest Plan. Other species, including deer, elk, turkey, and mountain lion, and fish are not included in the Monitoring Implementation Guide, but are monitored Forest-wide by South Dakota Game, Fish, and Parks. Refer to the annual Monitoring Reports (1998 through 2001) for results and additional information.

Northern Goshawk

The northern goshawk has specific nesting habitat requirements and is vulnerable to changes in forest stands resulting from vegetation treatment. The goshawk usually nests in denser timber stands, but utilizes stands with a variety of structure and density for foraging.

There are two known goshawk territories in the Prairie Project Area that have been active in recent years (Victoria and Eidelweiss). The Victoria territory was discovered in 1994, with 2 known alternate nests, one of which was active in 1994-1996 and 1999-2002. The Eidelweiss territory was discovered in 1996, and has been active in 1996, 1999, and 2001. No alternate nests have been located in this territory. Surveys for northern goshawk were conducted during the 2002 field season in suitable nesting habitats in the remainder of the Prairie Project Area. The surveys were performed following protocol developed in Region 3 (Kennedy 1993) that was modified in that only 3C, 4B, and 4C conifer stands were surveyed. No additional goshawk territories were located, although several observations of birds in the same general vicinity indicate a probable territory in the northern portion of the project area.

The Forest Plan provides specific guidance for management of goshawk nesting and post-fledgling areas (Standards 3108, 3109, and 3111, Guidelines 3110 and 3112-3114 which are treated as standards). In addition to the two known territories in the Prairie Project Area, an additional three potential territories were identified and included in the analysis. The location of

the three potential territories (for analysis purposes named Norris, Powerhouse, and Pactola Work Center, or PWC) was based on availability of suitable nesting habitat, distance from adjacent known territories (at least three miles from territory center), and observations of birds during the nesting season. Identification and location of these three potential post fledgling areas (PFAs) is consistent with Forest Service Manual Supplement direction (Black Hills Supplement #2600-2002-1 dated April 30, 2001) that “if goshawk nesting territories are not currently known within the landscape area (5,000-10,000 acres) project alternatives would locate post-fledging family areas around suitable nesting habitat appropriate for the landscape areas. These PFAs would consider known goshawk nest distribution and would be designed to fill holes or gaps where needed between the known goshawk territories.” Forest Plan Standard 3108, which specifies protective measures for the goshawk regarding pre-project nest surveys, and identification and exclusion of nest stands and replacement stands from treatment, is met by all action alternatives.

Forest Plan Standard 3109 directs that “protected acreage will include 180 acres best suited for nesting habitat within one-half mile of the historically active or currently active nest or within the goshawk territory. The acreage need not be contiguous but must occur in 30-acre units or larger. If these conditions cannot be met, then the acreage will include stands that are not currently suitable but that could be managed to meet nesting conditions over time.” At least 180 acres of nesting habitat were identified in the two known goshawk territories, including stands containing actual nest(s) and additional stands best suited for nesting habitat that are within 600 acres of a known goshawk nest. These stands provide optimal nest stand characteristics (e.g. large trees, closed canopy). At least 180 acres of potential stands best suited for nesting habitat were also identified for the Norris, Powerhouse, and PWC (Alternative B and Alternative D) potential goshawk territories. For the PWC potential territory in Alternative C, at least 180 acres of potential nest stands were identified, although some stands of less than optimal quality were selected because several optimal quality stands are in need of treatment to meet fire and fuels objectives. Even though not all the potential nest stands in the PWC potential territory selected for Alternative C are best suited for nesting habitat, they currently provide goshawk nest stand characteristics, or will do so in the near future.

All action alternatives meet Standard 3109 by maintaining at least 180 acres best suited for nesting habitat in known goshawk territories. All action alternatives meet Standard 3109 by maintaining at least 180 acres best suited for nesting habitat in the Powerhouse and Norris potential territories. Alternative B and Alternative D meet Standard 3109 by maintaining at least 180 acres best suited for nesting habitat in the PWC potential territory. None of the stands identified as nesting habitat are treated under any alternative. Alternative C may not meet Standard 3109 because some stands of lesser quality, rather than those “best suited for nesting habitat” were identified for nest stands. Those stands best suited for nesting habitat are proposed for treatment in Alternative C to meet fire and fuels objectives. It is debatable whether selection of lesser quality stands as nest stands is inconsistent with meeting Standard 3109, since the PWC territory is considered a potential territory for this analysis, and no known nests or nest stands have been identified. Whether or not Alternative C is consistent with Standard 3109 is dependent on the interpretation of the specific wording of the standard. See the Prairie Project file for additional information regarding selection of nesting habitat and location of potential territories.

Forest Plan Guideline 3110 (treated as a standard) specifies that activities should not reduce the structural and compositional integrity of active and alternate nest stands. Guideline 3112 (treated as a standard) directs that management of goshawk nest sites be designed to conserve or enhance site conditions (e.g. thin regeneration). Actions proposed in Alternative B and Alternative D are consistent with Guidelines 3110 and 3112. Actions proposed in Alternative C in the PWC potential PFA may not be consistent with Guidelines 3110 and 3112, depending on the interpretation of those guidelines, for reasons discussed above in relation to Standard 3109. Actions proposed in all other PFAs in Alternative C are consistent with Guidelines 3110 and 3112.

For goshawk post-fledgling area analysis in the Prairie Project, six vegetation structural stages (VSS) were used that describe regeneration, growth, and development of ponderosa pine in the Black Hills that meet specific requirements for goshawk nesting and post-fledgling habitat (approximately 420 acres centered around the nest stand(s)). These VSS were derived from Reynolds et al. (1992) and modified to reflect conditions in the Black Hills (Guideline 3114). The six VSS were used in the Post-fledgling Model (USDA Forest Service 2001b) for goshawk analysis only, and although somewhat similar they are different from the five structural stages used for the remainder of the Prairie Project analysis.

Table 3-20 displays the existing (Alternative A) proportion of each VSS in each known and potential PFA. In general, all PFAs are deficient in the smaller VSS (1, 2, and 3), and are also deficient in the older, denser VSS (450 and 460 are below desired levels, and VSS 550 and 650 are completely absent). The majority of all PFAs is in VSS 400 (9-14" DBH with <40% canopy closure, characterized as mid-aged forest), primarily due to past vegetation treatment. This VSS, however, is not considered by Forest Plan Guideline 3114 as a desirable structural stage for goshawk in the PFA, and thus is not included in the six VSS although the understory component of these stands may contribute to VSS 1, 2, or 3.

Table 3-20 also displays the effect of treatments proposed in each alternative on the balance of structural stages in each PFA. Treatments of stands within PFAs are proposed either to meet the Prairie Project purpose and need for fire and fuels, and/or to move toward a better distribution of structural stages in each alternative. Treatments to achieve desired proportions of VSS 1, 2, and 3 in a single entry could be detrimental to goshawk, particularly since stands in VSS 450 and 460 are currently lacking, and VSS 550 and 560 are completely absent in all PFAs. It was also determined through analysis of existing condition that many of the PFA stands are heterogeneous and have a high degree of within-stand diversity not evident when classified into a single VSS, thus many of the stands currently provide some habitats in VSS 1 and 2 although not classified as such. It is therefore desirable to move towards the lower end of the desired range of percentages, as shown in Table 3-20, for VSS 1 (7%), VSS 2 (7%), and VSS 3 (15%) in PFAs where those classes do not currently meet desired condition. It is for these reasons that proposed treatments to improve and enhance the distribution of structural stages by increasing the proportion of VSS 1 and 2 were conservative and limited to only one or two stands in each PFA. The lower end 400 stands (smaller diameter, more open canopy) are targeted for treatment where possible to increase the proportion of VSS 1 and 2, leaving the higher end 400 stands (larger diameter, more closed canopy) to move into the 450/460/500 classes. It is also desirable to maintain as much habitat as possible that is currently in VSS 450 and 460 because stands in

those larger, denser classes are currently lacking. Treatments that decrease the amount of VSS 450 and 460, or higher end 400 stands will have a negative, long-term effect on the balance of structural stages for the affected PFA, because those stages can only be obtained through growth over long periods of time (e.g. 50-80 years).

Alternative B proposes only non-commercial treatments in goshawk PFAs, with the exception of limited commercial treatments to develop fuelbreaks adjacent to private land, consistent with the theme of Alternative B. Table 3-20 displays the effects of Alternative B treatments on the balance of VSS in each PFA. Also see Table 3-21 for a summary of commercial and non-commercial treatments in each PFA by alternative, as well as the number of acres that are positively or negatively affected by those treatments. Commercial treatments are proposed in Alternative B for a total of 76 acres, and non-commercial treatments are proposed on a total of 656 acres in all five PFAs combined. The most commercial treatment proposed in any PFA is 33 acres in the Eidelweiss PFA. No treatments are proposed in Alternative B to improve and enhance the balance of structural stages by creating VSS 1 or 2 because to do so would require removal of commercial-sized trees for purposes other than fire and fuels, which is inconsistent with the theme of Alternative B. A total of 102 acres of VSS 450/460 in the Eidelweiss and PWC PFAs are proposed for treatment that would result in a decrease to VSS 400, as shown in Table 3-21 for Alternative B. Such treatments would negatively affect the distribution of structural stages and quality of habitat in those PFAs relative to the number of acres or percentage of the PFA treated. There are no treatments proposed in Alternative B to improve the proportion of VSS 1 in any of the PFAs.

Alternative C proposes aggressive treatment to meet fire and fuels objectives, including 1000 acres of commercial treatments and an additional 238 acres of non-commercial treatments in all five PFAs combined. Refer to Table 3-20 for a summary of the effects of Alternative C treatments on the balance of structural stages in each PFA. See Table 3-21 for acres proposed for commercial and non-commercial treatment in each PFA, and the number of acres positively or negatively affected by those treatments. Treatments proposed for Alternative C in the PWC potential PFA affects the largest number of acres (514 acres commercial and non-commercial treatments), followed closely by the Victoria PFA (486 acres). Alternative C also proposes treatments in the PWC potential PFA on 207 acres of VSS 450, which would decrease the proportion of VSS 450 in the PFA from 18% to 6% (Table 3-21), and have a negative effect on the distribution of structural stages and quality of habitat. Much smaller acreages of VSS 450/460 are proposed for treatment in the Eidelweiss PFA and the Norris potential PFA (57 and 12 acres respectively). The degree of negative effect of these treatments is relative to the number of acres or percentage of the PFA treated. Alternative C also proposes treatments on 160 acres in the PWC potential PFA, and on 50 acres in both the Norris potential PFA and the Victoria PFA, to improve the proportion of VSS 1 in those PFAs. Such treatments would have a positive effect on the balance of structural stages in those PFAs (Table 13).

Alternative D proposes a total of 259 acres of commercial treatments and 217 acres of non-commercial treatments in all five PFAs combined (Table 3-21), considerably fewer acres than Alternative C. See Table 3-20 for a summary of the effects of Alternative D treatments on the balance of structural stages in each PFA. The largest number of acres treated is in the Victoria PFA (217 acres), followed by the PWC potential PFA (122 acres). The Forest Plan desired

condition of VSS distribution includes at least 60% of the PFA in VSS 450 and larger classes (Guideline 3114). Given the theme for Alternative D, at least 60% of the stands in each PFA were maintained in a combination of higher end 400 VSS, VSS 450 and 460 in Alternative D, as shown in Table 3-20. For this reason, none of the treatments planned in Alternative D reduce existing VSS 450 or 460, as shown in Table 3-21, and thus there are no negative effects relative to meeting Guideline 3114 associated with such treatment. Alternative D also proposes treatments on 50 acres of the Norris potential PFA, and 55 acres of the PWC potential PFA to improve the proportion of VSS 1 in those PFAs. Such treatments would have a positive effect on the balance of structural stages in those PFAs, as shown in Table 3-21.

Forest Plan Guideline 3114 (treated as a standard) provides direction to “design silvicultural prescriptions and manage activities to enhance prey species habitat by maintaining vegetative diversity and striving for a balance of structural stages, from stand initiation to late successional, within goshawk fledgling habitat (approximately 420 acres around each historically active goshawk nest and alternate nests).” Alternative D is consistent with Guideline 3114 in that no VSS 450/460 stands are treated in any PFA, and the proportion of VSS1 is improved in three of the five PFAs. Alternative B and Alternative C are not consistent with Guideline 3114 because VSS 450 and/or 460 are treated to meet fire and fuels objectives in two PFAs in Alternative B, and three PFAs in Alternative C.

Alternative D maintains or enhances the largest amount of suitable nesting and PFA habitat for goshawk, and treats the fewest total acres as compared to the other action alternatives (Table 3-21). Alternative A is the second best for goshawk, followed by Alternative B, and lastly Alternative C. Alternative D maintains the best suited nesting habitat in all PFAs, and provides small improvements in the balance of structural stages in two of the five PFAs, without decreasing VSS 450/460. The small improvements to the balance of structural stages are preferred over no improvements in Alternative A. Alternative B treats some VSS 450/460 stands, but fewer than Alternative C, and also treats fewer acres overall than Alternative C. Alternative C is least favorable in terms of maintaining and enhancing goshawk habitat because some best suited nest stands are treated in the PWC potential PFA, it treats the highest number of acres of VSS 450/460, and treats the most acres in PFAs overall.

Forest Plan Standard 3111 directs that additional human-caused noise and disruption beyond that occurring at the time of nest initiation (e.g. road traffic, timber harvests, construction activities) be minimized within one-fourth mile of all active goshawk nests from March 1 through August 31, will be included as a mitigation measure and thus be met for all action alternatives. Guideline 3113 (treated as a standard) directing that timber harvest schedules that cause simultaneous, widespread disturbance across active goshawk fledgling habitat be avoided from March 1 through September 30 will also be included as a mitigation measure and thus be met for all action alternatives.

For more details on the analysis of goshawk PFAs and vegetation structural stages, see the Prairie Project file.

Table 3-20 Balance of vegetation structural stages in five goshawk post-fledgling areas for Alternatives

Structural Stage ¹		Eidelweiss PFA				Norris PFA				Powerhouse PFA				PWC PFA				Victoria PFA			
VSS	DFC %	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D
1	10 (7-13)							12	12			12	12	1	1	29	9			8	
2	10 (7-13)									7	7	7	7	15	15	14	15	8	8	8	8
3	20 (15-25)	8	8	8	8	27	27	27	27	17	17	18	18	2	2		2	42	35	70	42
400		43	50	56	43	32	32	23	20	75	75	63	63	65	74	51	56	50	56	13	50
450	13 (8-18)	35	28	28	35	41	41	38	41					18	8	6	18	1	1	1	1
460	7 (2-12)	15	14	9	15																
500																					
550	20 (15-25)																				
650	20 (15-25)																				

¹Forest Plan Guideline 3114. Refer to Appendix A for a description of the six vegetation structural stages.

Table 3-21 Acres, types, and effects of proposed treatments for all alternatives in the five goshawk post-fledgling areas

Treatment type	Eidelweiss PFA				Norris PFA				Powerhouse PFA				PWC PFA				Victoria PFA			
	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D	Alt A	Alt B	Alt C	Alt D
Commercial		33 ¹	57	0		12	104	72		0	65	65		31	454	122		0	320	0
Non-com. only		0	0	0		0	12	0		65	0	0		105	60	0		486	166	217
Effect on PFA																				
Degrade Balance (treat VSS 450/460)		33	57	0		0	12	0		0	0	0		69	207	0		0	0	0
Improve balance (create VSS 1)		0	0	0		0	50	50		0	0	0		0	160	55		0	50	0

¹Acres. Type of treatment (e.g. commercial) and whether the effect is to decrease VSS 450/460 or increase VSS 1 are not additive.

Merriam's Turkey

Turkeys occur in a variety of habitats, from agricultural fields to hardwood and coniferous forest, and roost in trees at night to avoid predators. Turkeys feed primarily on seeds, fruits, nuts, and invertebrates. Nesting occurs in woodland/deciduous communities with a diverse understory to provide cover from predators. The Black Hills population appears stable and is considered a game species with hunting seasons usually spring and fall. Turkeys are monitored Forest-wide by South Dakota Game, Fish, and Parks. Refer to the annual Monitoring Reports (1998 through 2001) for results and additional information. Impacts to this species include severe winters, cold wet springs, loss of herbaceous cover to support invertebrate prey items, predators, poaching and over-harvest.

Alternative A would not move toward desired future condition for this species because meadows and hardwoods would not be treated for pine encroachment, and dense pine canopies would not be opened up, stimulating regeneration and thus increasing future pine seed production. The Forest Plan provides specific Standards and Guidelines that provide for maintenance of roost trees (Guideline 3205, treated as a Standard) and restoration and retention of hardwoods and meadows (see Hardwood Habitats and Meadow Habitats sections). All action alternatives will meet Forest Plan Standards and Guidelines relating to Merriam's turkey. All action alternatives will move toward Forest Plan desired future condition by maintaining forage and seed production, and cover for this species. All action alternatives will improve turkey habitat in the Prairie Project Area through protection of riparian habitats, enhancement of hardwoods and meadows, and increasing pine seed production through vegetation treatment. Degree of improvement would be relative to the number of acres of meadows, hardwoods and pine treated.

Brown Creeper

In the Black Hills, this uncommon resident is usually associated with pine and spruce forest (year-round), and cottonwood riparian areas during the winter (Pettigill and Whitney 1965, Peterson 1995, SDOU 1991). Late successional stage conifer stands with a snag component are essential for nesting, with nests usually constructed behind loose slabs of bark still attached to large diameter snags. The brown creeper is primarily insectivorous, but will eat other invertebrates, nuts, and seeds (Udvardy 1977). The population that occurs in the Black Hills is considered disjunct, and its status is relatively unknown although Breeding Bird Survey data (Sauer et al. 2000) indicate population numbers are increasing. The brown creeper is adversely affected by forest fragmentation (Dykstra 1996), heavy logging, predation, and alteration of nest sites. This species has not been recorded in the Prairie Project Area, but potentially suitable habitat is present, particularly in Management Area 3.7.

The large-scale Late Succession Management Area present in the Prairie Project Area will contribute to the brown creeper's habitat needs in all alternatives. The No Action alternative will result in increasingly closed crowns, thus making forested stands more susceptible to insect, disease, and wildfire. These naturally occurring processes would provide an increase in the number of large diameter snags which provide suitable nesting and foraging habitat. Alternative C and Alternative D would provide suitable habitat for this species over the long-term by maintaining and enhancing tree growth and vigor in treated areas, while at the same time

providing snag habitat across the landscape and retaining large diameter green trees for future snag recruitment, per the Forest Plan (see Snag and Down Log section). Alternative B would result in habitats across the Prairie Project Area quite similar to Alternative A because the primarily non-commercial treatments proposed would have minimal effect on overstory canopy closures and densities of large snags. Growth and vigor would be maintained in commercially treated sites in Alternative B, similar to the other action alternatives.

Mountain Lion

This state threatened species is known to occur in the Prairie Project Area, and the population trend in the Black Hills appears to be on the increase, although the overall population trend throughout the mountain lion's range appears to be declining. Mountain lions are monitored Forest-wide by South Dakota Game, Fish, and Parks. Refer to the annual Monitoring Reports (1998 through 2001) for results and additional information. The South Dakota Game, Fish and Parks estimates there are approximately 150 lions in the Black Hills (SDGF&P Pers. Com.). Mountain lions prefer remote, undisturbed areas for the seclusion they offer, but for the most part they are habitat generalists as long as their primary prey (deer) is available. Threats to the mountain lion are federal predator control efforts augmented by bounty programs, loss of remote, undisturbed habitat, excessive killing by humans, and depleted ungulate populations.

The relatively remote, rugged large-scale Late Succession Management Area along the Rapid Creek corridor in the Prairie Project Area will contribute to the mountain lions' need for seclusion in all alternatives. Untreated areas besides the Late Succession habitat, such as thermal cover and future thermal cover stands (Alternative B) will also provide blocks of habitat for security and movement. Alternative A will result in increasingly closed canopied stands, providing security for the mountain lion and big game species. Management activities, proposed in the action alternatives, including both vegetation treatment and travel management, that improve habitat for big game also benefit mountain lion. Conversely, activities that degrade big game habitat would negatively affect mountain lions (also see Big Game section).

Brook Trout

Brook trout is an introduced species that occurs in Rapid Creek, Prairie Creek, and Victoria Creek in the Prairie Project Area. Brook trout need cold, clean headwater streams and lakes, and will not thrive in warm or turbid water. Most populations are self-sustaining, though some stocking occurs. This species is important to local sport fisheries. Brook trout are monitored Forest-wide by South Dakota Game, Fish, and Parks. Refer to the annual Monitoring Reports (1998 through 2001) for results and additional information. Management practices that can adversely affect brook trout are livestock grazing in riparian zones, channelization, and sedimentation from roads or other ground-disturbing activities (USDA Forest Service 2001a).

The Forest Plan provides specific Standards and Guidelines to manage habitat for the brook trout, in the form of watershed protection measures to reduce sediments that degrade water quality. The Watershed Report quantifies the amount of lake and stream habitat available for the brook trout, as well as provides discussion regarding water quantity and quality relative to the No Action and the action alternatives.

Alternative A will not increase water flows that result from vegetation removal, nor will any of the proposed watershed improvement projects be implemented under the No Action alternative. Alternative C treats the most acres, so will likely result in the largest increase in streams flows, followed by Alternative D and Alternative B. Numerous watershed improvement projects are proposed for all action alternatives (see Watershed Report). These projects will rehabilitate existing connected disturbed areas to reduce soil erosion and sedimentation, stabilize streambanks, improve water quality, etc. Under the action alternatives, the condition of stream habitats would be directly and indirectly enhanced as a result of the proposed watershed improvement projects. The positive effects of these projects would be the same under all action alternatives. Hardwood and meadow restoration and retention treatments proposed under all action alternatives will enhance riparian and stream ecosystems where these treatments occur near riparian habitats. Although not quantifiable, the level of benefits of these treatments is directionally proportional to the number of acres proposed for treatment in each alternative.

There is potential for negative effects to riparian areas and aquatic ecosystems resulting from proposed activities in the action alternatives (e.g. erosion, sedimentation, noxious weed control). Such effects will be mitigated by implementation of Best Management Practices (South Dakota-Division of Forestry, 1994), Watershed Conservation Practices (Forest Service Handbook 2509.25, USDA-Forest Service R-2, 2001), and Forest Plan Standards and Guidelines. Any overall negative effects should be minimal in the short term and positive over the long term.

Brown Trout

The brown trout is also an introduced species that occurs in Rapid Creek and Prairie Creek. This important game species also prefers cold, clean headwater streams, but can survive in water that is deeper, warmer, and slower than would be tolerated by other trout. Brown trout are widely stocked in the Black Hills, and are monitored Forest-wide by South Dakota Game, Fish, and Parks. Refer to the annual Monitoring Reports (1998 through 2001) for results and additional information. Management practices that adversely affect this species include those that result in reduction of shade over water, channelization, and sedimentation (USDA Forest Service 2001a).

Alternative A will not increase water flows that result from vegetation removal, nor will any of the proposed watershed improvement projects be implemented under the No Action alternative. Alternative C treats the most acres, so will likely result in the largest increase in streams flows, followed by Alternative D and Alternative B. Numerous watershed improvement projects are proposed for all action alternatives (see Watershed Report). These projects will rehabilitate existing connected disturbed areas to reduce soil erosion and sedimentation, stabilize stream banks, improve water quality, etc. Under the action alternatives, the condition of stream habitats would be directly and indirectly enhanced as a result of the proposed watershed improvement projects. The positive effects of these projects would be the same under all action alternatives. Hardwood and meadow restoration and retention treatments proposed under all action alternatives will enhance riparian and stream ecosystems where these treatments occur near riparian habitats. Although not quantifiable, the level of benefits of these treatments is directionally proportional to the number of acres proposed for treatment in each alternative.

There is potential for negative effects to riparian areas and aquatic ecosystems resulting from proposed activities in the action alternatives (e.g. erosion, sedimentation, noxious weed control). Such effects will be mitigated by implementation of Best Management Practices (South Dakota-Division of Forestry, 1994), Watershed Conservation Practices (Forest Service Handbook 2509.25, USDA-Forest Service R-2, 2001), and Forest Plan Standards and Guidelines. Any overall negative effects should be minimal in the short term and positive over the long term.

Mountain Sucker

One of few fish species native to the Black Hills, the mountain sucker occurs in Rapid Creek and is associated with clear, cold streams with aquatic vegetation and undercut banks. Little data is available regarding special habitat needs or management practices that affect this species. Surveys conducted over the last 40 years found mountain suckers in many creeks in the Black Hills. More recent surveys in the mid- to late 1990s found the species to be absent from a substantial number of creeks where it was previously located (USDA Forest Service 2001a). The mountain sucker is monitored Forest-wide by South Dakota Game, Fish, and Parks. Refer to the annual Monitoring Reports (1998 through 2001) for results and additional information.

The Forest Plan provides specific Standards and Guidelines to manage habitat for the mountain sucker, in the form of watershed protection measures to reduce sediments that degrade water quality. The Watershed Report quantifies the amount of lake and stream habitat available for the brook trout, as well as provides discussion regarding water quantity and quality relative to the action alternatives.

Alternative A will not increase water flows that result from vegetation removal, nor will any of the proposed watershed improvement projects be implemented under the No Action alternative. Alternative C treats the most acres, so will likely result in the largest increase in streams flows, followed by Alternative D and Alternative B. Numerous watershed improvement projects are proposed for all action alternatives (see Watershed Report). These projects will rehabilitate existing connected disturbed areas to reduce soil erosion and sedimentation, stabilize stream banks, improve water quality, etc. Under the action alternatives, the condition of stream habitats would be directly and indirectly enhanced as a result of the proposed watershed improvement projects. The positive effects of these projects would be the same under all action alternatives. Hardwood and meadow restoration and retention treatments proposed under all action alternatives will enhance riparian and stream ecosystems where these treatments occur near riparian habitats. Although not quantifiable, the level of benefits of these treatments is directionally proportional to the number of acres proposed for treatment in each alternative.

There is potential for negative effects to riparian areas and aquatic ecosystems resulting from proposed activities in the action alternatives (e.g. erosion, sedimentation, noxious weed control). Such effects will be mitigated by implementation of Best Management Practices (South Dakota-Division of Forestry, 1994), Watershed Conservation Practices (Forest Service Handbook 2509.25, USDA-Forest Service R-2, 2001), and Forest Plan Standards and Guidelines. Any overall negative effects should be minimal in the short term and positive over the long term.

For all Management Indicator Species analyzed for the Prairie Project, some individuals may be negatively affected by the action alternatives. However, overall habitat for some species will be improved by the action alternatives, particularly for those species where stream health is currently negatively affected under Alternative A.

Species Of Special Focus (Snails/Bats/Dipper)

Snails

The Forest Plan provides direction to ensure that all identified colonies of two regionally sensitive snail species and an additional five snail species are protected from adverse effects of livestock use and other management activities (Standard 3103). The Monitoring Implementation Guide (USDA Forest Service 2001d) established monitoring protocols for snails, as directed by the Forest Plan. Refer to the annual Monitoring Reports (1998 through 2001) for results and additional information.

The two sensitive snail species are discussed in the Prairie Draft BA/BE. Snail surveys were conducted at various locations throughout the Black Hills in 1991, 1992, and 1999 by a private contractor (Frest and Johannes 1993, 2002). Three survey sites were located in the Prairie Project Area, but none of the seven species of concern were found at any of the sites. Therefore, there are no issues regarding the additional five snail species relative to any of the proposed activities for the Prairie Project.

Bats

The Forest Plan provides direction related to bat habitat, specifically “for caves ... manage to protect or enhance biological, ... ecological, ... and physical characteristics ... avoid ground disturbance within 500 feet of an opening of a natural cave ... take measures to prevent human caused changes in cave ecosystem, ... air flow, humidity, or temperature regimes” (Guideline 1401, treated as a Standard). Guideline 3102 (treated as a Standard) specifies that “where caves and mines are important nurseries or hibernacula for bats, protect the caves and mines and their microclimates when designing management activities (e.g. timber harvest, road construction, recreation facilities). Protect known bat day and night roosts.” Standard 3207 also “protects known bat nursery roosts and hibernacula.” The Monitoring Implementation Guide (USDA Forest Service 2001d) established monitoring protocols for bats, as directed by the Forest Plan. Refer to the annual Monitoring Reports (1998 through 2001) for results and additional information.

Two sensitive bat species, one of which has been documented in the Prairie Project Area, are discussed in the Prairie Draft BE/BA. The Prairie Project Area also likely provides habitat for other bat species as well. There is one known abandoned mine on National Forest System land in the northwest portion of the project area, and there is one cave on private land. These sites provide potential habitat as day or night roosts, or as nurseries or hibernacula. The project area also provides snags and rock outcrops for roosting habitat, as well as other habitat features important to bats such as water sources and riparian habitats.

Implementation of Forest Plan direction regarding bats and bat habitat, snags, green tree replacements, and riparian habitat under all action alternatives would maintain or enhance these components of bat habitat in the Prairie Project Area. Under the action alternatives, the condition of riparian habitats would be directly and indirectly enhanced as a result of the proposed watershed improvement projects. The positive effects of the watershed projects would be the same under all alternatives.

State Listed Species

Species listed as threatened or endangered by the State of South Dakota (South Dakota Department of Game, Fish and Parks 2000) that occur or may occur in the Prairie Project Area include American dipper, bald eagle, osprey, and mountain lion. The mountain lion was previously addressed as a Management Indicator Species, and the bald eagle and osprey are addressed in the Draft BA/BE.

The dipper is considered a State threatened species and was recently (March 2003) petitioned to be emergency listed under the Endangered Species Act. The American dipper is a truly aquatic songbird, rarely wanders from water, and is dependent on clean, fast-moving streams with abundant aquatic insect prey. Dippers do not migrate, although they do move up and down a particular stream during the winter as the stream freezes and thaws. Winter survival is related to availability of ice-free streams for foraging (Price and Bock 1983). This species nests on cliffs or rocky ledges adjacent to streams, behind waterfalls, on large rocks in the stream, or under bridges and other man-made structures. Aquatic invertebrates (primarily larval caddisflies and mayflies) associated with rock, sand, or rubble stream bottoms are the dipper's primary food source.

Threats to the dipper and its habitat include sedimentation and pollution that can destroy the habitat of most aquatic insects. Streams with a heavy sediment load are not suitable dipper habitat (Backlund 2001). Livestock can cause damage to streams by trampling stream banks and destroying riparian vegetation, thus increasing sedimentation and warming of stream water which in turn negatively affects aquatic insects. Osborn (1999) reported from a study in Montana that dippers were rare or absent on streams that flowed through areas of high livestock use. Improperly located or constructed roads also increase sedimentation. According to Anderson (2002), severe wildfires may increase erosion and damage riparian zones, and chemical control of noxious weeds could negatively affect dippers if the chemicals enter the water and affect water quality. In the Black Hills, the increasing abundance of ponderosa pine in the uplands, coupled with fire suppression, has made less water available for stream flow (Stewart and Thilenius 1964, Froiland 1978).

Water impoundments have many effects on streams and dipper habitat, depending on the type of dam. Small dams allow water to warm, which affects stream characteristics and aquatic insect fauna. Decreases or loss of water flows in streams can also threaten dippers. Pactola Dam may have had severe impacts on the dippers of Rapid Creek (Backlund 2001). According to Backlund (2001), erratic and periodic low releases from Pactola Dam may have caused the near extirpation of the dipper from Rapid Creek below the dam. Dark Canyon once provided the best dipper habitat on Rapid Creek. Even short periods of low flows in winter months could

eliminate the dipper population if the stream freezes over, leaving no areas of open water for foraging. Base flows of approximately 20 cubic feet per second (Anderson 2003) are generally maintained in Rapid Creek below Pactola Dam, but that flow may be adjusted according to local conditions (e.g. drought). Peak flows may also be reduced by dams due to the need to store water in the reservoir. See Watershed Report for additional discussion of stream flows in the Prairie Project Area.

The Rapid Creek watershed is the largest watershed in the Black Hills, both in terms of watershed size and stream flows. The Prairie Project Area encompasses the lower Rapid Creek drainage, from Pactola Dam east to the Forest boundary. It should be noted that approximately 50% of the length of this segment of Rapid Creek passes through private property. Livestock grazing on NFS lands is currently excluded below Pactola Dam for approximately the first mile of Rapid Creek. According to Backlund (2001), dippers were once common on Rapid Creek in Dark Canyon and the Pactola area, and were regularly observed during Rapid City Christmas Bird Counts until 1985. Few birds and little evidence of nesting have been observed along lower Rapid Creek in the past two decades (refer to Backlund, 2001 for a more detailed account).

Alternative A will not increase water flows that result from vegetation removal, nor will any of the proposed watershed improvement projects be implemented under the No Action alternative. Alternative C treats the most acres, so will likely result in the largest increase in streams flows, followed by Alternative D and Alternative B. Numerous watershed improvement projects are proposed for all action alternatives (see Watershed Report). These projects will rehabilitate existing connected disturbed areas to reduce soil erosion and sedimentation, stabilize stream banks, improve water quality, etc. Additional activities proposed in all action alternatives include providing livestock watering sources away from streams and riparian areas, and constructing fencing to exclude livestock from Prairie Creek Dam. Under the action alternatives, the condition of stream habitats would be directly and indirectly enhanced as a result of these proposed projects. The positive effects of these projects would be the same under all action alternatives. Hardwood and meadow restoration and retention treatments proposed under all action alternatives will enhance riparian and stream ecosystems where these treatments occur near riparian habitats. Although not quantifiable, the level of benefits of these treatments is directionally proportional to the number of acres proposed for treatment in each alternative.

There is potential for negative effects to riparian areas and aquatic ecosystems resulting from proposed activities in the action alternatives (e.g. erosion, sedimentation, noxious weed control). Such effects will be mitigated by implementation of Best Management Practices (South Dakota-Division of Forestry, 1994), Watershed Conservation Practices (Forest Service Handbook 2509.25, USDA-Forest Service R-2, 2001), and Forest Plan Standards and Guidelines. Refer to the Watershed Report for additional discussion of treatment effects, watershed improvement projects, proposed mitigation measures, and ongoing water quality monitoring by the State of South Dakota. Also refer to the Range Specialist Report for discussion of the effects of livestock grazing in the Prairie Project Area, as well as effects of alternatives and proposed mitigation measures such as relocating livestock watering sources away from creeks and riparian areas. Numerous components of riparian habitats are included as monitoring items in the Monitoring Implementation Guide (USDA Forest Service 2001d). In addition, South Dakota Department of Game, Fish, and Parks monitor this species Forest-wide.

Big Game

The Prairie Project Area provides critical wintering habitat and important year-round habitat for mule deer, white-tailed deer, elk, and bighorn sheep. During the spring, the area provides important calving and fawning habitat, and lambing habitat for the Dark Canyon herd of bighorn sheep. Sixty-seven percent (19,486 acres) of the Prairie Project Area is designated by the Forest Plan to be managed with an emphasis on Big Game Winter Range (Management Area 5.4). The Forest Plan provides specific direction for management of big game habitat Forest-wide, as well as direction specific to various management areas.

South Dakota Department of Game, Fish and Parks (SDGFP) estimated the Black Hills deer population in 1994 to be approximately 51,000 to 60,000 animals. In 2002, the estimated population had decreased to 41,000 to 46,000, with an agency objective of 60,000 to 70,000 animals. DePerno (1998) estimated the white-tailed deer population in the central Black Hills declined 10-15% per year from 1993-1996. One factor theorized to contribute to such declines is fawn mortality, shown to average 60% during the first year of life in the northern Black Hills (Benzon 1996). The elk population in the Black Hills is at or above state-agency objectives, with a current population estimate of 4,100 animals. SDGFP advocates long-term habitat management for deer that improves quality of habitat, particularly shrub forage. Management objectives for elk are to maximize recreational (e.g. hunting) opportunities and minimize depredation on private lands, while maintaining current population levels.

Most of the deer population in the Black Hills is migratory with distinct summer and winter ranges (Parrish et al. 1996). Most deer migration that occurs is elevational. Elk migration is generally dependent on winter severity and snow depth (SDGFP 1998). In general, high quality deer habitat is a function of a diversity of habitats within its home range that provide cover and forage. Winter forage is considered the primary factor limiting deer populations in the west, including the Black Hills (Sieg and Severson 1996, Richardson and Peterson 1974). A recent study of deer winter range diets in the central Black Hills found they were composed of approximately 40% ponderosa pine needles, 30% grasses, 20% shrubs, and 5% forbs (Hippensteel 2000). Such a heavy dependence on pine needles supports the assertion that winter range forage in the central Black Hills is in poor condition. According to DePerno et al. (2002), approximately 80% of the central Black Hills is unacceptable to deer due to lack of shrubs. Low quality and quantity of browse, combined with high site fidelity to small winter ranges (0.75 square mile), lead to malnutrition, resulting in a population unable to successfully reproduce enough to maintain herd size. Such small home ranges also compound the effects of roads, logging, and other wide-scale disturbances like wildfire to disrupt a deer's seasonal cycle.

The amount of winter range available to big game is also limited. Changes in historic use of private land from meadows and cropland to residential and subdivision development has further reduced and degraded available deer winter habitat (Griffin et al. 1999). Other factors that affect big game are roads that disrupt deer migration and movements, and predators that take advantage of sparse fawn and calf hiding cover.

Screening Cover, Hiding Cover and Security Cover

Forest Plan Guideline 3203 (treated as standard) provides Forest-wide direction to provide big game screening along at least 20% of the edges of arterial and collector roads. The amount of screening cover that currently exists in the Prairie Project Area is 3%. This figure was determined using vegetation characteristics only (structural stage 3C), and is a conservative estimate because topography also functions to provide screening cover but was not considered in the analysis. Alternative B and Alternative D maintain the screening cover that is now present in the project area at 3%. Alternative C decreases the amount of screening cover to 2% of the edges of arterial and collector roads. For this reason, Alternative C is not consistent with Forest Plan Guideline 3203, since it does not maintain all the screening cover that is currently present.

There is no Forest Plan direction specific to big game hiding cover or security cover, although these habitat components are incorporated into the HABCAP model. Hiding and security cover have been shown to be very important to big game populations, especially during hunting season and in areas with numerous open roads. Elk tend to be more sensitive to human disturbance than deer, and open road density (more specifically vehicle traffic) affects habitat use. Hiding cover is vegetation capable of hiding 90% of a standing deer or elk from the view of a human at 200 feet. Security is defined as protection that allows an animal to remain in a defined area despite increases in stress and disturbance associated with hunting season or other human activities. Neither hiding cover or security cover have been quantified for the Prairie Project Area, but these components can be evaluated qualitatively. In terms of vegetation to provide cover, Alternative A would provide the most cover, followed by Alternative B and Alternative D, while Alternative C would provide the least cover. In terms of open roads, Alternative B would have the fewest open roads, followed by Alternative D and Alternative C, while Alternative A has the most open roads.

Management Areas 4.1 and 8.2

The Forest Plan provides specific direction for big game in Management Area 4.1 (Guideline 4.1-3201, treated as standard), and Management Area 8.2 (Guideline 8.2-3203, treated as standard), in the form of habitat effectiveness thresholds. Since Management Areas 4.1 and 8.2 represent such small portions of the Prairie Project Area (349 acres or 1%, and 149 acres or <1%, respectively), habitat effectiveness was not analyzed for these management areas because to do so would produce ambiguous results. The model used to calculate habitat effectiveness (ARC HABCAP, see discussion below) is not intended for use, nor does it provide reliable estimates of habitat effectiveness when used to analyze such small areas.

Management Area 5.1 (Resource Production Emphasis)

The Forest Plan provides specific direction regarding big game habitat in Management Area 5.1 in the form of habitat effectiveness thresholds (Guideline 5.1-3201, treated as standard). The Black Hills version of GIS HABCAP (USDA Forest Service 1992) was used to calculate habitat effectiveness. The HABCAP model facilitates comparison of effects among the proposed alternatives on big game habitats, by management area, and to determine whether alternatives

comply with Forest Plan direction. The model evaluates the spatial arrangement of forage and cover, quality of cover stands (thermal and hiding), and the effects of roads. The model does not produce accurate predictions of actual population numbers, but is a tool to compare the relative quality and quantity of habitat components, and to determine whether alternatives comply with Forest Plan direction for big game habitats. Data and maps generated by the HABCAP model for analysis of alternatives can be found in the Prairie Project File.

Table 3-22 Habitat effectiveness values for deer and elk in Management Area 5.1 by alternative

Species	Forest Plan DFC ¹	Alt. A	Alt. B	Alt. C	Alt. D
White-tailed deer					
Summer	.40 ²	.25 ²	.31 ²	.31 ²	.31 ²
Winter	.35	.26	.33	.31	.32
Mule deer					
Summer	.40	.36	.45	.45	.44
Winter	.35	.29	.37	.38	.36
Elk					
Summer	.43	.30	.37	.38	.36
Winter	.34	.27	.33	.30	.32

¹Forest Plan Guideline 5.1-3201 (treated as standard).

²Habitat effectiveness index

Existing deer and elk habitat effectiveness values (Alternative A) for both summer and winter are below Forest Plan levels in the Management Area 5.1 portion of the Prairie Project Area (Table 3-22). This may be explained by a combination of factors, including the number of roads in the area, ineffectiveness of existing road closures, and limited quantities of thermal and hiding cover. All action alternatives result in increased habitat effectiveness values relative to Alternative A, although only mule deer values meet or exceed Forest Plan levels. Increases in habitat effectiveness correlate to the level of habitat improvement in each alternative. A number of factors, including seasonal and year-round road closures, retention of hiding and thermal cover, improved distribution of cover and forage, and restoration and retention of hardwood stands account for the increases in habitat effectiveness. Miles of road proposed for seasonal or yearlong closure or decommissioning (elimination) vary by alternative (see Travel and Transportation section). According to the habitat effectiveness values, Alternative B provides the greatest increases for white-tailed deer and elk, although Alternative C and Alternative D are very similar for both species. Habitats are most improved for mule deer in Alternative C, but Alternative B and Alternative D are again very similar. All action alternatives are consistent with Forest Plan Guideline 5.1-3201 in that they result in increased habitat effectiveness.

Management Area 5.4 (Big Game Winter Range Emphasis)

Forage Production

Availability of good quality forage and browse is critical to big game, especially during periods of heavy snow accumulations. According to DePerno et al. (2002), selection of specific foraging habitats on either summer or winter ranges is dependent on the understory plant community.

Gibbs (1993) concluded that summer forage does not appear to be a limiting factor for deer in Custer State Park. Deer are primarily browsers, feeding mostly on shrubs and forbs. Summer elk diets in the southern Black Hills were reported by Wydeven and Dahlgren (1983) to be composed of 50% grasses, 45% forbs, and 5% shrubs. Elk diets therefore overlap more closely with cattle than deer, and forage competition can be a concern on summer and winter elk ranges (Sieg and Severson 1996).

The Forest Plan provides direction for big game habitat in Management Area 5.4 to manage at least 20% of a project area for forage production (meadows, structural stages 1, 3A, 4A, Objective 5.4-202). Forage production and forage utilization are included as monitoring items in the Monitoring Implementation Guide (USDA Forest Service 2001d) to be monitored Forest-wide.

As shown in Table 3-23, there are currently 8,736 acres (45%) of foraging habitat in the Management Area 5.4 portion of the Prairie Project Area, more than twice the amount specified by Objective 5.4-202. Alternative B and C propose 85 acres of patchcuts, and 44 acres of patchcuts are proposed in Alternative D. These patchcuts were located and designed specifically to benefit bighorn sheep, but will benefit other big game species as well. All action alternatives further increase the amount of foraging habitat, with the largest increase in Alternative C (to 14,729 acres or 76%), and the smallest increase in Alternative D (to 10,509 acres or 54%). All action alternatives exceed Forest Plan Objective 5.4-202 for forage production. It is for this reason additional patch cuts in the Prairie Project Area were deemed unnecessary.

Table 3-23 Quantities of foraging habitat, thermal cover, potential future thermal cover, for deer and elk in Management Area 5.4 by alternative

	Forest Plan DFC	Alt. A	Alt. B	Alt. C	Alt.D
Forage Production	3897 (20) ¹	8736 (45) ¹	11691 (60) ¹	14729 (76) ¹	10509 (54) ¹
Thermal Cover	3193 (20) ²	236 (1) ²	236 (1) ²	124 (<1) ²	236 (1) ²
Potential Future Thermal Cover	N/A ³	---	2507 (16) ³	1150 (7) ³	3256 (20) ³

¹Guideline 5.4-202. Forage production areas include meadows and forest structural stages, 1, 2, 3A and 4A. Expressed in acres (percent), based on 19486 National Forest acres in MA 5.4.

²Forest Plan Objective 5.4-205. Expressed as acres (percent), based on 15965 conifer forested acres in MA 5.4.

³There is no Forest Plan direction for potential future thermal cover. Expressed as acres (percent), based on 15965 conifer forested acres in MA 5.4. Potential future thermal cover was not calculated for Alt. A.

As previously stated, the Forest Plan provides specific direction for big game forage production. It does not, however, provide any direction pertaining to forage quality. Effects of nutrition on population demography of free-ranging ungulates have been reasonably well-established, yet in the context of large-scale habitat management, the effects of nutrition generally have been ignored and the need for adequate nutrition should not be discounted (Cook et al. 1998). In addition, the long-recognized inverse relationship between forage production and canopy closure indicates that emphasis of thermal cover over food production can reduce availability of quality forage. The study by Cook et al. (1998) indicates that the assumption that thermal cover

compensates for marginal or inadequate forage conditions is insupportable, and the authors contend that greater emphasis be placed on forage quantity and quality.

Hardwood treatments proposed in all action alternatives, and prescribed burning proposed in Alternative B (7,502 acres) and Alternative C (4,224 acres) is expected to improve the quality and quantity of forage species in the Prairie Project Area, relative to the number of acres treated. Browse species important to deer such as chokecherry, wild rose, serviceberry, and others respond vigorously to fire as well as to harvest treatments that open the tree canopy. Browse production in burns typically increases for 3 to 5 years following the burn and then returns to pre-burn browse conditions. DePerno et al. (2002) found that central Black Hills deer selected for burned pine/grass/forb habitats in winter, but avoided burned pine/litter types in summer and winter. Selection of burned habitats in winter is likely due to persistent presence of bearberry, snowberry, and juniper in the understory of burned pine stands, species that are typically absent in the understory of unburned pine communities (DePerno et al. 2002).

Thermal Cover

The Forest Plan provides direction in Management Area 5.4 to provide thermal cover for elk, deer, and turkey on at least 20% of the forested portion of the management area (Objective 5.4-205). Guideline 5.4-2101 (treated as standard) provides further direction to avoid harvesting thermal cover if the project area does not meet Objective 5.4-205. Thermal cover is included as a monitoring item in the Monitoring Implementation Guide (USDA Forest Service 2001d) to be monitored Forest-wide. Refer to the annual Monitoring Reports (USDA Forest Service 1998 through 2001) for monitoring results and additional information. Stands with tall trees (>40 feet) and higher canopy closures (>70%) provide thermal cover and intercept snowfall, and thereby lessen snow depths. Thermal cover also provides protection from heat during summer months. DePerno et al. (2002) found that in summer, deer select forest with dense canopies (71-100%) to avoid heat stress.

The concept that vegetative cover provided by dense coniferous forests enhances survival of big game by conferring energetic benefits has become an accepted standard in wildlife habitat management over the past 50 years (Cook et al. 1998). Providing thermal cover for ungulates has become a key habitat objective for western elk ranges. This widespread belief that thermal cover constitutes a key component of big game (and more specifically elk) habitat has resulted in its widespread application and inclusion in virtually all elk habitat evaluation procedures currently in use (e.g. Wisdom et al. 1986, Thomas et al. 1986, Christensen et al. 1993).

Cook et al. (1998), however, found no significant, positive effect of thermal cover on condition of elk. In contrast, the study found that dense cover provided a costly energetic environment, resulting in significantly greater over winter weight loss and mortality. The authors of the study concluded that thermal cover does not appreciably enhance energetic status and productive performance, providing thermal cover is not a suitable solution for inadequate forage conditions, and finally that habitat management based on the perceived value of thermal cover should be re-evaluated (Cook et al. 1998). The findings of Cook et al. (1998), combined with the results of other studies of thermal cover, provide substantial evidence indicating that thermal cover has little relevance to herd productivity and demographics. The biological relevance of thermal

cover to big game in the Black Hills therefore remains debatable, although Millsbaugh et al. (1998) recommend maintenance of appropriate thermal cover on elk summer range in the Black Hills. Their study in Custer State Park found that elk selected bed sites on northern aspects with >40 square/feet acre basal area, >54% canopy closure, and >271 trees/acre for thermal rather than security cover.

There are few stands in the Prairie Project Area that possess thermal cover qualities. As shown in Table 3-23, there is currently 236 acres (1%) of thermal cover (structural stage 4C stands) in the Management Area 5.4 portion of the Prairie Project Area, well below the amount specified by Objective 5.4-205. Alternatives B and D maintain all existing thermal cover, consistent with Guideline 5.4-2101. Alternative C harvests 112 acres of thermal cover, reducing the amount present to <1% of Management Area 5.4. Harvesting thermal cover as proposed in Alternative C when the Management Area 5.4 portion of the project area does not meet Objective 5.4-205 and is inconsistent with Guideline 5.4-2101.

Since the Management Area 5.4 portion of the Prairie Project Area is deficient in thermal cover as discussed above, potential future thermal cover was identified as part of the analysis even though there is no Forest Plan direction to do so. Stands not currently providing thermal cover, but in larger diameter classes, with higher canopy closures and basal areas relative to other stands were selected because stands with these characteristics have the best potential to develop into thermal cover in the shortest period of time. See the Prairie Project File for additional details regarding stand selection and the analysis process. As shown in Table 3-23, 3,256 acres (20%) of potential future thermal cover was identified to be retained in Alternative D. Alternative B and Alternative C identified lesser acreages to be retained as potential future thermal cover. The majority of these stands will develop into thermal cover by 2022. Even though specific stands were not identified as potential future thermal cover in Alternative A, analysis indicates that under the No Action alternative the majority of pine stands in the Prairie Project Area will develop into thermal cover by 2032.

Habitat Effectiveness

Existing deer and elk habitat effectiveness values (Alternative A) for both summer and winter are below Forest Plan levels in the Management Area 5.4 portion of the Prairie Project Area (Table 3-24). This may be explained by a combination of factors, including the number of roads in the area, ineffectiveness of existing road closures, and limited quantities of thermal and hiding cover. All action alternatives result in increased habitat effectiveness values relative to Alternative A, although only mule deer summer values meet or exceed Forest Plan levels. Increases in habitat effectiveness are relative to the level of habitat improvement in each alternative. A number of factors, including seasonal and year-round road closures, retention of hiding and thermal cover, improved distribution of cover and forage, and restoration and retention of hardwood stands account for the increases in habitat effectiveness. Miles of road proposed for seasonal or yearlong closure or decommissioning (elimination) vary by alternative (see Travel and Recreation Use and Transportation section(s)). According to the habitat effectiveness values, Alternative B provides the greatest increases for deer and elk (Table 3-24). Habitat effectiveness values for Alternative C and Alternative D also improve over existing condition, but to a lesser degree than Alternative B. All action alternatives are consistent with Forest Plan Guideline 5.1-

3201 in that they result in increased habitat effectiveness for big game species for big game species.

Table 3-24 Habitat effectiveness values for deer and elk in Management Area 5.4 by alternative

Big Game Species	Forest Plan DFC¹	Alt. A	Alt. B	Alt. C	Alt.D
White-tailed deer					
Summer	.45 ²	.27 ²	.42 ²	.34 ²	.34 ²
Winter	.46	.26	.39	.31	.40
Mule deer					
Summer	.45	.35	.56	.45	.45
Winter	.46	.26	.43	.39	.43
Elk					
Summer	.54	.29	.48	.39	.38
Winter	.47	.26	.39	.31	.41

¹Forest Plan Guideline 5.4-3203 (treated as standard).

²Habitat effectiveness index.

All action alternatives improve suitability of some habitat components for big game species, for example by closing roads and maintaining cover by varying degrees depending on alternative. Prescribed burning proposed in Alt. B and C will improve quantity and quality of forage and browse, and stimulate regeneration of some hardwoods and pine understories. Overall, all action alternatives will improve habitat for big game, but to varying levels.

Roads And Travel Management

Forest Plan direction regarding roads and travel management Forest-wide specifies in Standard 9101 that “newly constructed Forest Development roads are open all year to appropriate motorized vehicle use, unless a documented decision shows ... seasonal travel restrictions are required ... to prevent unacceptable wildlife conflict or habitat degradation.” Guideline 9108 (treated as a standard) specifies that vehicle traffic ... will be restricted to roads and trails in riparian areas. The Forest Plan provides additional road and travel management direction specific to Management Areas, as shown in Table 3-25. Forest-wide road mileage and off-road vehicle access are included as monitoring items in the Monitoring Implementation Guide (USDA Forest Service 2001d).

Table 3-25 Forest Plan Management Area direction for motorized travel

Forest Plan Reference	Direction
Management Area 3.7	
Guideline 3.7-9103 (treated as Standard)	Off-road motorized travel is prohibited.
Guideline 3.7-9104 (treated as Standard)	Motorized travel is restricted to designed routes.
Management Area 4.1	
Standard 4.1-9101	Off-road motorized travel is prohibited.
Guideline 4.1-9102 (treated as Standard)	Motorized travel is restricted to designed routes.
Management Area 5.1	
Guideline 5.1-9101	Off-road motorized travel is allowed.
Guideline 5.1-9102	Motorized travel is allowed unless restricted by a project decision.
Management Area 5.4	
Guideline 5.4-9101 (treated as Standard)	Off-road travel may be restricted.
Guideline 5.4-9102 (treated as Standard)	Motorized travel may be restricted.
Management Area 8.2	
Standard 8.2-9101	Off-road motorized travel is prohibited.
Guideline 8.2-9102 (treated as Standard)	Motorized travel is restricted to designated routes.

The extensive road network in the Black Hills has multiple negative effects on wildlife habitat, including direct conversion of habitat to roads, construction in riparian areas and meadows, and decreased habitat quality for some species. Roads and associated motorized traffic negatively affect many wildlife species. Direct effects include roadkill, harassment, and disturbance, especially during critical periods like winter and the nesting season. Indirect effects on habitats include improved access for recreation and fuelwood cutting (which decreases snag densities), and poaching, as well as, riparian area degradation from illegal motorized vehicle use. Roads also facilitate the spread of noxious weeds, which displace native vegetation and cause increased expense and effort to control or eradicate. Such indirect effects apply to varied species such as bats, snails, small mammals, and many birds (USDA Forest Service 2000).

Roads displace habitat and their use can disturb wildlife and decrease habitat suitability and availability for most species, but especially big game. The HABCAP model incorporates road density along with the distribution of cover and forage to calculate habitat effectiveness. Effectively closing roads, either through seasonal or yearlong travel restrictions or road decommissioning (elimination), decreases the amount of vehicular travel and subsequent human disturbance, thus providing big game and other wildlife species relatively undisturbed habitats. Areas free from disturbance are particularly important during the critical winter period when animals are already stressed by weather conditions.

Big game habitat security and habitat effectiveness are reduced by the presence of roads and the human disturbance associated with them. Road access equates to an increase in the ‘vulnerability’ of big game to hunters as well as illegal poachers. Elk tend to avoid areas near roads with traffic, and human disturbance associated with roads, trails, logging, and other activities can influence elk habitat selection (Lyon and Ward 1982). Rowland et al. (2000) found

that cow elk in Oregon consistently selected areas away from open roads in both spring and summer during calving season. Klaver (2001) recently found that deer in the central Black Hills tend to avoid areas of human disturbance adjacent to roads and houses. Elk in Custer State Park responded to ATVs with long distance displacement from the disturbed area (Millsbaugh 1995).

The effects of roads on big game have been most studied with elk (Christensen et al. 1993) and deer, but it also applies to many other species of wildlife. For example, experts interviewed for the Phase I Amendment indicated roads negatively affect (from human disturbance or the roads themselves) sensitive plants, woodpeckers, American marten, bats, northern goshawk and several other bird species, snakes, butterflies and snails (USDA Forest Service. 2000). Nesting birds may abandon nests due to human disturbance, and roads can also present a physical barrier to some species like snails and small mammals. Roads can increase visibility and indirectly increase mortality from predation in species like amphibians and small mammals (USDA Forest Service. 2000). Vehicles can cause direct mortality from collisions with wildlife (e.g. big game, snakes, birds, small mammals, butterflies). Collisions with vehicles accounted for mortality of 1400 deer/year in the Black Hills during the 1990s (Parrish et al. 1996). Vehicles can be the cause of additional indirect mortality by allowing easy human access to hunt, poach, collect, or otherwise kill a variety of game and non-game species (USDA Forest Service. 2000).

The existing, overall open road density in the Prairie Project Area is 5.26 miles/square mile. Open road densities by Management Area are shown in Table 3-26 and Table 3-27. It should be noted that these densities differ somewhat from those shown in the Travel and Transportation Report due to differences in calculation methods. Road densities include all types of roads, from user-created two-tracks to paved highways, and assume that all existing road and area closures are ineffective. Unclassified roads, or user-created roads not maintained by the Forest Service, account for 45% or nearly half of all roads in the area. This level of roading is not required for any aspect of forest management and is detrimental in many ways to many species of wildlife.

Table 3-26 Winter/spring open road densities by management area, for each alternative

Road Type ¹	Management Area																Total Project Area ⁶ (excluding private land)				Private Land ⁷
	3.7 ²				5.1 ³				5.4 ⁴				4.1 and 8.2 ⁵				Alt. A	Alt. B	Alt. C	Alt. D	
	Alt. A	Alt. B	Alt. C	Alt. D	Alt. A	Alt. B	Alt. C	Alt. D	Alt. A	Alt. B	Alt. C	Alt. D	Alt. A	Alt. B	Alt. C	Alt. D					
P	0.64 ⁸	0.60 ⁸	0.60 ⁸	0.60 ⁸	1.66 ⁸	1.64 ⁸	1.64 ⁸	1.64 ⁸	2.03 ⁸	1.26 ⁸	1.52 ⁸	1.18 ⁸	5.56 ⁸	3.14 ⁸	3.21 ⁸	3.82 ⁸	1.84 ⁸	1.27 ⁸	1.45 ⁸	1.23 ⁸	3.29 ⁸
S	0.26	0	0	0	1.56	1.45	1.56	1.45	1.61	0.06	0.81	0.09	0	0	0	0	1.40	0.30	0.82	0.32	0
T	0.74	0.04	0.04	0.04	3.54	2.10	2.10	2.51	1.86	0.13	0.25	0.10	2.40	0.56	0.62	0.67	2.02	0.48	0.56	0.54	0.30
All roads	1.64	0.64	0.64	0.64	6.76	5.19	5.30	5.60	5.50	1.45	2.58	1.37	7.96	3.70	3.83	4.49	5.26	2.05	2.83	2.09	3.59

Table 3-27 Summer/fall open road densities by management area, for each alternative

Road Type ¹	Management Area																Total Project Area ⁶ (excluding private land)				Private Land ⁷
	3.7 ²				5.1 ³				5.4 ⁴				4.1 and 8.2 ⁵				Alt. A	Alt. B	Alt. C	Alt. D	
	Alt. A	Alt. B	Alt. C	Alt. D	Alt. A	Alt. B	Alt. C	Alt. D	Alt. A	Alt. B	Alt. C	Alt. D	Alt. A	Alt. B	Alt. C	Alt. D					
P	0.64 ⁸	0.60 ⁸	0.60 ⁸	0.63 ⁸	1.66 ⁸	1.64 ⁸	1.64 ⁸	1.64 ⁸	2.03 ⁸	1.26 ⁸	1.60 ⁸	1.70 ⁸	5.56 ⁸	3.14 ⁸	3.20 ⁸	3.20 ⁸	1.84 ⁸	1.27 ⁸	1.50 ⁸	1.58 ⁸	3.29 ⁸
S	0.26	0	0.08	0.03	1.56	1.45	1.56	1.56	1.61	0.06	1.33	1.08	0	0	0	0	1.40	0.30	1.18	1.00	0
T	0.74	0.04	0.04	0.07	3.54	2.10	2.10	2.51	1.86	0.13	0.30	0.21	0.40	0.56	0.62	0.67	2.02	0.48	0.60	0.83	0.30
All roads	1.64	0.64	0.72	0.73	6.76	5.19	5.30	5.71	5.50	1.45	3.23	2.99	7.96	3.70	3.82	3.87	5.26	2.05	3.28	3.41	3.59

¹P – Primary (>35 vehicles/week)

S – Secondary (10-35 vehicles/week)

T – Tertiary (0-10 vehicles/week)

²Based on 3858 acres or 6.03 square miles in Management Area 3.7.

³Based on 5182 acres or 8.10 square miles in Management Area 5.1.

⁴Based on 19486 acres or 30.45 square miles in Management Area 5.4.

⁵Based on 498 acres or 0.78 square miles in Management Areas 4.1 and 8.2 combined.

⁶Based on 29024 acres or 45.35 square miles of Forest Service land in the project area. It should be noted that densities across management areas are not additive.

⁷Based on 6301 acres or 9.85 square miles of private land in the project area.

⁸Road density calculated as miles per square mile.

Note: Open road densities shown in Tables above differ somewhat from those shown in the Travel and Transportation Report due to differences in calculation methods.

Compounding the effects of high road density and minimal hiding cover on big game and other wildlife species is the high level of recreational use the area receives year-round. The proximity of the Prairie Project Area to Rapid City, ease of access via paved highways, extensive system and non-system roading, and the large amount of interspersed private land results in high levels of on and off-road motorized and non-motorized use throughout the entire area, but especially in the eastern portions of the project area. The road system and ease of access lowers wildlife seclusion values by increasing the frequency and number of people that use the area. The road system fragments habitat and creates edges that adversely affect some species. Roads allow human access and thus human disturbance into areas where there would be almost none without the roads.

Recurring disturbance can negatively affect foraging, courtship, mating and reproductive activities of most wildlife species to varying degrees. During the critical winter months, this area generally does not receive sufficient snowfall to impede motorized access. The area is also a popular destination for ATVs year-round, which can adversely affect wildlife behavior and animal health by causing disturbance and harassment. The SDGFP recommended road and area closures and a reduction in road density in the Prairie Project Area to improve wildlife habitat quality and seclusion, particularly during the times of the year when wildlife are more vulnerable.

The increase in human visitation facilitated by the road system lowers wildlife seclusion, interferes with reproductive success, and can move big game and other species out of an area prematurely. People often bring pets (primarily dogs) on recreational visits that can harass and kill game and non-game wildlife. Access for illegal plant and animal collection is also made easier by roads. In general, roads tend to increase human visitation, which in turn decreases wildlife seclusion, interferes with reproductive success, and causes increased energy expenditures.

Finally, habitat availability and capability in an area is reduced by the fact that roads remove habitat. One mile of road, 20 feet wide equates to 2.4 acres of habitat loss. For the Prairie Project Area with 238 miles of roads on National Forest System lands, about 570 acres or nearly one square mile of wildlife habitat is lost due to roads, nearly half of which is due to unclassified roads.

The Prairie area is known to be home to Region 2 sensitive species like the northern goshawk, osprey, tawny crescent butterfly, and leopard frog, and is likely to provide habitat for other sensitive species such as the tiger salamander and red-bellied snake. The area is also known to provide habitat for two state threatened wildlife species, the mountain lion (also a management indicator species) and the American dipper. Mountain lions prefer unroaded areas for the seclusion they offer. Fecske et al. (In Press) determined that radio-collared mountain lions in the Black Hills avoid habitat near roads. The dipper is very habitat-specific in terms of foraging and nesting habitat; the Rapid Creek corridor is one of the few places on the Black Hills that provides suitable dipper habitat. The road system itself increases sedimentation into Rapid Creek, which affects foraging habitat, and the human disturbance introduced by the road system likely has negative effects, particularly on dipper reproduction. The majority of Region 2 sensitive plant species also inhabit draw bottoms or riparian areas. Such areas are often adjacent to roads and are negatively impacted by sedimentation from roads. There is also potential for negative

impacts to such species and associated habitats from the introduction of people via the road system.

A Roads Analysis Process (RAP) was conducted as an initial phase of the Prairie Project analysis. The RAP assessed the existing transportation system in the Prairie Project Area, as well as potential public safety and resource concerns. The RAP revealed opportunities to better balance the need for an efficient road system with the need of other resources, including wildlife and especially big game species. Refer to the Prairie Project File for additional information regarding the RAP analysis and conclusions. The results of the RAP were incorporated into the design and analysis of the action alternatives.

Alternative B proposes to decommission (eliminate) 59 miles of existing roads, and no new road construction is planned. Alternative B also proposes to close about 80% of the project area to off-road motorized travel year-round. Only the northwest portion of the Prairie Project area (Management Area 5.1) would be open year-round to off-road motorized vehicles. Alternative B results in the lowest road density of all action alternatives, during both summer/fall and winter/spring. Alternative B would provide the most security, least disturbance, and best habitat quality overall of all the action alternatives. Refer to Table 3-26 and Table 3-27 for open road densities by management area for each alternative.

Alternative C proposes to decommission (eliminate) 50 miles of existing roads, and three miles of new construction are planned. Alternative C also proposes yearlong restrictions to off-road motorized use in about 30% of the area along the Rapid Creek corridor (primarily Management Area 3.7), winter/spring road and off-road closures in about 40% of the area in the southern portion of the project area (primarily Management Area 5.4), and the remaining 30% of the area Management Areas 5.1 and 5.4) would be open year-round to motorized use. The portions of Management Area 3.7 along Victoria Creek and Prairie Creek are included in the winter/spring road off-road closure area proposed in Alternative C. Alternative C is therefore inconsistent with Forest Plan Guideline 3.7-9103 (treated as a Standard), which prohibits off-road motorized travel in Management Area 3.7. Alternative C results in the highest road densities of the action alternatives during the winter/spring and second highest density during summer/fall. Alternative C would provide the least security, most disturbance, and lowest habitat quality during the winter/spring of all the action alternatives.

Alternative D proposes to decommission (eliminate) 55 miles of existing roads, and one mile of new construction is planned. Alternative D also proposes yearlong restrictions to off-road motorized use in about 15% of the area along the Rapid Creek corridor, 20% of the area would be open year-round to off-road motorized travel in the northwest portion of the project area (Management Area 5.1), and the remainder of the area would be closed to off-road motorized use during the winter/spring (Management Area 5.4). Alternative D results in winter/spring road densities very similar to Alternative B, but would have the highest density of roads during summer/fall of all the action alternatives. Alternative D would provide the least security, most disturbance, and lowest habitat quality overall during the summer/fall of all the action alternatives. Effects during the winter/spring would be quite similar to Alternative B. Selected roads would remain open year-round throughout the project area in all action alternatives. Roads proposed to be closed yearlong would still allow administrative access for

activities such as fire suppression and noxious weed treatment. Winter/spring seasonal road and area closures are intended to maintain security for big game and other wildlife during the critical winter months. Road decommissioning (elimination) consists of physically altering at least the initial portion of the road to render it impassible to motorized vehicles (e.g. with berms, ditches, ripping, recontouring, etc.). In addition, areas closed to motorized vehicles provide opportunities for hunters who prefer a walk-in experience, as well as other users seeking opportunities for non-motorized recreation like hiking and mountain biking. Road closures and decommissioning (elimination) proposed in all action alternatives would substantially benefit wildlife and wildlife habitat, as compared to the No Action Alternative, regardless of the action alternative selected.

Migratory Birds

Alternative A would have no short-term or direct impacts to any migratory birds and other landbirds or their habitat. The action alternatives would move stand densities and tree species composition in the Prairie Project Area towards earlier successional stages by varying degrees (Table 3-12), which may result in a change in bird species composition in those areas. However, sufficient foraging habitat, hiding cover, and nesting habitat exists within and adjacent to the project area for migratory birds and other landbirds. Although species composition may change, nesting attempts may fail, or individuals may be displaced to other areas as a result of project activities, overall numbers of migratory birds and other landbirds would not likely change.

Edge, Interior Habitat, and Fragmentation

There is a concern that fragmentation of wildlife habitat will result in species becoming imperiled through isolation of individuals of the same species or result in increased susceptibility to predation. This has occurred in some parts of the United States where large areas of natural habitat have been converted to agricultural lands or urban areas. The forests of the Black Hills have evolved under a heavy influence of fire, insect, and disease activity (Parrish et al. 1996). That evolution, combined with the variation in terrain, aspect, and geology has resulted in forests with a wide variety of vegetation structure and composition, varying densities, and abundant forest/meadow edges.

While vegetation treatment (timber harvest or prescribed burning) does change patch size and vegetation structure, this is not the type nor degree of fragmentation that is likely to result in a loss of species viability. This type of fragmentation more closely resembles the pattern of natural variability found in many western forests. There have been no species identified in the Black Hills for which there is agreement that habitat fragmentation is considered a threat.

Endangered, Threatened, Proposed, and Sensitive Species

A Draft Biological Assessment/Biological Evaluation (BA/BE) has been completed for the Prairie Project Area and can be found in the Project File. The effects of the various alternatives and activities proposed were evaluated for all endangered, threatened, proposed, and sensitive species and their habitats.

According to the U.S. Fish and Wildlife Service website (southdakotafieldoffice.fws.gov), the bald eagle (threatened) and the black-footed ferret (endangered) are federally listed species for which potentially suitable habitat may occur in the Prairie Project Area. There is no suitable habitat for the black-footed ferret, but the bald eagle occurs as a winter resident or seasonal migrant. A determination of “No Effect” was made for the bald eagle for all alternatives in the Prairie Project Area.

Region 2 sensitive wildlife species known to occur in the Prairie Project Area include northern goshawk, osprey, Townsend’s big-eared bat, leopard frog, Black Hills redbellied snake, tawny crescent butterfly. Other sensitive wildlife species that may occur in the project area include dwarf shrew, fring-tailed Myotis, pygmy nuthatch, black-backed woodpecker, three-toed woodpecker, Lewis’ woodpecker, fox sparrow, merlin, upland sandpiper, loggerhead shrike, milk snake, tiger salamander, and regal fritillary butterfly. *Arnica lonchophylla* was the only Region 2 sensitive plant species found during surveys of the project area.

For Region 2 sensitive species, all action alternatives either will have no impact, may beneficially impact, or may adversely impact individuals but is not likely to result in a loss of viability in the Black Hills, nor cause a trend to federal listing or a loss of species viability range-wide. All known locations of Region 2 sensitive species will be protected through Forest Plan Standards and Guidelines. Mitigation measures specified in the Draft BA/BE will further protect habitats and individuals.

Threatened, endangered, and Region 2 sensitive species, both plant and animal, are included as monitoring items in the Monitoring Implementation Guide (USDA Forest Service 2001) to be monitored Forest-wide as directed by the Forest Plan. Refer to the annual Monitoring Reports (USDA Forest Service 1998 through 2001) for monitoring results and additional information.

CUMULATIVE EFFECTS

Cumulative effects take into account activities or events through time (past, present, and reasonably foreseeable future activities), and through space (activities on adjacent Forest Service lands as well as private lands). The Forest Plan addresses the Forest as a whole in terms of cumulative effects at the landscape scale. Effects considered include those from such activities as timber harvest, recreation, livestock grazing, and the socio-economic changes that may occur when Forest Plan Standards and Guidelines are implemented Forest-wide. For the Prairie Project, the area analyzed for cumulative effects is the project area. The size of the cumulative effects analysis area is large enough to include the home range of wildlife species considered. Cumulative effects vary among species due to the diversity of habitat required by the various species. Vegetation treatments in the Prairie Project Area would improve habitat for some species at the expense of others. Proposed activities that may contribute to cumulative effects include non-commercial and commercial timber harvest, prescribed burning, and road and travel management (reconstruction, decommissioning, closures, etc.)

Numerous past events and activities have influenced the condition of wildlife habitats in the Prairie Project Area. Past activities or events considered include fire suppression, wildfires, timber harvest, mining, weather-related events, livestock grazing, insect infestations, and

residential development. Some of these activities or events have been affecting the project area for over 100 years. Perhaps the most influential effect on wildlife habitat in the Black Hills and the Prairie Project Area has been suppression of wildfire. Historically, more open pine stands interspersed with meadows, shrubs, and hardwoods dominated the Black Hills as a result of relatively frequent low-intensity fires. A century of fire suppression has resulted in increasingly dense and dominant pine communities with higher levels of natural fuels characteristic of later successional communities. Fire suppression has also caused reductions in early successional communities like meadows, shrubs, and hardwoods due to encroachment of conifers. Species associated with early successional conditions and communities have been negatively affected by fire suppression, while species associated with later successional conditions and communities have benefited. Fire suppression will continue to influence habitats in the Prairie Project area, regardless of alternative selected.

Timber harvest initially occurred the area in the late 1800s, and during the last two decades, commercial and non-commercial treatments have occurred on about half of the NFS lands in the project area. Refer to the Silvicultural Report for further discussion of past vegetation treatment activities in the Prairie Project Area. Cumulative effects of past and current timber management activities include moving much of the dense, mature conifer forest that resulted from fire suppression toward younger, more open stands. Older, larger diameter class stands were harvested, and medium-aged stands were precluded from achieving late successional character through treatment. Commercial and non-commercial treatments proposed in the Prairie Project Area would continue this trend by setting back succession relative to the acreage treated, thus further contributing to cumulative effects of past timber management activities. Harvest treatments proposed in Alternative C would result in the greatest increase in younger, more open stands among the alternatives, while treatments proposed in Alternative B would result in the least increase. The No Action Alternative would not contribute to cumulative effects of past harvest. The change from mature, dense forest to younger, open canopy forest has benefited species associated with those habitats such as foraging big game and foraging goshawk. Conversely, species associated with mature, closed-canopy pine such as the brown creeper, black-backed and three-toed woodpeckers, and nesting goshawk have been negatively affected. Past treatments have also affected snag densities by decreasing the number of trees available to become snags. Insect and disease control and firewood gathering have also reduced snag densities. Firewood gathering regulations on the Forest were modified in 2000 to restrict cutting of snags, which should result in increased snag densities throughout the Forest, including the Prairie Project Area, over time.

The Prairie Project Area has thus far been largely unaffected by recent wildfires across the Black Hills. Numerous, primarily small wildfires have occurred in and adjacent to the project area over the past several decades (larger fires include Westberry Trails Fire, Boone Draw Fire, Horse Creek Fire, and Battle Creek Fire). Proposed activities, including commercial and non-commercial harvest and prescribed burning, have been specifically designed to substantially reduce the potential for catastrophic wildfire in the Prairie Project Area. The extent of that reduction is directly related to the type of treatments and acreage affected as proposed in each action alternative. Wildfire potential would be reduced the most with Alternative C, the least with Alternative B, and increase in Alternative A. Refer to the Fire and Fuels Report for the Prairie Project Area for additional discussion of wildfire and effects of proposed treatments.

Catastrophic wildfire can drastically alter or eliminate wildlife habitat for most species long-term, and recovery of soils and vegetation can take decades. The reduction in potential for devastating wildfire as a result of proposed activities is expected to benefit habitat for all wildlife species.

The 1972 flood affected riparian and stream habitats, particularly in the Rapid Creek drainage. Stream channels and banks were altered by high flows and large debris swept along by floodwaters, riparian vegetation was destroyed, soil and sediment depositions were removed, and boulders and other debris was deposited in stream channels. Most riparian habitats affected by the 1972 flood have likely recovered to a large degree by now. Construction of the Pactola Reservoir altered stream flows, especially during drought, and resulted in changes to water temperature, riparian community health, and changes to associated biota. Past over-harvest of beaver has also negatively affected riparian habitats and stream flows. Watershed improvement projects proposed for the Prairie Project Area are expected to benefit stream and riparian communities. Alternative A represents a continuation of the current condition of these habitats. Proposed activities are similar in all action alternatives, so effects would also be similar. Refer to the Watershed Report for additional discussion of effects of past activities and events on streams and riparian resources.

Livestock grazing has occurred in the Prairie Project Area for at least the past 100 years, on both private and public lands. Intensive grazing likely occurred initially, resulting in altered plant communities favoring less palatable species, decrease or loss of the shrub component, and degraded riparian habitats. The current, much improved grazing practices of the past 20-30 years have allowed most areas to recover from impacts of early intensive grazing, but impacts do still occur on both National Forest System land and private land. Effects of grazing would be the same under all alternatives, including the No Action.

Roads displace habitat and their use can disturb wildlife and decrease habitat suitability and availability, especially for big game species. High road densities makes the forest more easily accessible, facilitates poaching, illegal removal of snags for firewood, and results in increased disturbance to all wildlife species. Road densities have increased cumulatively through time in the Prairie Project Area as a result of vegetation management activities, access for private lands, and recreational demands. Alternative A represents a continuation of the current high road densities and ineffective road closures in the area. Road closures and year-long off-road restrictions proposed in Alternative B would have the greatest positive impact, while year-long and seasonal restrictions proposed in Alternative C would have the least benefit of the action alternatives to wildlife resources. Effective road closures, off-road restrictions, and decommissioning (elimination) proposed in all action alternatives would substantially benefit wildlife and wildlife habitat.

Present and reasonably foreseeable future activities are those activities currently occurring or ongoing in the project area. These activities include continued fire suppression, additional actions to manage forested stands for health and timber products, road maintenance, noxious weed treatments, livestock grazing on both private and National Forest System lands, residential and road development on private lands, and recreation. Recreational activities include fishing, hunting, hiking, camping, ATV and dirt bike riding, horseback riding, and mountain biking.

Residential development on private lands and recreational use of the area (especially ATV use) is expected to increase, along with associated trails and user-created roads. Increased use correlates with increased disturbance to wildlife.

Like much of the Black Hills, the Prairie Project Area was homesteaded and subject to patenting of mining claims in the late 1800s and early 1900s. Most of the land that was homesteaded was along streams and in meadows of valley bottoms. Much of the land currently in private ownership therefore encompasses creeks and riparian areas. Of the 6,301 acres of private land included in the Prairie Project Area, it is estimated that 792 acres (13%) consist of developed property with structures and other improvements. Approximately 1,815 acres (29%) of private land supports meadows, and the remaining 3,685 acres (58%) support ponderosa pine forest. Approximately 80% of the pine on private land is considered to be in the 4B structural stage. About 500 acres of private land have been treated in the past 25 years. Community and rural housing development has supplanted many acres of wildlife habitat, including prime winter range elevational migrants like deer and sharp-tailed grouse. This conversion may limit winter habitat availability during critical periods of the year for some wildlife species (Parrish et al. 1996).

SOCIAL ENVIRONMENT

This section will describe the affected environment and environmental consequences for each alternative to the Social Environment (Travel and Recreation Use, Visuals, Special Uses, Heritage, and Social and Economic).

TRAVEL and RECREATION USE

Affected Environment

The Prairie Project Area lies along the eastern edge of the Black Hills. It is located on National Forest System Lands within the wildland-urban interface west of and along the outskirts of Rapid City, SD. Because of its proximity to Rapid City and centralized location in the Black Hills area, it very likely receives more dispersed recreation use than any other part of the Black Hills National Forest. Most of this use is by local Rapid City residents and those living within and adjacent to the Project Area. The area population is rapidly expanding at an average of 10% over the past 10 years. Approximately 7,500 people live within or directly adjacent to the Project Area.

The Project Area provides great scenery and abundant dispersed recreation use in a setting that is close to town or, for some, right out their back door. Topography consists of canyons, ridges, hills, and gently sloping terrain. It is heavily forested with ponderosa pine, and includes areas of hardwoods and grasslands. Heaviest recreation use is in the non-winter months, but the typical low snowfall levels in this area also encourages use in the winter.

The project area is heavily roaded. The amount, location, and type of roads and trails within the area directly affect recreation use. This also applies to areas open and closed to off-road motorized use. Motorized and non-motorized use is intermixed throughout the area. There are strong opinions and preferences regarding the proper level and mix of motorized and non-motorized use in this and other areas within the Black Hills.

Tourists also enjoy and use the Prairie project area, primarily to view scenery along the main road corridors that access the interior of the Black Hills. Heavy tourist traffic in the summer on Highway 385 along the western project boundary averages 1,240 vehicles per day. Significant amounts of tourist traffic in the summer traveling east to west along scenic Highway 44 (Rimrock Scenic Highway) averages 1,285 vehicles per day. Sheridan Lake Road (Hwy 228) averages 700 vehicles per day along the south and east boundaries of the project area (SD DOT, 2000-2002 traffic counts).

Motorized Opportunities

The Black Hills National Forest is an “Open Forest”. This means the public may drive off-roads unless the area is either designated as closed to or seasonally restricted from motorized use, or if the motorized use “damages or unreasonably disturbs the land”. This approach used on the Black Hills NF is different than that used on many other Forests throughout the country. On most Forests areas are closed to or restricted from motorized vehicle use unless specifically designated open. This open approach also results in confusing situations whereby a road might be closed to motorized use seasonally or yearlong for resource protection reasons but the area surrounding the road is open to motorized use. In these cases, driving on the road is not permitted but driving adjacent to the road is allowed.

Frequent motorized use of off-road areas often leads to the creation of new roads and trails. This complicates the distinction between road and off-road motorized use. Many roads and trail systems in this area are actually created by recreation users. That is, they begin as cross-country (off-road) use and develop into new roads through continued use. In this way, the number of roads and motorized trails has continued to grow over time.

The project area encompasses 55.2 square miles and includes approximately 292 miles of existing roads (see Appendix E, Map 18). This includes State and County Highways, private roads, high and low standard Forest System Roads (FSR) and unclassified roads. Unclassified roads constitute half of area roads and are generally created by users or are old skid trails. Average open road density within the project area varies by season, ranging from 3.1 miles per square mile during the winter-spring (December 15 to May 15), to 4.0 miles per square mile during the summer-fall (May 15 to December 15). The total road density for the area, which includes both open and closed or restricted roads, is 5.3 miles per square mile

Thirty-three gates restrict travel on roads. Twenty-nine gates close 72 miles (25 percent of the road miles) yearlong to motorized use and four gates restrict motorized vehicles from using 46 miles (16 percent of road miles) from December 15 to May 15 each year. These road closures were implemented to reduce disturbances to wintering wildlife and to minimize road damage and erosion. Attempts have been made to eliminate some unclassified roads by blocking the entrance

with rocks or berms or placing logs and other debris along the route. Some of these efforts have been successful while others have not.

Approximately 22,000 acres or 76% of the 29,024-acres of National Forest area is open to off-road use yearlong. Seven special orders defining yearlong area closures totaling 6,994 acres or 24% of the area prohibit motorized vehicles from traveling off road (see Appendix E, Map 18). Closures were implemented to reduce resource damage from motorized vehicles going off roads, protect watersheds, wildlife, and archaeological sites. Motorized vehicles must stay on designated roads yearlong in these areas: Victoria Area Closure, Victoria Creek Permanent Area Closure, Buzzard's Roost Area, Shanks Quarry Reclamation Area, McVey Wildlife Closure, Management Area 3.7 along Rapid Creek, and the Pactola Developed Recreation Concentrated Use Area. The boundaries of these closure areas can be difficult to determine on the ground.

Some of the motorized closure restrictions are very effective. Others are partly so, while some are totally ineffective. Factors that influence the effectiveness of motorized travel restrictions include: topography, vegetation, location of gates or other barriers, proximity to private land, historic use patterns, public attitudes, adequacy of agency information, signing and maps, and enforcement. Closures and restrictions are least effective on flat or gentle terrain near openings or where trees are widely spaced adjacent to gates, or where barriers are placed in a location where it is easy to simply drive around the gate/barrier. Adjacent homeowners sometimes make their own roads or travel off-road from their property to bypass gates or other closure devices.

Non-Motorized Opportunities

Eleven miles of designated US Forest Service hiking trails are located within the project area. This includes 10 miles of the Centennial Trail, a Nationally Designated Recreation Trail, and one mile of the Deerfield Trail. Both trails are located in the far western portion of the project area. Three maintained trailheads service these trails. Only non-motorized uses are allowed on these trails and include hikers, mountain bikers and horseback riders. Many ATV's and dirt bikes illegally use both trails in this area due to the accessibility of the trails, lack of knowledge on the uses allowed on the trails, and because the trails provide the recreation experiences some motorized users prefer. Non-motorized use is allowed everywhere within the project area, both on roads and trails and cross-country. Twenty four percent of the project area provides opportunities more likely suited to non-motorized users because motorized use is prohibited here yearlong.

Motorized And Non-Motorized Recreation

Recreation use in the project area continues to grow. The most popular recreational activities are dispersed in nature and include viewing scenery and wildlife, hunting and fishing, driving for pleasure or sport, hiking, and mountain biking. One of the fastest growing activities in this and other areas of the Black Hills is driving Off Highway Vehicles (OHV's), such as all-terrain vehicles, dirt bikes and 4x4 trucks and jeeps.

There are no developed campgrounds, picnic areas, or other sites on National Forest System lands in the project area. The Pactola Concentrated Public Use area, adjacent to the western

portion of the project area, contains many developed facilities such as campgrounds, paved trails, swim beaches, boat launches and picnic areas. There are commercial caves and other private developed recreation and tourist facilities on private lands within and adjacent to the Project area.

The increase in recreation use and the types of uses within the Prairie Project Area is similar to that observed in National Forest and nationwide recreation surveys in recent years. Overall, participation in outdoor recreation activities has been taking an upward trend in the United States since 1983. The top five most popular recreation activities on 61 National Forests surveyed from 2000-2002 include viewing natural features, general relaxing, viewing wildlife, hiking and driving for pleasure (NVUM survey 2002). The top five most popular outdoor activities nationwide on federal, state, county and city lands include backpacking, bird watching, hiking, snowmobile use and off-road driving. The sixth fastest growing group of activities over the past 20 years include off-road driving, driving for pleasure and sightseeing. This includes the 37 million people who enjoy off-road driving using 4 wheel vehicles, all terrain vehicles, or motorcycles (NSRE, 2002).

The predominant recreational activities that users pursue within the project area include the following:

- Viewing scenery and wildlife is one of the top recreational pursuits in the area. Both motorized and non-motorized users value this activity.
- Hunting is a seasonal activity that occurs throughout the area during the fall and spring months. Deer, elk and turkeys are key game species in the area. Both motorized and non-motorized users value this opportunity.
- Fishing for trout, primarily along Rapid Creek, is a very popular activity in the area. This includes the catch-and-release area beneath Pactola Dam, and at a number of access points downstream. Several outfitter guides and the general public value the opportunity to participate in this activity. Many fishermen drive to a parking area and then walk to a more secluded spot to enjoy fishing.
- Dispersed camping is found normally on the back roads away from noise and heavily used motorized traffic areas and along the Centennial Trail. Most forest visitors drive to a site and then set up camp, mostly in hunting season. Although, non-motorized users along the Centennial Trail also camp. Both groups value the opportunity to participate in this activity.
- Mountain bike riding is very popular in the area. Every summer for the past 12 years the local mountain bike club has maintained racecourses in the Victoria Area and Norris Peak areas. These races are permitted under a permit with the Forest Service. The opportunity to enjoy the area by this group and others is highly valued.
- Hiking is a popular activity along the Centennial and Deerfield trails in the western portion of the analysis area. Hikers either drive to one of the three trailheads providing access to these trails or just pass through the area on the trails. Hikers also enjoy walking on roads closed to motorized vehicles and cross-country through the woods. Hikers either drive to the area and find a place to park, often in front of or next to a gate, or, walk out their back door onto the Forest.

- Other activities include berry picking, fuel wood gathering, Christmas tree cutting, gold panning, and rock climbing. Recreational gold panning is limited in locations found along Rapid Creek on National Forest System lands. Rock climbing is very popular, especially on the limestone cliffs at Falling Rock just off Highway 44. Some routes receive abundant sun in the winter, thus allowing for climbing yearlong. Gathering wood products is appealing and valued by the local public because of its close proximity to their homes.
- Challenging the riding skills of dirt bike, all terrain vehicle, and modified 4X4 users is a popular activity in the area. These motorized users strongly value the opportunity to pursue this activity. This is evidenced by the large amount of unclassified roads and trails used in the area and the number of these vehicles owned by residents in the project area. They value the opportunity to experience both road and “ad-libbing” challenges.
- Target shooting occurs randomly across the project area, although a few popular spots exist. Target shooting is highly valued activity for users to sight in their rifles before hunting season and to test their skills on targets.
- Partying is a common activity within the area, particularly among teenagers and young adults, who drive some distance away from main roads to avoid being seen. This activity is often associated with littering of bottles, cans and other trash, and illegal campfires.

The many different dispersed recreation activities that occur within the Prairie project area depend on both motorized vehicles and non-motorized transportation for access to and enjoyment of the area. Motorized users access and use the area in vehicles that include stock vehicles (sedans, vans, pickups and motorcycles) that travel on roads; and four-wheel drive vehicles (modified jeeps and other 4x4 vehicles), all-terrain vehicles (ATV’s), and motorbikes (dirt bikes) that may use roads or off road areas. Most non-motorized users access the area in a motorized vehicle then park at a trailhead or off a main road and hike, mountain bike, and horseback ride. Some non-motorized users ride bikes or walk from their homes within and adjacent to the project area to pursue their activities. Both motorized and non-motorized users are interested in off-road type experiences that include designated areas for exclusive users only.

Often times both motorized and non-motorized users pursue the same recreational activity. Hunting is a good example. Some hunters prefer walk-in areas closed to motorized use for a quieter, more natural setting, and become upset when someone drives by them while hunting. Other hunters prefer to scout game from motorized vehicles and have the opportunity to drive up and retrieve their game. Another example is viewing scenery, the top recreational pursuit nationwide and a popular activity within the project area. Some users enjoy viewing scenery while driving in a vehicle, while others prefer to park their vehicle and then view on foot or mountain bike along a trail or in the backcountry.

Recreation users can be separated into five distinct groups that have specific preferences. The activities they pursue are often the same as stated above. The exact figures on what percentage of the total recreation users fall into each of the five groups is not known. However, past management practices, road building, and established uses in the area have created an environment that more closely meets the motorized user preferences. Area users recommended that a distinction be made between all terrain vehicles, dirt bikes and 4x4 vehicles. Each of these

user groups prefer different types of experiences and value different riding opportunities (see Table 3-28).

Table 3-28 Recreation Users and their Preferences and Uses in the Prairie Project Area

User Group	Method of Travel	Experience Preferences	Trail or Road Preferences	Forest Uses	Time of Year Uses Occur
Motorized	Dirt Bikes	<ul style="list-style-type: none"> • Backcountry • No all terrain vehicles or jeeps on trails (to keep the trails single track) 	Single Track and cross-country “adlibbing”	<ul style="list-style-type: none"> • Scenic Rides • Wildlife Viewing • Berry Picking • Challenge Motorbike riding skills 	All Year
	All Terrain Vehicles (ATV)	<ul style="list-style-type: none"> • Varied Topography • Varied roads and trail types • Share roads and trails with all other users 	<ul style="list-style-type: none"> • Lower Level Roads • Some Trails • Cross Country 	<ul style="list-style-type: none"> • Hunting • Challenge their riding skills • Racing • Scenic Riding • Fishing 	All Year
	Modified Vehicles	<ul style="list-style-type: none"> • Backcountry • Varied Topography • Varied roads and trail types • Share roads and trails with all other users • Rocky areas 	<ul style="list-style-type: none"> • All level roads to access rock crawl areas • Rocky areas for challenging their skills 	<ul style="list-style-type: none"> • Viewing Scenery • Challenge their driving skills and vehicle modifications • Picnicking • Fishing • Berry Picking 	Primarily Non-Winter
	Pickups and Cars “stock vehicles”	<ul style="list-style-type: none"> • Rural setting • Varied scenery • Safe logical routes 	<ul style="list-style-type: none"> • Maintained gravel roads • Asphalt roads 	<ul style="list-style-type: none"> • Viewing Scenery • Gathering forest products 	All Year in good weather
Non-Motorized	<ul style="list-style-type: none"> • Mountain Bikes • Foot • Horseback 	<ul style="list-style-type: none"> • Natural Backcountry • Solitude • See or Hear little or no motorized uses 	Single Track	<ul style="list-style-type: none"> • Biking • Hiking • Horseback Riding • Hunting • Fishing • Camping • Backpacking • Wildlife Viewing • Nature Study 	Primarily non-Winter

Some of the users concentrate their activities in favorite spots that are very important to them. Residents living within and adjacent to the area enjoy being able to walk or drive into the area

from their back door. Others appreciate that the short distance from their homes within the city or surrounding vicinity allows them to quickly access the area.

There is strong support among most users to maintain road and off-road motorized access that supports much of the dispersed recreation use in the area. There is also strong support among many users to have areas that are free from motorized use so they can enjoy the activities that are important to them.

The Prairie Project Area is classified as Roaded Natural under the recreation opportunity spectrum. This means that a motorized or non-motorized user has a moderate to high chance of seeing or hearing other users and uses in the area along roads, and low to moderate frequency on trails and in the backcountry (see Scenery Management section in this chapter).

Along with the positive aspects of abundant dispersed recreation opportunities, however, are undesirable actions and negative effects to natural resources. These effects are invariably tied to motorized access into the area. The better the access the more these undesirable actions and negative effects occur. These actions are committed by a small group of people, and spoil the area and experience for the majority of users. Such actions include:

- Trash dumping includes household garbage, lawn and yard wastes, used appliances, abandoned vehicles, hazardous wastes such as paint, batteries and refrigerator coolant, and empty cans and bottles. It also includes discarded shooting targets such as paper plates and clay pigeons, broken bottles, empty shell casings and other trash left at target shooting areas.
- Illegal campfires are abundant throughout the area, often associated with illegal parties, and typically are accompanied by trash such as that found at target shooting areas and trash dumpsites.
- Vandalism includes shooting and destroying signs, damaging gates, cutting fences, and intentionally killing trees during target practice.
- Damage to soils and water resources includes rutting and soil compaction from motorized use in wet areas especially when it is associated with mud bogging (driving through muddy water with 4x4 vehicles), soil erosion from overuse, poorly located or unmaintained roads and motorized trails, and effects to stream channels from crossings on some road and motorized trail segments.
- The spread of noxious weeds along travel routes is increasing due to more users and a lack of education concerning weed identification and their methods of transport.
- Disturbance to wildlife from the noise and presence of motorized vehicles varies according to species and time of year.

Environmental Consequences

Effects Common To All Alternatives

The amount, location, and quality of roads and trails, and areas open to off- road motorized use directly influence the public's recreational opportunities in the Prairie Project Area. The

different approaches to travel management in each alternative would change future recreational opportunities and land uses of motorized and non-motorized users. All alternatives would result in changes to recreation use and motorized and non-motorized access. Some of this change is a result of actions directed by each alternative. Some are the result of overall trends that are not directly influenced by the alternatives, such as increasing population, an increase in outdoor recreation activities, and increasing sales and use of Off Highway Vehicles (OHV) such as ATV's, dirt bikes and 4x4's.

For all alternatives, the Forest Service would continue to repair and maintain roads and trails under its jurisdiction. New and existing user-created roads that are causing resource damage would be rehabilitated or removed. Emergency restrictions would be implemented as needed, such as temporarily closing roads during wet conditions to prevent rutting and erosion, or closing an area to off-road motorized use during periods of high fire danger. The Forest Service would continue to patrol and enforce regulations to protect surface resources. None of the alternatives affect State, County or private road management. All areas of the Forest within the project area would remain open to non-motorized use such as hiking, biking and horseback riding cross-country.

The recreational opportunities resulting from actions in each alternative can be measured on the basis of motorized and non-motorized travel management scenarios as presented in Table 3-29. The baseline (existing) condition is presented as Alternative A. Each alternative is compared to this baseline.

Table 3-29 Travel and Recreation Comparisons by Alternative

Travel and Recreation Parameters	A	B	C	D
Total Miles of Roads and Motorized Trails	292	206	233	230
Miles of Roads and Motorized Trails Open Winter-Spring (Dec 15-May 15) to Motorized Use	173	128	172	131
Miles of Roads and Motorized Trails Open Summer-Fall (May 15-Dec 15) to Motorized Use	219	128	186	191
Percent of the Area Open Winter-Spring (Dec 15-May 15) to Off-Road Motorized Use	76%	18%	29%	18%
Percent of the Area Open Summer-Fall (May 15-Dec 15) to Off-Road Motorized Use	76%	18%	68%	85%
Miles of Non-Motorized Trails	11	49	33	20

ALTERNATIVE A

This alternative is responsive to those users who do not want to see a change in current travel management and recreational opportunities in the area. It also serves as a baseline from which to compare other action alternatives.

Motorized Opportunities

Direct Effects

There would be no direct effects to road and off-road motorized use under Alternative A. This alternative would not directly result in any increase or decrease in the 173 miles of roads open for motorized use during the winter-spring period (Dec 15-May 15), and the 219 miles of road open summer-fall (May 15 to December 15). It would not directly affect 76 percent of the area that is currently open on a yearlong basis for off-road motorized use (see Appendix E, map 18).

Indirect Effects

There are a number of indirect effects resulting from this alternative. These indirect effects are largely the result of a growing population and a rapidly expanding use of OHV's. New recreation user-created roads would be developed over time in areas open to off-road motorized use. Some of these new user-created roads would be developed along paths where private landowners within the project area enter and exit their property. The increase would likely be fairly small compared to the existing road system, but could grow by several miles a year. This would indirectly increase the overall road density in the area.

Current off-road area closures would continue in seven areas. The effectiveness of these closures would vary based on a number of factors, including proper boundary signing, public support, and law enforcement patrols. Non-motorized users such as hikers and mountain bikers would continue to use these closure areas.

Cumulative Effects

The general trend in recent years is to close roads and off-road areas to motorized use either seasonally or yearlong within the Black Hills National Forest. Some of these closures are the result of recent wildfires where soil, water and wildlife protection required closures. Other limitations on motorized use have been the result of implementing Forest Plan guidelines, as project areas are analyzed and site-specific decisions made. Because Alternative A does not change the existing travel management direction for this area, it would not contribute to this cumulative effect.

Non-Motorized Opportunities

Direct and Indirect Effects

There would be no new trail construction or area closures limiting use to only non-motorized users under this alternative. Regular maintenance would continue on the existing 11 miles of non-motorized trails.

Cumulative Effects

Use and enjoyment of non-motorized trails for hiking, biking and horseback trails can be affected by the proximity to motorized use. As motorized use expands within this area and other areas of the Black Hills, overall satisfaction for non-motorized trail use may decline.

Motorized And Non-Motorized Recreation

Direct and Indirect Effects

There are no direct effects on dispersed recreation opportunities from this alternative. No changes would be made in access or travel management that would directly affect recreation use. Indirect effects would result from a growing population, increasing trend to participate in outdoor recreation activities, and a rapidly expanding use of OHV's.

All current types of dispersed recreation would continue. Those activities that rely on motorized access, such as driving for pleasure or sport would see an increase in use. Activities such as fishing, rock climbing, and dispersed camping likely would see no effect from this alternative. Hunters who desire a more motorized experience - driving the roads, short walks, motorized game retrieval - would not be affected and would probably see increased access over time as additional recreation user-created roads are developed. Hunters who desire a more non-motorized experience - longer hikes, less noise, less disturbance during the hunt and to wildlife - would see a gradual decline in their hunting opportunities.

Because of the relatively high open road density and large areas available for off-road motorized use, this alternative should meet the desires of many motorized users, including those that drive stock vehicles, ATV's, and 4x4's. Specific types of motorized use would be affected in different ways.

- Dirt bike users prefer open areas for ad-libbing, and single-track use secured from wider motorized vehicles. Users feel that the project area is one of the best for dirt bike ad-libbing and single-track on the entire Black Hills National Forest. However, their single-track opportunities would be compromised when ATV's widen the single tracks which leads to jeep and pickup use.
- Modified vehicles, stock vehicles and ATV users prefer a diverse road system and an opportunity to experience off-road riding. These vehicles would continue to travel on existing open roads and open off-road areas. New recreation user-created roads would also be available for use, primarily by OHV's.

Negative effects related to motorized access - partying, littering, trash disposal, vandalism, damage to soils and water resources, spreading of noxious weeds, and disturbance to wildlife would increase over time. These indirect effects would negatively affect the use and enjoyment of the area for many recreation users.

This alternative would likely not meet the desires of many non-motorized users such as hikers, mountain bikers and horseback riders who prefer opportunities away and separate from motorized use areas. Some users seeking more secluded, quiet, non-motorized experiences would move to other areas for their recreation activities. Generally, this would cause them to travel further to enjoy these types of experiences.

- Hikers and horseback users in the area prefer a quiet, natural setting free of motorized use and activities. Alternative A gives them less opportunity to enjoy these activities. This is partly because the Centennial and Deerfield trails prohibit motorized use but the area

adjacent to the trails does not. They would continue to share the areas with motorized users.

- Horseback riders voiced a concern for their safety because of the large amount of random target shooting activities that occur. Their preference is to have an area secure from target shooting.
- Mountain bikers currently share their traditional race areas with motorized users in the Victoria, Norris Peak and Shanks areas. Some users would like to see a trail system for mountain bikes and other non-motorized use extend from Rapid City to Pactola Reservoir, assuming the trail and area surrounding the trail could be protected from motorized use. This likely would not occur under Alternative A because the entire area would not be closed yearlong to motorized uses. Mountain bike users would seek out more seclusion and areas for trail systems away from motorized users outside the project area.

Increased conflicts between users would be expected, especially conflicts between motorized and non-motorized users. Motorized use would expand and additional user-created roads would be developed by OHV's, thereby increasing the total number of roads within the area.

Cumulative Effects

Population and recreation use will continue to grow in the Black Hills. New houses and developments will be constructed within and adjacent to the project area. Increased competition and conflicts will occur among users. The result would be a gradual decline in solitude and non-motorized recreation opportunities within the project area and adjacent to population centers within the Black Hills.

ALTERNATIVE B

This alternative is responsive to those users who want to see a stronger emphasis on non-motorized recreation opportunities and reduced effects from road and off-road motorized use. It reduces the total miles of road and roads open to motorized use, and eliminates off-road motorized use over most of the area.

Alternative B has the largest effect of all alternatives on motorized and non-motorized use within the Prairie Project Area. It would divide the project area into two zones. The larger zone would favor non-motorized use and the smaller zone would favor motorized use, as described below.

- The majority of the project area, 23,842 acres (82%) would be closed yearlong to off-road motorized use (see Appendix E, Map 19). Motorized vehicles could travel only on high standard roads. All unclassified roads and some low standard Forest System Roads would be converted to trails or decommissioned (eliminated). Some low standard roads would be open for private land access only. This zone includes Management Areas 3.7, 4.1, 5.4 and 8.2.

- The northwest corner of the analysis project area, 5,182 acres (18 percent of area) would be open to off-road motorized use yearlong. All levels of road would be open yearlong to motorized users. This zone consists of Management Area 5.1.

Motorized Opportunities

Direct Effects

Over the entire project area motorized users would find 128 miles of roads open yearlong compared to the existing condition of 173 miles. Most of these roads would be high standard and provide less of a backcountry experience to users. There would be no seasonal road closures during the winter-spring time period. Open road density would be reduced to 2.3 miles per square mile, compared to the current 3.1 miles (winter-spring) and 4.0 miles (summer-fall). Total road density (open and closed roads) would be reduced to 3.7 miles per square mile versus the current 5.3 miles. These road densities include all FS roads and motorized trails, State, County and private roads.

Approximately nine miles of unclassified roads would be converted to OHV motorized trails in the northwest corner of the project area. Twenty-seven miles of unclassified and low standard Forest System Roads (FSR) would be converted to non-motorized trails. All high standard FSR's would remain open. All other roads would be closed to motorized use except those needed for private land access. Approximately 59 miles of unclassified and low standard NFS roads would be decommissioned. That is, various methods would be used to make the roads unusable to motorized vehicles. This could include placing rocks or other debris on the road, ripping up a portion of the road, removing a stream crossing or other similar measures.

In Alternative B all of the seven current closures would be rescinded and replaced with one that includes 82 percent of the area as indicated in Appendix E, Map 19. Motorized vehicles would be restricted to driving on designated roads on a yearlong basis. Off-road motorized travel would not be allowed in this larger zone. Motorized users would find less opportunity to experience adlibbing or cross country experiences.

Indirect Effects

Users who prefer motorized use would be concentrated into a smaller area and many would move their use out of the project area and onto other areas of the Forest. Non-motorized users would be drawn to the area as more opportunities for solitude and non-motorized experiences are improved.

Cumulative Effects

This alternative would continue the trend of closing roads and areas to motorized use within the Black Hills. It would result in a lower total and open road density overall in the Black Hills. Combined with other existing road and area closures, there would be limited opportunities to ride OHV's both on and off roads near Rapid City.

Non-Motorized Opportunities

Direct and Indirect Effects

Alternative B would add 38 miles of non-motorized trail in the project area, resulting in a total trail system of approximately 49 miles. Approximately 27 miles of existing unclassified and low standard FSR's would be converted to non-motorized trails. Ten miles would be newly developed trails (Buzzards Roost and Crouch Line Railroad Trails). These new non-motorized trails are displayed in Appendix E, Maps 19 and 20.

Non-motorized trail users would see expanded opportunities for this use. Approximately 82% of the area is prohibited to yearlong motorized use off roads. Mountain bikers, that would like to see a trail system for mountain bikes and other non-motorized use extend from Rapid City to Pactola Reservoir, might propose such a system because of the large area restricted from motorized use.

Cumulative Effects

This alternative would continue the trend of expanding non-motorized opportunities in the Black Hills.

Motorized And Non-Motorized Recreation

Direct Effects

Alternative B would have the largest effect of all alternatives on dispersed recreation use. This is a direct result of changes in total road miles and area closure acres. It would reduce the total road miles by 86 miles and miles of road open to motorized use by 91 miles, and would substantially expand the areas closed to off-road motorized use.

Motorized access would be reduced and no off-road motorized use would be allowed over 82 percent of the area (see Appendix E, Map 19). Road access would be mostly limited to highways and high standard roads. Roads would be opened or closed yearlong, with no seasonal (winter-spring) restrictions in effect. This would negatively affect dispersed recreation opportunities that depend on motorized use, such as driving for pleasure or sport, dispersed camping, fishing, climbing, and hunting in areas with good motorized access. Both fall big game and spring turkey hunting would be affected due to changes in motorized opportunities. OHV use on lower standard roads and off roads would be limited to an area in the northwest portion of the project area.

Specific types of motorized use would be affected in various ways. Stock vehicles such as cars and pickups would be affected the least as most of this use is restricted to main roads and higher standard FSR's. Those users who enjoy driving on low standard roads and off-road, such as OHV's, would be affected to a large degree. Opportunities for this use would exist in only 18 percent of the area. Dirt bike, ATV and 4x4 users would likely move out of the area to enjoy these activities.

Non-motorized recreation opportunities would expand under this alternative. Non-motorized users that wish to hike, mountain bike and ride horses in areas free from motorized use would find more opportunities to engage in these activities. Hunters who want walk-in hunting opportunities would find many more areas in which to conduct this activity. The area would offer more opportunities for solitude and would generally favor non-motorized uses, as compared to the existing condition.

Indirect Effects

Negative effects related to motorized access - partying, littering, trash disposal, vandalism, damage to soils and water resources, noxious weed spread, and disturbance to wildlife - would be reduced. Those users seeking motorized recreation opportunities would be pushed into other areas of the Forest. Generally, this would cause them to travel further to enjoy these types of activities. Conflicts between motorized and non-motorized users would increase in these other areas of the Forest.

Area closures would be easier to identify on maps and on the ground because of the large area covered, as compared to the existing closures. Enforcing these new closures, however, would be difficult and ineffective in places without strong public support. This support might be lacking from many motorized users and area residents who might feel upset about the substantial change in management and lost opportunities in an area that historically has been open motorized use. Enforcement would be particularly difficult adjacent to the many private parcels of land, where users can access areas behind closed gates and law enforcement patrols would find it difficult to stop this illegal use.

Conflicts between motorized and non-motorized users would be reduced over most of the project area, as there would be less motorized use in the area. Conflicts would likely increase in the northwest area that has higher open road densities and is open to off-road use. This is because motorized users would be concentrated into this smaller area. Conflicts between residents living within the area and locals living in Rapid City and surrounding vicinity would increase. Some locals might feel that project area residents have better access to the Forest than they have and in effect have special privileges.

Cumulative Effects

This alternative would continue the trend of expanding non-motorized recreation opportunities and limiting motorized recreation opportunities in the Black Hills. The majority of the Black Hills, however, would remain open to and provide substantial motorized recreation opportunities.

ALTERNATIVE C

This alternative is responsive to those users who want to see more balance between motorized and non-motorized recreation use, and additional opportunities to pursue their favorite recreational activities. It reduces the total road miles and roads open to motorized use, provides protection for other resource needs such as wildlife and soils, expands the area closed to off-road motorized use, and designates a specific area for yearlong off-road motorized use. It also

provides opportunities for partnering with the Forest Service to develop motorized and non-motorized “use areas” and trail systems. The criteria for use areas and trails systems are included in Appendix B.

Alternative C would divide the project area into three zones or corridors. The northern zone would favor yearlong motorized use both on and off-road, the middle zone would favor non-motorized uses, and the southern zone would provide a mix of both motorized and non-motorized uses (see Appendix E, Map 20).

- The northern zone emphasizes an area for motorized opportunities. Users would find this zone of 8,348 acres (29 percent of the area) open to on and off-road motorized use yearlong. The highest density of roads open to motorized travel is found in this corridor. All road levels from unclassified to high standard roads would be available for motorized use. Use areas and trail systems for motorized and non-motorized users could be allowed yearlong under certain criteria (see Appendix E, Map 20). This zone would provide a motorized corridor from the edge of Rapid City west into higher elevations of the Black Hills.
- The middle zone emphasizes an area for non-motorized opportunities. Non-motorized users would find the middle corridor of 9,265 acres (32 percent of the area) closed to off-road motorized travel yearlong. Motorized travel would be on higher standard, designated roads only. Some lower standard roads would be converted to non-motorized trails. Of the three zones, this has the lowest density of roads open to motorized use. Use areas and trail systems for mountain biking and other non-motorized uses could be allowed within this area.
- The southern zone emphasizes an area for motorized opportunities during the summer-fall period (May 15 to December 15). This area is 11,412 acres (39 percent of the area). Winter travel by motorized users would be restricted to higher standard roads only while summer travel would be allowed on all level of roads and off-roads. Use areas and trail systems for motorized users could be allowed in the summer only and for non-motorized users yearlong under certain criteria (see Appendix B).

Motorized Opportunities

Direct Effects

Alternative C would reduce total road miles to 233 miles versus the current 292 miles. Roads open to motorized use would vary according to season. During the summer-fall (May 15 to December 15), approximately 186 miles would be open, as compared to the current 219 miles. During the winter-spring (December 15 to May 15), approximately 172 miles would be open to motorized use, essentially the same as the current amount, though not necessarily the same roads. This would result in 80 percent of all motorized roads and trails being open to motorized use during the summer-fall and 74 percent open during the winter-spring. Open road density would remain at the current 3.1 miles per square mile during the winter-spring time period (December 15 to May 15) and would be reduced to 3.4 miles per square mile versus the current 4.0 miles during the summer-fall period (May 15 to December 15). Total road density (open and closed

roads) would be reduced to 4.2 miles per square mile compared to the current 5.3 miles. These road densities include all FS roads and motorized trails, State, County and private roads.

In Alternative C all of the seven existing area closures would be rescinded and replaced with a yearlong area closure (closed to off-road use) for the middle zone and a seasonal area closure for December 15 to May 15 in the southern zone (see Appendix E, Map 20). Motorized vehicles would be restricted to driving on designated roads yearlong in the middle zone and seasonally in the southern zone.

Approximately 50 miles of existing unclassified road and low standard FSR's would be decommissioned to address soil, water and other issues. Twenty-eight miles of unclassified roads would be converted to off-highway motorized trails. Approximately three miles of new road would be constructed to accommodate vegetative treatments. These new miles would not be open to public motorized use. Approximately 11 miles would be converted from unclassified motorized road to non-motorized trails.

Indirect Effects

Both motorized and non-motorized users would find opportunities within the project area. Motorized users would be drawn to the northern zone yearlong and the southern zone during the summer-fall period. Non-motorized users would be drawn to the middle zone yearlong and the southern zone during winter-spring.

Cumulative Effects

This alternative would continue the trend of closing roads and areas to motorized use within the Black Hills. It would result in a lower total and open road density overall in the Black Hills. It would, however, maintain motorized access in the project area.

Non-Motorized Opportunities

Direct and Indirect Effects

Alternative C would add 22 miles of non-motorized trail in the project area, resulting in a total trail system of approximately 33 miles. Approximately 12 miles of existing unclassified and low standard FSR's would be converted to non-motorized trails. Ten miles would be newly developed trails (Buzzards Roost and Crouch Line Railroad Trails). These new non-motorized trails are displayed in Appendix E, Maps 19 and 20. Non-motorized trail users would see expanded opportunities for this use.

Non-motorized users would find recreation opportunities in approximately 71% of the area is closed to off-road motorized use in the winter-spring and 32% in the summer-fall. Mountain bikers that would like to see a trail system for mountain bikes and other non-motorized use extend from Rapid City to Pactola Reservoir might propose such a system because of the additional area restricted from motorized use.

Cumulative Effects

This alternative would continue the trend of expanding the non-motorized trail system in the Black Hills.

Motorized And Non-Motorized Recreation

Direct Effects

Alternative C would affect dispersed recreation use directly as a result of changes in total road miles and travel management restrictions. It would reduce the total road miles by 59 miles and would increase the area closed to off-road motorized use. Road access for winter-spring recreational activities pursued by users such as turkey hunting, viewing scenery, and camping would be approximately the same as exists today, but would include a different mix of roads than currently available. Road access would be reduced by 33 miles in the summer-fall for users pursuing motorized recreation opportunities, such as fall big game hunting, camping and driving for pleasure or sport.

Alternative C would provide opportunities for both motorized and non-motorized users to propose and develop “use areas” or trail systems in the project area. These use areas and or trail systems would consist of designated areas where specific users could develop opportunities for OHV or mountain bike use. For example, single-track dirt bike or mountain bike courses might be developed or an ATV trail system developed, or possibly a location to do rock crawling for modified 4x4 vehicles. These use areas would be limited in size, would be designed to minimize environmental effects, and would be under special use permit to groups who would be responsible for development and maintenance of the system. This alternative does not designate specific use areas at this time, but instead lists general criteria and zones where this activity might occur (see description of Alternative C in Chapter 2, and Appendix B).

Despite reductions in road and off-road areas available for motorized use, some additional motorized opportunities would be available to OHV users. First, a corridor would be established allowing for yearlong access within the northern zone from the edge of Rapid City west to the higher elevations of the Black Hills. This corridor currently does not exist during the winter-spring because of seasonal road closures in this area. Second, OHV users would have the opportunity to propose and develop OHV use areas within the northern and southern zones, covering 29 percent of the area during the winter-spring and 68 percent of the area during the summer-fall time period. The Forest currently has no areas designated as suitable for these uses.

Specific types of motorized use would be affected both in terms of location and season of use. The most substantial effect would be noticed during the winter-spring period. All motorized users would be accommodated to varying degrees.

- Stock vehicles such as cars and pickups would be affected the least as most of this use is focused on main roads. Stock Vehicles prefer moderate to high standard roads. These users would generally find the same opportunities as the current situation. Some of these

users prefer to travel on the lower standard roads and they would find a slight decrease in motorized recreational opportunities in the summer-fall period.

- Dirt bike users recommend open areas for ad-libbing and single-track use secured from wider motorized vehicles. These users would find less opportunity to travel off-roads and trails in the winter-spring months than exists today, and the area available for this use would change. Because this alternative provides opportunities to propose and develop designated dirt bike use areas, however, users could have more opportunities to enjoy their sport on single-track motorized trails. Potential areas for this use are in the northern zone yearlong, and the southern zone during summer-fall.
- All terrain vehicle (ATV) users prefer low-level primitive roads and trails and the opportunity to go cross-country or “ad-lib” their experiences. These users would find less opportunity to travel off roads and trails than currently exists. As stated above, however, these users would have the opportunity to propose and develop ATV use areas within the northern and southern zones.
- Modified 4x4 vehicles prefer to travel on a diverse road system allowing them to access rock crawl type areas to challenge their skills. These users would find more opportunities in the northern corridor than current travel allows, but less during winter-spring than currently exists in the southern zone. They would find opportunities to pursue their activities in the summer-fall in the southern corridor. They also would find more opportunities by proposing use areas to meet their needs in the northern area yearlong and southern area during the summer and fall.

Non-motorized users voiced a strong desire to experience the backcountry in a secluded environment free of motorized traffic and noise. Non-motorized recreation opportunities would expand under this alternative. The middle zone would favor non-motorized use on a yearlong basis and the southern zone would favor non-motorized use during the winter-spring time period. Non-motorized users that wish to hike, mountain bike and ride horses in areas free from motorized use would find more opportunities to engage in these activities. These areas would be larger than the current non-motorized areas. Hunters who want walk-in hunting opportunities would find more areas in which to conduct this activity. The overall area would offer more opportunities for solitude and non-motorized uses, as compared to the existing condition. The Deerfield trail users would not see a change in the status of off road travel near this trail and trail area because the area is open yearlong to off road motorized use.

- Mountain bike users would have more opportunity to experience a larger area (32%) for racing and trail development that is free from motorized use during the summer-fall. This area encompasses an historical race area near Victoria and a proposed trail system area near Dark Canyon. Mountain bikers would have the opportunity to propose and develop non-motorized trails within the project area. The options for this would be expanded based on the additional area closed to motorized use.
- Hikers throughout the area would find an area free of off-road motorized use in the winter-spring in the southern corridor and yearlong in the middle corridor. Hikers along the Centennial trail would continue to see a decrease in their recreational experience as motorized traffic could still be present next to the trails in the summer-fall south of Pactola reservoir. Centennial trail users in the winter would find more opportunity to pursue their activities without motorized use in the winter-spring months.

- Horseback riders throughout the area would find an area free of off-road motorized use in the winter in the southern corridor and yearlong in the middle corridor. These users would enjoy the seclusion in the middle corridor but might still stay away from the southern corridor in the summer as motorized traffic is still allowed there throughout the area.

Indirect Effects

Negative effects related to motorized access - partying, littering, trash disposal, vandalism, damage to soils and water resources, noxious weeds, and disturbance to wildlife - would be reduced as compared to the current condition because of the reduced amount of motorized access.

Area closures would be easier to identify on maps and on the ground because the boundaries would more clearly follow identifiable features, such as highways or other roads. Enforcing these new closures would be difficult in places but would be easier than for Alternative B. Enforcement would be more difficult adjacent to private parcels of land within the area, where users can access areas behind closed gates and patrols would be hard to detect this use.

Conflicts between motorized and non-motorized users would continue, but might be reduced as user groups become more segregated within the project area. All users could find opportunities to experience their activities under Alternative C, especially if use areas are proposed and implemented for motorized and non-motorized use. Conflicts between residents living within the area and locals living in Rapid City and the vicinity would increase, as locals would feel that residents have better access to the Forest than they have and in effect have special privileges.

Cumulative Effects

This alternative would continue the trend of expanding non-motorized recreation opportunities and limiting motorized recreation opportunities in the Black Hills. The majority of the Black Hills, however, would remain open to and provide substantial motorized recreation opportunities. Alternative C would provide opportunities in the Black Hills to develop “use areas” for motorized (OHV) and non-motorized (mountain bike) use.

ALTERNATIVE D

This alternative is responsive to management guidelines presented in the Forest Plan. The Forest Plan provides guidelines for road and off-road motorized use within each Management Area. Alternative D strictly adheres to Forest Plan Management Area boundaries, and it does not include opportunities for development of use areas for off highway vehicle’s or mountain bikes. It rescinds existing area closure orders and replaces it with new restrictions.

Alternative D is divided into three categories and comprises four separate zones (see Appendix E, Map 21).

- A northwestern zone consisting of 5,182 acres (18 percent) of National Forest System Lands. This zone is open to off-road motorized use and has a high open road density. This zone comprises Management Area 5.1, which has a Resource Production emphasis.
- A middle zone consisting of 4,356 acres (15 percent) of NFS Lands. This zone is closed yearlong to off-road motorized use and has a low open road density. It comprises Management Areas 3.7 (Late Successional Forest Landscape), 4.1 (Limited Motorized Use and Forest Product emphasis), and 8.2 (Developed Recreation Complex).
- Northeastern and southern zones consisting of 19,486 acres (67 percent) of NFS Lands. These zones are open to off-road motorized use seasonally during the summer-fall period (May 15 to December 15). Most Forest System Roads in these zones are open to motorized use during the summer-fall and restricted from motorized use in the winter-spring. The northeastern zone has a high seasonal open road density, and the southern zone has a lower seasonal open road density. These two zones comprise Management Area 5.4, which has a Big Game Winter Range emphasis.

Motorized Opportunities

Direct Effects

Alternative D would reduce total road miles to 230 miles versus the current 292 miles. Roads open to motorized use would vary according to season. During the summer-fall (May 15 to December 15), approximately 191 miles would be open, as compared to the current 219 miles. During the winter-spring (December 15 to May 15), approximately 131 miles would be open to motorized use, as compared to the current 173 miles. This would result in 83 percent of all roads/motorized trails being open to motorized use during the summer-fall and 57 percent open during the winter-spring. Open road density would be reduced to 2.4 miles per square mile versus the current 3.1 miles per square mile during the winter-spring time period (December 15 to May 15) and would be reduced to 3.5 miles per square mile versus the current 4.0 miles during the summer-fall period (May 15 to December 15). Total road density (open and closed roads) would be reduced to 4.2 miles per square mile compared to the current 5.3 miles. These road densities include all FS roads and motorized trails, State, County and private roads.

In Alternative D all of the seven existing area closures would be rescinded and replaced with a yearlong area closure (closed to off-road use) for the middle zone and a seasonal area closures for December 15 to May 15 in the northeastern and southern zones (see Appendix E, Map 21). Motorized vehicles would be restricted to driving on designated roads yearlong in the middle zone and seasonally in the northeastern and southern zones.

Approximately 55 miles of existing unclassified road and low standard FSR's would be decommissioned to address soil, water and other issues. Twenty-five miles of low standard roads would be converted to off-highway motorized trails. Approximately one mile of new road would be constructed to accommodate vegetative treatments. This new mile of road would not be open

to public motorized use. Approximately eight miles would be converted from unclassified motorized road to non-motorized trails.

Indirect Effects

Both motorized and non-motorized users would find opportunities within the project area. Motorized users would be drawn to the northwest zone yearlong and the northeast and south zones during the summer-fall period. Non-motorized users would be drawn to the middle zone yearlong and the northeast and south zones during winter-spring.

Cumulative Effects

This alternative would continue the trend of closing roads and areas to motorized use within the Black Hills, particularly during the winter-spring period. It would result in a lower total and open road density overall in the Black Hills. It would, however, maintain abundant motorized access in the project area

Non-Motorized Opportunities

Direct and Indirect Effects

Alternative D would add approximately ten miles of non-motorized trail in the project area, resulting in a total trail system of approximately 20 miles. Approximately eight miles of existing unclassified and low standard FSR's would be converted to non-motorized trails. Non-motorized trail users would see expanded opportunities for this use.

Non-motorized users would find recreation opportunities in approximately 82% of the area in the winter-spring (an increase) and 15% in the summer-fall (a decrease). Mountain bikers would like to see a trail system for mountain bikes and other non-motorized use extend from Rapid City to Pactola Reservoir. This likely would not occur under Alternative D because the area would not be closed yearlong to motorized uses.

Cumulative Effects

This alternative would continue the trend of expanding the non-motorized trail system in the Black Hills.

Motorized And Non-Motorized Recreation

Direct Effects

Alternative D would affect dispersed recreation use directly as a result of changes in total road miles and travel management restrictions. It would reduce the total road miles by 62 miles, would decrease the areas closed to off-road motorized use during summer-fall, and substantially increase the area closed to off-road motorized use during the winter-spring. Some existing closures would become open to off-road motorized use.

Road access for winter-spring recreational activities such as spring turkey hunting, viewing scenery, and camping would be reduced by 42 miles as compared to the existing condition. Road access would be reduced by 28 miles in the summer-fall for users pursuing motorized recreation opportunities such as fall big game hunting, camping, climbing, and driving for pleasure or sport (see Appendix E, Map 21).

Specific types of motorized use would be affected both in terms of location and season of use. All motorized users would be accommodated to varying degrees during the summer-fall period. Some areas currently closed to off-road motorized use would be open for this use during the summer-fall. Limited motorized use would be available during the winter-spring. Stock vehicles such as cars and pickups would be affected the least as most of this use is restricted to main roads. Those users who enjoy driving off-road, such as OHV users, would be able to ride in about 85 percent of the area during summer-fall (an increase) and 18 percent of the area during winter-spring (a decrease).

Non-motorized users voiced a strong desire to experience the backcountry in a secluded environment free of motorized traffic and noise. Some existing area closures would be open to motorized use. The middle zone would favor non-motorized use on a yearlong basis. Non-motorized users that wish to hike, mountain bike and ride horses in areas free from motorized use would find less opportunities in the summer-fall than exist today, and more opportunities in the winter-spring months due to the winter closure of the northeastern and southern project areas. Hunters who want walk-in hunting opportunities during the fall big game hunting season would likely find less opportunities than today, but more walk-in hunting opportunities would be available during the spring turkey season.

Hikers along the Centennial trail would continue to see a decrease in their recreational experience as motorized traffic could still be present next to the trails in the summer-fall south of Pactola reservoir. Centennial trail users in the winter would find more opportunity to pursue their activities without motorized use. Deerfield trail users, however, would see a continued decrease in their recreational experience, as motorized traffic would not be restricted in the area around this trail yearlong. Horseback riders would enjoy the seclusion in the middle corridor but might still stay away from the southern corridor in the summer as motorized traffic is still allowed there throughout the area.

Indirect Effects

Negative effects related to motorized access - partying, littering, trash disposal, vandalism, damage to soils and water resources, noxious weeds, and disturbance to wildlife - would be reduced as compared to the current condition because of the reduced amount of motorized road access.

Area closures would be difficult to identify on the ground because the boundaries would be more difficult to follow. These boundaries are based on topographic lines and do not follow roads or other easily definable boundaries. Enforcing these new closures would be difficult in places but would be easier than for Alternative B, which greatly limits motorized use. Enforcement would

be more difficult adjacent to private parcels of land within the area, where users can access areas behind closed gates and patrols would be hard to detect this use.

Conflicts between motorized and non-motorized users would continue. Conflicts between residents living within the area and locals living in Rapid City and the vicinity would increase in the winter-spring period. Some users might feel that project area residents have better access to the Forest than they have and in effect have special privileges.

Cumulative Effects

This alternative would continue the trend of expanding non-motorized recreation opportunities in the Black Hills, particularly during the winter-spring. The majority of the Black Hills, however, would remain open to and provide substantial motorized recreation opportunities, especially in the summer-fall period.

SCENERY

Affected Environment

The Prairie Planning Area includes lands in the eastern portion of the Black Hills National Forest, west of Rapid City, encompassing the Lower Rapid Creek watershed. Most of the Prairie Planning Area has a Scenic Integrity Objective of High or Moderate. The Prairie Project Area has a scenic make up of several components as described below.

Landscape Character

Landscape character gives a geographic area its visual image and consists of the combination of physical, biological, and cultural attributes that make each landscape identifiable or unique. Landscape character embodies distinct landscape attributes that exist throughout an area. The Prairie Project Area is located within the Moderately Dissected Terrain / Mixed Forest Landscape Character Unit (LCU). This LCU covers a broad range of characteristics, from deep stream carved canyons to rolling hill landforms. A fairly uniform, dense, carpet of trees and other vegetation covers the planning area. The stands are typically dominated by ponderosa pine, with aspen, spruce and grassland scattered throughout. Rock forms and rock cliffs are evident along Rapid Creek. Landscape use patterns throughout this area include developed/transitional uses, natural appearing, recreation, transportation, and rural uses. Management of this area includes evidence of timber harvests, recreational uses, and grazing. Although these activities are occurring and have occurred in the past they are subtle and not visually dominant from any sensitive travel corridor.

Visual Absorption Capability

Visual Absorption Capability is the ability of an area to withstand management manipulations without significantly affecting its visual character. Approx. 1/3 of the planning area has a Low

VAC, this indicates that the area has a lower than average capability to absorb resource management activity alterations without changing the scenic appearance - these areas are primarily along the Rapid Creek, Highways 44 & 385, and on the upper third of the hills; the remaining areas, have a Moderate or High VAC, indicating areas with a better than average capability to absorb resource management activity alteration without changing the scenic appearance.

Inherent Scenic Attractiveness

Scenic attractiveness is obtained by classifying the landscape into different degrees of variety. Scenic attractiveness classifications are: Class A - Distinctive, Class B - Typical and Class C - Indistinctive. Class A refers to unique or outstanding scenic quality. Class B refers to ordinary or common scenic quality. Class C refers to low scenic quality.

Some areas within the planning area (5%) have a Scenic Attractiveness A. They are located along Rapid Creek in the northern portion of the planning area and near Pactola Reservoir. Scenic class A features are associated with rock, streams, and vegetation to create diverse visual features. Scenic attractiveness B classification, comprised of a typical Black Hills National Forest scene, makes up less than 40% of the planning areas. The majority of the project area (55%) lies within the scenic attractiveness C areas, which are associated with dense, even age stands of Ponderosa Pine with few openings, few dominant rock formations, and little or no water bodies/streams.

Seen Areas

Travel ways are identified and classified in order to determine which existing observer positions to use in the landscape visibility analysis. Sensitivity Level 1 represents corridors where the public has the highest concern, and Level 3 being the lowest level of concern. All areas of the Forest were determined to be seen (Foreground, Middleground, or Background) from some corridor or viewpoint, thus there are few areas that were unseen from some location.

Sensitivity Level 1 travel ways include US Highway 385, in the western portion, State Highway 44 in the northern portion, and Sheridan Lake Road in the southeast corner of the Planning Area.

Although the rest of the area is mapped as Level 3, it is close to Rapid City and many nearby residential developments, and receives heavy dispersed recreation use. Management activities should be designed to account for this heavier dispersed use – and the closer scrutiny it receives by the recreation community.

Existing Scenic Integrity

Existing scenic integrity represents the current status of a landscape. It is determined on the basis of visual changes that detract from the scenic quality of the area. Existing scenic integrity is the current visual state, which is measured in degrees of deviation from the natural appearance of the landscape character type.

The existing scenic integrity of Prairie is Moderate to High. The majority of the area is consistent with a natural appearing landscape with past management activities generally not evident in, or subordinate to, the natural environment.

Inventoried Scenic Class

The inventoried scenic class values are 1,2, 3, and 4. Within the planning area, Scenic Class 1 areas are along the foreground of the Sensitivity Level 1 travel ways in and around the planning area include US Highway 385 and State Highway 44. Scenic Class 2 areas are along the foreground of the Sensitivity Level 2 travel ways in and around the planning area include Sheridan Lake Road. Scenic Class 3 - 4 areas are scattered throughout the project area and are associated with areas seen from sensitivity level 3 travel ways or small-unseen areas. The scenic class values demonstrate the importance of the views in different areas.

Scenic Integrity Objectives (SIO)

Scenic Integrity Objectives were adopted from the scenic class values. Areas with High Scenic Integrity Objectives should appear natural; management activities should be un-noticeable within one year after the completion of the project. Areas with Moderate Scenic Integrity Objectives should appear only slightly altered from the more natural appearing forest. Spacing and age diversity is not as important as in areas of High Scenic Integrity Objectives. Management activities should not be noticeable within one year after the completion of the project. Areas with Low Scenic Integrity Objectives should appear moderately altered with management deviations becoming more noticeable. Management activities, in the form of slash and logging systems, should be unnoticeable within three years after the completion of the project.

Within the Prairie Project Area, approximately 29 % of the planning area has a High SIO, 41 % a Moderate SIO, and 30 % in a Low SIO.

Recreation Opportunity Spectrum (ROS)

The ROS classifications for this project area is:

- Roaded Natural, Non-motorized (Mgmt Areas 3.7 - Late Successional Landscapes)
- Roaded Natural, Non-motorized (Mgmt Areas 4.1 - Limited Motorized Use and Forest Product Emphasis)
- Roaded Natural (Mgmt Areas 5.1 - Resource Production Emphasis)
- Roaded Natural (Mgmt Areas 5.4 - Big Game Winter Range Emphasis)
- Roaded Natural (Mgmt Areas 8.2 - Developed Recreation Complexes)

The ROS is identified for each management area. The physical, social and managerial settings support the Forest Plan ROS classifications of this area. The ROS is compatible with the Scenic Integrity Objectives.

ALTERNATIVE A

Direct Effects

No management activities would occur.

Indirect Effects

Existing conditions and natural processes of trees growing and regenerating will continue. Wildfires will continue to be extinguished as quickly as possible. This management will continue to try to limit the natural role of fire in the landscape. As a result, the ponderosa pine will continue to grow densely, becoming thicker and reducing visible open space. Should wildfires burn into stands of densely packed growing trees, these trees can act as “ladder fuels” moving the fire up into the crowns and could expect to see groups of fire killed trees, which could occur in small patches or cover large expanses of the landscape. These fire-killed trees will generally remain standing for 5 to 10 years (depending upon wind, rate of decay, and size of the tree). As these trees fall, these areas will be more visible in the landscape as large openings. Previously constructed roads that traverse these burned landscapes, can be highly visible as horizontal lines across the landscape. During periods when the ground is snow covered, these areas will be highly visible in the landscape. Burned areas may, or may not, be similar in shape and size (scale) to meadows, and other existing natural open areas in the landscape. In areas with a High or Moderate Scenic Integrity Objective, such as near State Highways, large burned areas where most large trees, as well as the small trees, are killed by fire, would likely move the forested landscape away from the desired condition for more open park-like stands.

Cumulative Effects

The Existing Scenic Integrity within the planning area would not appreciably change in the short term, but slowly the aesthetic appeal will decrease, as the lack of open space diminishes and the forest becomes thick with small diameter trees. Visibility into the forest will diminish. The forest will appear as “walls” along a trail, a highway, or adjacent to private land. Long term, as the forested stands move away from the desired condition, the visual diversity and variety will likely be reduced. The dense understory will limit views into the landscape while hardwood and meadow components will be reduced. Natural changes in the landscape, such as from high intensity fire, insect activity and disease, will potentially change the character from a landscape with a forest overstory, to one that would likely contain large open hillsides, hillsides with fire-killed trees, and hillsides of young trees. Depending on how wide spread these natural processes are would determine how dramatically these changes would be evident in the landscape.

ALTERNATIVE B

Direct Effects

Vegetation treatment will create stumps, slash, areas of reduced vegetation, and can create unnatural appearing edges between areas of cut / no cut, or areas of heavy / light vegetation

density. Treatment methods can create impacts that are evident in the landscape; i.e. – paths or other locations where skidders or other equipment are used can displace soil that create noticeable color difference. Generally these impacts are reduced to areas of heaviest use. Areas where firebreaks are constructed, depending upon the need for equipment in these areas, may display this effect.

Non-commercial thinning will reduce the density of trees within the forest, helping to create a more coarse texture that allows the viewer to see into the forest. Larger trees are more visible, as the smaller trees than can screen them are thinned out and removed.

Non-commercial thinning will place cut up trees (slash) on the forest floor. Initially needles in this slash will be green, as the limbs and branches dry the color of the needles will turn a reddish color. Slash is piled then burned, or chipped, along highways in areas with a High SIO. Slash is piled and burned, or scattered and then may be burned (as in prescribed fire). During this time when the slash is on the ground, color contrasts between the green forest and the red slash, as well as sunlight reflecting off the slash, is most evident. Once the dried slash is burned, circular burn marks on the ground where piles were located, or blackened hillsides will be evident where under burning occurred. In both cases, the blackened areas will not be evident very long as new grasses and other vegetation are stimulated to grow with the spring rains.

The prescribed fires will have an immediate effect in the landscape that will be evident. Where low intensity fire occurs, black scorch marks will be evident on the boles of the trees from less than one foot to three feet in height; these marks will fade over time - at three years they should blend with the bark on trees and appear as a natural condition. Often, shrubs are stimulated and begin to grow in these areas, depending upon the amount of tree cover. Areas that have received a low intensity fire meet a High SIO within 1-2 growing seasons.

Where moderate to high intensity occurs, seedlings, saplings, branches on trees, as well as some pole and possibly mature trees can be killed. In the short-term red, scorched crowns or black tree crowns devoid of needles will be visible. Over time (three years plus), this will become less evident. Larger burned dead trees will be evident longer (five-ten years) before they begin to rot and fall. Some larger dead trees will remain as standing snags for many years. The smaller trees that are fire killed should be down and well into decomposition at the end of three years.

Overall the landscape will noticeably change. The change would be less evident to travelers/users but more obvious to those that live in the area. Trees will be thinned out or in some locations burned. All this will be unattractive to some people.

Indirect Effects

Wildlife browse may increase, resulting in greater opportunities to view wildlife in their natural setting. Flowering plants, and hardwoods, may also increase, providing more spring and fall color in the landscape.

Cumulative Effects

Past activities within this planning area have included vegetation treatments, road, trail, utility, and recreation facility construction. Some evidence is still evident from past vegetation treatments in the form of open areas, and reduced tree vegetation, however it is not readily apparent from the highways that traverse the area. In specific isolated locations along the eastern portion of Highway 44, areas of past vegetation treatment, in the form of less dense forested areas, can be seen in the distant middleground and background. During the months when snow covers the ground, these areas are more evident. The treatments under this alternative should not increase the amount of open areas (forms) visible in the landscape, but textural changes (less dense forests, less screening, and increased views into the forest among the trees) will likely occur along Hwy. 44. The majority of the treatments are located away from the Sensitivity Level 1 & 2 corridors, but will be evident from interior forest roads and trails. These treated areas will create conditions that could produce park-like areas of a grass and small tree understory with a large tree overstory. Generally these treatments should move the forest toward a natural appearing condition. A variety of activities could occur on private land within the planning area, from no treatment to thinning to clearing the land and constructing structures (i.e.-homes). The national forest lands provide a backdrop for private lands. There has been an increase in the number of homes constructed on private lands either in, or look into, this planning area. This area is heavily used by the recreating public, because of its ease of access from the Johnson Siding and Rapid City communities. The concern for a natural appearing landscape will likely continue, or increase, for this area.

ALTERNATIVE C

Direct Effects

Overstory removal treatments, where there is only a seedling under story, will result in visual impacts to the characteristic landscape; from a middle ground viewing distance these changes will be noticeable to the average forest visitor because of the lack of vegetation, coarser texture, lighter colors and the possible formation of shadow lines between adjacent stands of denser timber. As re-vegetation occurs, these units will have a finer texture, and lighter green color, than surrounding stands. When viewed in background, the shelterwood treatments will be most evident when the ground is snow covered; the snow will accentuate the form created by the shape of the unit(s). The shape of the cutting unit, with this prescription, has the greatest visual effect on the landscape, when viewed from the Middleground & Background distance zones.

Many of the units are adjacent to one another, clumped in groups (although not necessarily having the same treatment), in effect treating the area on a landscape basis. This is generally a desired approach to treating an area, from a scenery standpoint, as it avoids creating a “patch-work” appearance on the landscape.

Generally, those units on the west and south sides of the ridges, ridge noses, and ridge tops, are most visible. Many units in these areas will be seen in Middleground or Background, when viewed from the highways.

Vegetation treatment will create stumps, slash, areas of reduced vegetation, and can create unnatural appearing edges between areas of cut / no cut, or areas of heavy / light vegetation density. Treatment methods can create impacts that are evident in the landscape; i.e. – paths for skyline cables in the canopy create lines, tractors or skidders used to drag logs to landings can create displaced soil.

Treatments that are highly visible, out of character with the natural vegetative patterns, and dominate the view, result in a Low SIO being achieved.

To meet a SIO of Moderate, the slash needs to be reduced to natural levels and clumping of the remaining overstory trees. To meet a High SIO harvest activities should mimic natural appearing conditions of vegetation (types, sizes, and spacing) and openings, slash cleaned up to natural levels, and landings should be located so they are not evident.

The prescribed burns will have an immediate effect in the landscape that will be evident. Where low intensity fire occurs, black scorch marks will be evident on the boles of the trees from less than one foot to three feet in height; these marks will fade over time - at three years they should blend with the bark on trees and appear as a natural condition. Often shrubs are stimulated and begin to grow in these areas, depending upon the amount of tree cover. Areas that have received a low intensity fire meet a High SIO within 1-2 growing seasons.

Where moderate to high intensity occurs, seedlings, saplings, branches on trees, as well as some pole and possibly mature trees can be killed. In the short-term red, scorched crowns or black tree crowns devoid of needles will be visible from some locations. Over time (three years plus), this will become less evident. Larger burned dead trees will be evident longer (five-ten years) before they begin to rot and fall. The smaller trees that are fire killed should be down and well into decomposition at the end of three years.

Indirect Effects

Wildlife browse may increase, resulting in greater opportunities to view wildlife in their natural setting. Flowering plants, and hardwoods, may also increase, providing more spring and fall color in the landscape.

Cumulative Effects

Past activities within this planning area have included vegetation treatments, road, trail, utility, and recreation facility construction. Some evidence is still evident from past vegetation treatments in the form of open areas, and reduced tree vegetation, however it is not readily apparent from the highways that traverse the area. In specific isolated locations along the eastern portion of Highway 44, areas of past vegetation treatment, in the form of less dense forested areas, can be seen in the distant middleground and background. During the months when snow covers the ground, these areas are more evident. The treatments under this alternative should increase the amount of open areas (forms created by overstory removals). In the southern and northern portions of the planning area, the forest will have less variety of tree sizes; more one or two story forested stands will be evident. Treatments will be evident from Sensitivity Level 1 &

2 corridors, as well as from interior forest roads and trails. These treated areas could produce park-like areas of a grass and small tree understory with a large tree overstory. Generally in the southeastern portion of the planning area, treatments could move the forest toward a more managed appearance where various stages of shelterwood type treatments continue to occur (overstory removals, seed tree cuts, seed tree cuts, & shelterwood cuts), and a more natural appearance in the northern and western areas where prescribed burning will occur. Larger trees would dominate the forested landscape around the Hisega area along Hwy 44, but they would be similar in appearance as they would be generally the same size and age. A variety of activities could occur on private land within the planning area, from no treatment to thinning to clearing the land and constructing structures (i.e.-homes). The National Forest lands provide a backdrop for private lands. There has been an increase in the number of homes constructed on private lands either in, or look into, this planning area. This area is heavily used by the recreating public, because of its ease of access from the Johnson Siding and Rapid City communities. The concern for a natural appearing landscape will likely continue, or increase, for this area.

ALTERNATIVE D

Direct Effects

Effects of vegetation treatments would be similar to Alternative C, but would cover a smaller area. There would be no prescribed burning, thus, potential effects from prescribe fire described in Alternatives B and C would not occur. More areas are planned for overstory removal in this alternative. Thus, the appearance of those stands will be shorter, younger trees.

Indirect Effects

The stimulation of wildlife browse and wildflowers would be similar to current levels. Spring and fall color would likely increase only in areas where hardwood restoration efforts occur.

There would be a larger number of hardwood restoration treatments evident within the HIGH SIO areas along the major travel routes. As a result, spring and fall color would be more evident than the other alternatives.

Cumulative Effects

Effects would be similar to Alternative C, but with fewer overall acres treated. In the southern portion of the planning area, treatments could move the forest toward a more managed setting than Alternative C.

LANDS and SPECIAL USES

Affected Environment

The existing complicated land ownership pattern in this area was set in motion by the Euro-American settlement that exploded in this area immediately after the Custer Expedition of 1874. This settlement started as a gold rush, and quickly evolved to include cattle grazing, agriculture and logging - largely in support of the mining camps and operations. Associated with this were roads, trails, and railroads to provide access to markets. Lands were removed from the federal domain into private ownership as mining claims and homesteads. The earliest patent was issued for a mining claim in 1882, and the last for a homestead in 1937. Most of the private land patents were issued between 1890 and 1910.

Lands that are now part of the Black Hills National Forest are the result of the Organic Administration Act of 1897, which established many Forest Reserves in the West. A large amount of land within the project area that is now National Forest was formerly private land, especially on the east side closest to Rapid City. Thousands of acres were brought into the NFS through exchanges in the 1930's up through 1945 under authority of the General Exchange Act.

There are a number of private and public road easements that have been granted in the project area for access across NFS lands, and easements that the Forest Service has acquired to cross private lands. There also are special use and other authorizations issued for utility and water lines, outfitting and guiding, church camps and other uses of NFS lands within the project area. The project file contains information related to these easements and other special uses.

Environmental Consequences

Direct, Indirect and Cumulative Effects

All alternatives would continue existing easements and special use permits. New construction of houses and subdivisions is anticipated. This will result in new requests for road and utility access across NFS lands. All alternatives would respond to continuing requests for legal access and utility lines to private land and would address each request on its own merits under existing law and policy direction.

There are no direct, indirect or cumulative effects related to lands and special uses from any of the alternatives with the possible exception of Alternative C. Alternative C includes a provision to consider proposals from groups or individuals to develop and maintain use area(s) for motorized or non-motorized trails and roads. This could possibly result in issuance of a special use permit for these activities. However, no site-specific proposals have been submitted and a separate analysis would be required, as appropriate, should such actions be proposed.

HERITAGE

Affected Environment

The Prairie Analysis area contains numerous archaeological and historical sites that represent various aspects of occupation in the central Black Hills. Human use in this area dates back at least 10,000 years. Numerous tribes have roots in the Black Hills, including the Kiowa, Kiowa-Apache, Crow, Arapaho, Shoshone, Cheyenne, and Lakota, among others (Noisat and Buechler n.d.). The diaries of French, English, and American explorers, traders, trappers, and soldiers are hazy for the period A.D. 1600-1800, but it appears that each successive tribal invasion was accompanied by conflict and turbulence, in which the new tribe sought to dispossess the current inhabitants, sometimes in league with other tribes. By the time of Custer's 1874 expedition the Lakota had effectively replaced all their rivals and established a complete domination over the Black Hills, although non-Lakota tribes or bands continued to filter into the Hills for hunting, raiding, trading, or ritual purposes. Native American sites include open campsites, stone tool quarry sites, and rock shelter locations. There are also known spiritual and traditional use sites, and potentially sites considered to be Traditional Use Properties.

Historic land use in this area has occurred since the 1800s in the form of homesteading, trapping, livestock grazing, and mining, as indicated by the GLO and Land Status plats. This activity primarily took the form of ranching from homesteads found along the better streams. Logging has had an impact in the region, but only small historic logging camps or sawmills occur in the immediate surrounding area. The same is true for mining: limited mineral exploration occurred in the area, but it left no outstanding traces on the land. Remnants and anomalous foundations found in the area today could relate to either the logging or mining frontiers, or to ranching activity (i.e., cowboy line camps). Mining, hunting, horsepacking, off highway vehicles, and other recreational uses continue to be popular in this area.

Specific areas of concern for the heritage resource program include the protection of class I (eligible) and class II (unevaluated) archeological/historical sites, appropriate consultation with local American Indian groups, and the protection of spiritual sites, Traditional Cultural Properties (TCPs), recent and historic graves, and Euro-American cemeteries. No TCPs were identified within the Prairie Project Area during this analysis. Sites consist of historic period cabins or habitation sites, historic and prehistoric rock shelters, historic period trails, road, railroads, and historic and prehistoric artifact scatters. Protection measures for these sites are keyed to determinations of each site's eligibility for inclusion in the National Register of Historic Places. Heritage sites determined eligible or heritage sites with an undetermined eligibility are of concern. Ineligible sites are dropped from management concerns, and determinations of effect on these properties are not addressed in this analysis.

A total of 71 sites that are considered to be eligible or potentially eligible for the National Register of Historic Places were located within the Prairie Project Area. These sites were reviewed for potential effects created by the proposed Prairie Project. There are nine sites requiring special consideration. These sites consist of Cairns of unidentified association, a large

slate cross, three wooden crosses located near Placerville Church Camp, and a pilgrim rock located in the project area. There is a possibility that these sites are locations of continuing spiritual practices.

Environmental Consequences

Heritage resource effects were qualitatively assessed through a presence/absence determination of significant cultural resources and mitigation measures to be employed during commercial harvest, prescribed fire (broadcast burning), fuel break construction, and/or fuel reduction activities.

ALTERNATIVE A

Direct Effects

The No Action Alternative would not directly affect any significant Heritage Resources.

Indirect Effects

There are 24 historic sites that could be indirectly affected by Alternative A. These sites include six unevaluated recreation residences, historic cabins, mining camps, railroads, sawmill remains, and flumes. The potential for catastrophic wildfire is greatest with Alternative A, as it provides for no fuel reduction work, and does not provide for mitigation efforts for site protection.

Cumulative Effects

There would be no immediate adverse effects to heritage resources. However, the long-term risk of wildfire and potential damage of heritage sites would increase as forest conditions continue to deteriorate. In the event of a wildfire, any remaining combustible materials at sites could be damaged or destroyed, and all heritage resources would be subject to exposure and erosion. If present, traditional use areas such as plant and firewood gathering areas, and Traditional Cultural Properties (TCPs) could also be damaged by future wildfire.

ALTERNATIVE B

Direct Effects

General impacts to heritage resource sites under Alternative B include maintaining and/or upgrading existing roads, building fire lines, non-commercial and minor commercial thinning activities, and prescribed burning.

There are six sites that could be directly affected by Alternative B. One site is a historic mining camp with standing structures and numerous wooden remains from mining activity. This site would need to be avoided during broadcast burn activities. Pile burning would be more

beneficial, and would cause a minimal disturbance at this site. Two sites would also need to be avoided during prescribed burn activity for similar reasons. There are two located within the boundary of proposed prescribed burn units. The sites are extensive prehistoric artifact scatter that would need to be avoided during maintenance or improvement of the exiting road to use as a fuel break. A sixth site would not be affected by ground disturbing activity but could benefit from the removal of fuels from the surrounding area.

Indirect Effects

If some forest stand densities remain unnaturally high with the prohibition of taking any live trees, then the fire hazard in these areas would remain high and the potential for large, high intensity crown fires would remain. Such a fire would directly and indirectly, through soil erosion and exposure to the elements, damage and/or destroy heritage resource sites within its path. Effect to cultural resources from prescribed burning would be minor. Prescribed fire and thinning activities have the potential to expose unknown archeological sites and TCPs.

Cumulative Effects

Thinning activities could potentially impact resource sites. Also, the acreage for prescribed burning is highest under this alternative. As with all the Action Alternatives, this alternative, proposes ground-disturbing activity that, in turn, could increase the chances of damage to known and/or unrecognized Heritage sites. This alternative would be directed by site-specific mitigation that would be common to all action alternatives to protect resources.

ALTERNATIVE C

Direct Effects

Proposed activities with the potential to impact heritage resources include maintaining and/or upgrading existing roads, building fire lines, thinning, gathering forest products and prescribed burning. This alternative proposes the greatest number of acres to be treated by commercial and non-commercial treatments. This alternative has the greatest potential of disturbing currently identified Heritage sites. Proposed activities with the potential to affect heritage resources include maintaining and/or upgrading existing roads, building fire lines, thinning, gathering forest products and prescribed burning.

There are eight sites that could be affected by Alternative C. Three sites may also be affected by actions proposed in alternative C as they were in Alternative B. Additionally under this alternative the sites could also be adversely affected by timber harvest activity. Activities such as access, skidding, and landing could affect or displace artifacts. Four sites could be affected by proposed timber harvest activities, including access, skidding, and landing, as well as prescribed burn activities. Broadcast burning would have the greatest effect, while pile burning would have minimal effects. Three of the sites potentially affected under Alternative C have a low likelihood of being impacted by the proposed activities, and would most likely benefit from fuel reduction in their vicinity. These sites could be adversely affected by large wildfire activity, and

reductions in fuels would be desirable. This alternative provides the most beneficial results to heritage resources in the form of fuel reducing treatments around heritage resources.

A proposal to add more openings along Centennial Trail has been put forth under this alternative. This action would require additional consultation with the State Historic Preservation Office.

Indirect Effects

There is a greater potential for indirect effects to sites due to the proximity of proposed vegetative treatment activities to known sites and the increase of traffic to and through harvest units containing these sites.

Cumulative Effects

Many of the heritage resources located within these proposed treatment areas are newly recorded and do not have information on previous existing conditions. As with all the Action Alternatives, this alternative, proposes ground-disturbing activity that, in turn, could increase the chances of damage to known and/or unrecognized Heritage sites. Alternative C best reduces the potential for large-scale wildfire and therefore offers the most protection over the long-term to Heritage Resources. No additional effects are expected with the implementation of the proposed mitigation measures, and effective monitoring of those measures.

ALTERNATIVE D

Direct Effects

General effects to heritage resource sites under Alternative D would be similar to those described under the Alternative C. The number of resource sites potentially affected by prescribed burning would not occur under this alternative. Less activity would help minimize the risk of disturbing currently unrecognized sites. General impacts to heritage resource sites under Alternative D would be similar to those described under the Alternative C, with a few exceptions. The exclusion of prescribed burning (broadcast burning) would virtually eliminate the possibility of accidental damage to heritage sites that are combustible. Since slash pile burning would be conducted during winter, the potential for escape from a slash pile burn and for a subsequent wildfire is very low.

Nine sites have been identified as being potentially affected by Alternative D. Seven sites could be affected by proposed timber harvest activities, including access, skidding, and landing. Two of the sites potentially affected under Alternative D have a low likelihood of being impacted by the proposed activities, and would most likely benefit from fuel reduction in their vicinity. These sites could be adversely affected by large wildfire activity, and reductions in fuels would be desirable.

A proposal to add more openings along Centennial Trail has been put forth under this alternative. This action would require additional consultation with the State Historic Preservation Office.

Indirect Effects

Similar to the Proposed Action except that there is less chance to uncover new archeological sites in the absence of prescribed fire.

Cumulative Effects

Many of the heritage resources located within these proposed treatment areas are newly recorded and do not have information on previous existing conditions. As with all the Action Alternatives, this alternative, proposes ground-disturbing activity that, in turn, could increase the chances of damage to known and/or unrecognized Heritage sites. No additional effects are expected with the implementation of the proposed mitigation measures, and effective monitoring of those measures.

Sites Affected By All Action Alternatives

There are 15 sites that could be affected under all the action alternatives. These include two cairn sites with unknown association. These are located along the edge of a proposed prescribed burn area, and could be affected by fuel break construction. Five sites could be affected by proposed timber harvest activities, including access, skidding, and landing. As well as prescribed burn activities. Broadcast burning would have the greatest effect, while pile burning would have minimal effects.

There are eight sites that have a low likelihood of being impacted by the proposed activities, and would most likely benefit from fuel reduction in their vicinity. These sites could be adversely affected by large wildfire activity, and reductions in fuels would be desirable.

Within the Prairie Project Area there are several portions of the Warren-Lamb Railroad. Part of this site is being utilized as part of the Forest road system. This site is also considered to be eligible for the National Register of Historic Places, and will not be widened or improved without further consultation. Regular road maintenance within the existing road prism may continue. There are some portions of this site that are considered non-contributing elements to the overall significance of the site, and may be subject to additional roadwork as needed. Review of such proposals will be conducted by the district archeologist prior to implementation.

Indirect Effects Common To All Action Alternatives

As harvest activity increases in area and density (greater MBF per acre removed), access is also increased. While the access may not always increase in area density, it will increase in duration and intensity. Surface and subsurface effects due to repeated equipment/product traffic would occur. Additionally, this increased access would create opportunities for increase of post-sale noncommercial activity such as fuelwood cutting, which places the heritage resources at further risk of disturbance and vandalism.

Some form of burning (either broadcast or pile) is proposed under all action alternatives. Forest Plan Standard 4102 provides for the protection of heritage resources within proposed prescribed

burn areas. Site-specific mitigation measures will be outlined in the Prescribed Burn Plan, prior to implementation.

Cumulative Effects Common To All Action Alternatives

The combination of forest activities such as timber harvesting, recreation, and range activities may have a cumulative effect on Heritage resources in the form of increased soil erosion, increased visitor traffic, vandalism, and alteration of historic landscapes. Cumulative effects of these types are difficult to quantify, but may be avoided or minimized through the implementation of appropriate, site-specific treatments, when deemed necessary through the consultation process with the State Historic Preservation Officer and the Advisory Council on Historic Preservation. Table 3-30 summarizes the anticipated effects to heritage resources.

Table 3-30 Heritage Resources

PAST ACTIONS	Heritage resource effects from road building, fire suppression, timber harvesting, residential development, and recreation use; risk to resources increased in areas where tree densities and fuel loads remained at unnatural levels
PRESENT ACTIONS	Potential heritage resource effects from recreation, firewood collection, and other activities as areas become more frequented with population increase.
PROPOSED ACTIONS	Fuel treatments could result in minor effects to unknown and NR-eligible sites; potential discovery and protection of unknown resources uncovered during treatments.
FUTURE ACTIONS	Similar effects as described under proposed action
CUMULATIVE EFFECTS	Efforts to reduce fuels and wildfire risk across the landscape would reduce the risk to heritage resources; Proposed Project would not result in significant cumulative effects with the implementation of site specific mitigation. Alternatives C and D would contribute the most to heritage resources cumulative effects in the short-term, while the No-Action would contribute the least in the short-term and the most in the long-term.

Traditional Use

Existing information about heritage and cultural values may often be inadequate; ongoing inventories tend to be project-specific rather than part of the general program. Obtaining information about sacred places from some American Indian groups is difficult because Forest Service styles of communication and negotiation are often incompatible with these cultures, and revealing sacred values and identifying sacred places to outsiders may be thought to imperil the values in need of protection.

The extent of traditional plant use is poorly known for the entire Black Hills. However it is possible that unidentified traditional use plant species are located in the project area. Future identification of traditional use plants could result in a greater perceived need for access. There are identified areas within the Prairie Project that tribal representatives have used to collect such things as tepee poles and sage.

Access

For those areas that contain traditional use sites, access needs will be high for traditional groups utilizing the area. This is particularly true for tribal elders, who may have difficulty accessing areas for physical reasons. The ability to access Tradition Cultural Properties, Sacred sites, traditional use areas, or traditional plant gathering areas is guaranteed under the American Indian Freedom of Religion Act (AIRFA) and under Executive Order 13007, and the Agency must not impede access to such locations.

Consultation

The Heritage Resource report was sent to the South Dakota State Historic Preservation Office of Review and Compliance for comment and eligibility determinations for the heritage resources located within the project area. Likewise the reports were also sent to Tribal Historic Preservation Offices for their review and comment, and additional recommendations for the protection of American Indian spiritual use sites. Additional consultation may be conducted as needed. Follow-up contact will be made with Tribal representatives to determine if additional information on the environmental document is needed.

SOCIAL

Affected Environment:

The Prairie Project Area lies in Pennington County, South Dakota within the wildland-urban interface west of and along the outskirts of Rapid City, the regional trade center and second largest city in South Dakota. The project area also contains smaller communities-at-risk including Johnson Siding, Hisega, and Whispering Pines. In addition to these communities, there are numerous private inholdings scattered throughout the area. Forest resources play an important role for the people living in and adjacent to the project area. The project area provides great scenery and abundant dispersed recreation in a setting that is close to town, or for some, right out their back door.

Demographics:

The examination of population trends is vital to the understanding of the overall nature of an area. The use and occupation of the Black Hills is increasing due to population growth and a fairly diverse and flexible economy, as well as the presence of Ellsworth Air Force Base. The majority of growth is occurring in Rapid City and western Pennington County. Approximately 30% of the increase in population has been located outside of any town or municipality. The population increase is due in part to growth in the tourist, service and manufacturing industries, and an influx of retirees to the Black Hills.

The Rapid City Planning Department projects that by 2025 Rapid City will have a population of 103,000. Some of this residential growth will result from the annexation of existing residential

developments on the outskirts of the city and growth in the forested areas to the south and west of Rapid City. Subdivisions and home construction building permits on private lands within and adjacent to the project area have increased steadily and demands for public access roads and utility lines across the project area will continue to exert additional pressure on the Forest.

Tourism officials have described the Black Hills as a ‘friendly forest’. An extensive road system allows easy access into the Forest and, in most places, the topography is gentle enough to invite casual walking, berry picking, and other recreational activities. The inholdings of private land within and adjacent to the project area contain visitor services and facilities including stores, campgrounds, and resorts.

A Fire Protection Assessment was completed for the Black Hills National Forest and incorporated into the Black Hills Land and Resource Management Plan. This assessment evaluated risks, hazards and values on the National Forest. The Prairie Project Area has a “Risk-Value-Hazard” rating of High-High-High due in part to frequent fire starts, dense fuels, and increasing housing densities. The average household size within the project area is between 2.31 and 3.16 persons. The total population within the project area is 7,800 with 3,200 housing units (Census 2000).

Wildland-Urban Interface:

The wildland-urban interface (WUI) refers to the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Within the project area, the following are part of the WUI:

- Country Side subdivision and Victoria Area residents off Sheridan Lake and Victoria Road on the southeast corner,
- Schroeder Road, Dark Canyon and Falling Rock Residents on the east and northeast corner,
- Johnson Siding, Nemo Road, Norris Peak Road, Hisega and Highway 44 corridor,
- Highway 385 residents on the northwest corner, and
- Edelweiss Mountain, and Bald Hills residents on the southwest corner.
- Many isolated private tracts of land, many with dwellings and other buildings that affect the use within the area.
- Hisega Summer Home Group and Wild Irishman and Pactola Basin isolated summer homes on National Forest System lands.

Individuals that chose to live within the WUI are lured by solitude and the opportunity of being close to nature. Problems brought about by the influx of people are not just wildfire-related. Development of subdivisions and private lands within the project area are complete with forest insect/disease outbreaks, vegetation management, and urban forestry concerns. Values associated with these developments that could be directly or indirectly affected by an intense wildfire include highways and roads, transmission lines, municipal watershed and reservoirs such as Canyon Lake. Many new residents moving to the WUI carry expectations of urban services with them. Residents with tenure have a strong tradition of multiple-use of resources

and expect a balance of goods and services from these resources. Wherever there are people living in or adjacent to wildland areas there is a concern about the threat of wildfire.

Communities by nature of their location in the WUI, play a key role in mitigation of wildfire hazard. The resources, authorities and people share in the responsibility with adjacent land managers, for developing healthy and disaster resilient communities. It is critical that communities become equal partners with the agencies in implementing the National Fire Plan. Without significant action by communities to mitigate hazards (i.e. homes and yards that are highly ignitable), there will be continued high probability for catastrophic wildfire in the wildland urban interface in spite of actions on Federal and State lands. The Federal and State agencies can assist communities in their efforts to become less prone to disaster with a wide variety of resources.

Lifestyles:

Although population growth is bringing in more people with new and different ideas, there is little evidence that attitudes or lifestyles are changing in a major way. The beauty of the area brings in new residents and those with tenure are tied to the way the Forest is already managed, either by employment such as the logging/ranching industries or people are outdoor-oriented and have developed varied and specific outdoor user expectations (hunting, fishing, biking, off-road use and tourist based activities). Some residents in the area consider the forest resources and forest health as an important part of their quality of life. Visitors, both local and non-local use the area for a wide range of dispersed recreation activities including, hunting, fishing, camping, wildlife viewing, and off-road vehicle use.

Motorized use in the Black Hills has a fairly long history and people have been utilizing roads to access most parts of the Forest. Off-road use has risen steadily in the past couple of decades. In the Rocky Mountain region, about three million people participated in off-road driving in 1995; that number is expected to increase 17% by the year 2020, about five million people participated in hiking in 1995; that number is estimated to increase 24% by the year 2020, nearly two million people participated in backpacking in 1995; that number is estimated to increase 18% by 2020 (Cordell 1999). Off-road use has also created some new conflicts among motorized users. Four-wheel drive enthusiasts desire rugged roads that are not maintained, while motorcycles and all-terrain-vehicles (ATV's) prefer trails. The rise in off-road use is not restricted to local users. The Black Hills is increasingly becoming a destination area for off-road use, due in part to its popularity, but also the increasing restrictions in off-road use in other parts of the country.

Based on comments received during scoping, motorized users enjoy the sport for many of the same reasons non-motorized users say their activities should not be allowed, i.e. the chance to enjoy the beauty of nature and spend time away from the masses. They just prefer to participate in these activities using motorized vehicles. Motorized users feel they are being forced out of the forest by more restrictive rules and regulations. Many of the motorized users indicated they have a great respect for the land and try to be courteous when traveling. They feel the few people who do not follow the rules are giving all motorized users a bad name. Many motorcycle users feel their activities are compatible with non-motorized activities such as mountain biking and hiking.

A growing section of the population is calling for more areas to be managed for non-motorized uses. They feel that motorized use reduces their opportunities to experience solitude and non-motorized activities such as hiking, wildlife viewing, horseback riding, and picnicking. Mountain bike use has greatly expanded in recent years and, as with off-road use, the Black Hills is becoming a destination area.

Concerns received from non-motorize users included noise, dust, safety issues, wildlife displacement and harassment, and resource damage. Some commentors indicated that motorized and non-motorized uses are not compatible. When motorized use begins in an area, the non-motorized users go elsewhere. Many of the reasons people prefer non-motorize activities, is to enjoy the quiet, solitude, and natural sounds of nature. Unlike motorize users, mountain bikers prefer not to share the trail with motorcycles and ATV's, but are willing to share with hikers and equestrians.

Dispersed recreation within the Prairie Project Area will continue to grow, as will conflicts between motorized and non-motorized users. Any time access is limited, some users will gain and others will lose. Restrictions or prohibitions on motorized travel would indirectly benefit people who prefer non-motorized recreation, and could provide better hunting opportunities as big-game security is improved. However, restrictions or prohibitions on motorized travel can affect the ability to gather firewood, to hunt using vehicles, and to sightsee in portions of the project area. Off-road activities can lead to soil erosion, soil compaction and gully formation in riparian areas. The potential to cause resource damage is not limited to motorized travel. Trail segments heavily used by hikers, mountain bikes or horses can be damaged, leading to soil erosion and compaction.

Human Health and Safety

Public safety is more often affected by the choices people make on their own while visiting the project area, or by the consequences of natural events, like wildfires, flooding or hail storms. Despite being in close proximity to Rapid City, the project area is rural forested and in places semi remote. Hazards exist in the form of natural and human-caused conditions. Wild animals, insects like ticks, which may carry lime disease, are present. Weather-related events can be life threatening, and probability of a wildfire is a risk every month the year. Most human activities in the Forest, including hunting, hiking, mountain biking, and driving a vehicle, carry some inherent risk.

Fuel treatments that reduce the potential of a large, catastrophic fire occurring also help to protect human health and safety. Fuel treatment areas are marked and signed to make travelers aware of individuals and actions associated with the activity. Smoke from fuel treatments and wildfire can be a nuisance and may pose a threat to human health and safety.

Currently there is an extensive road system throughout most of the project area for fire suppression. A main concern is the ability of the Forest Service and local volunteer fire departments to have access and that important arterial and access roads are not closed in order to suppress most fires while they are still small in size (See 'Fire/Fuels Report discussion on access).

Effects on the Social Environment

ALTERNATIVE A

Under this alternative there would be no reduction to fire/fuels hazards or changes to roads, access, and travel management.

A great deal of attention has been focused on the increasing size and severity of wildfires occurring on forested lands, particularly pine forests of the west. Recent wildfires on the Black Hills National Forest have demonstrated that these fires are larger, hotter and more lethal to vegetation and soil than historic fires in ponderosa pine ecosystems. Additionally, these wildfires are more dangerous or damaging to human settlements, property, and values because of settlement patterns of humans within these environments.

A large, uncontrolled fire could threaten the numerous subdivisions and homes previously described within the surrounding wildland-urban interface. These homes often have: dense and continuous vegetation surrounding them, inadequate space between flammable fuels, lack of fire-resistant landscaping, and woodpiles or other flammable debris near structures.

Although not noted for loss of life, fires in the wildland/urban interface (WUI) are responsible for extremely large property losses.

If a large, catastrophic wildfire were to happen, aesthetics, privacy, and economic property values in the burned area would likely be considerably diminished in the short-term. As vegetation grows back and burned dead timber falls and deteriorates, the long-term (beyond 10-15 years) effects of the wildfire on property values would be lessened. Sense of loss of amenities and property values gradually fades. People become accustomed over time to changes in scenery and other impacts like loss or damage to structures. Large amounts of smoke could affect the city of Rapid City and surrounding communities during a fire event. Smoke from such a wildfire would present health problems to elderly and persons with respiratory problems (see 'Fire/Fuels' and prescribed burning section for a discussion of smoke impacts).

A large fire similar to the Grizzly Gulch near Deadwood in July 2002 would have long-term indirect effects. Soil movement, mud and woody debris flows, and flooding would occur during the rainy season following the fire. Sediment flow would increase in the reservoirs and would likely continue for several years following a major fire (see 'Watershed/Soils' discussion).

There would be no effect on access and travel management beyond current impacts, as management activities would not change. Conflicts between motorized and non-motorized users would continue and perhaps, increase in the future as the population of Rapid City and surrounding area increases. If there were a large fire, an area closure may be placed on National Forest System lands for safety reasons from falling dead trees along roads, and to allow time to repair damaged roads and rehabilitate the area. Also, temporary closure(s) to off-road motorized use would be in effect to protect sensitive soils and reduce weed infestations.

ALTERNATIVE B

Under this alternative the fire hazard /fuels reduction objectives would be addressed by utilizing limited commercial thinning, extensive non-commercial thinning and prescribed burning. Access and travel management would emphasize non-motorized use.

Extensive prescribed burning (7,502 acres) will occur under Alternative B. The potential social effects from prescribed burning include the risk of escaped fire, smoke impacts to health and safety, and associated costs. These risks are minimized by the mitigation measures and monitoring required prior to and during broadcast burning treatments. The resulting reduced fire hazard in the treatment areas and the completion of fuel breaks along private lands would increase the likelihood that firefighters would be suppressing, from defensible positions, low to moderate fire intensities that may threaten the CARs versus a high intense one.

Non-motorized users would benefit under Alternative B, which would enhance their recreation experiences by reducing the conflicts between motorized and non-motorized users. Individuals that engage in motorized activities would lose that opportunity on 82% of the project area, which could diminish their social well-being. Hunters would not be able to drive off-road within a majority of the project area to retrieve game.

ALTERNATIVE C

Under Alternative C, aggressive treatment of forest vegetation would address the fire hazard and fuels reduction needs within the Prairie Project Area. This alternative provides a broad spectrum of access and travel management opportunities for forest users.

A moderate amount of prescribed burning (4,224 acres) will occur under Alternative C. The potential social effects from prescribed burning include the risk of escape fire, smoke impacts to health and safety, and associated costs. These risks are minimized by the mitigation measures such as construction of fire lines, the presence of engines, and adherence to prescribed burn plans. The reduced fire hazard in the treatment areas and the completion of fuel breaks along private lands would reduce the potential for catastrophic wildfire and would increase the likelihood that firefighters would be suppressing, from defensible positions, low to moderate intensity fires that may threaten the CARs versus a high intensity one.

Alternative C provides a range of recreation and travel choices by establishing “core use” corridors. In the northern portion of the project area, motorized on and off-road use is open year-round. In the central portion of the project area along the Rapid Creek corridor, it is closed year-round with non-motorized use emphasis. In the southern portion of the project area, it is open seasonally with certain roads open in the summer and closed in the winter (December 15 – May 15) and it is closed to off-road motorized use year-round.

Conflicts between motorized and non-motorized user would be reduced under Alternative C by establishing “core use” corridors. The quality of hunting would be enhanced for those who

prefer a non-motorized experience; however, hunters would not be able to drive off-road to retrieve game in the central portion of the project area due to off-road year-round closure.

ALTERNATIVE D

Under Alternative D, forest vegetation would be treated within the scope of the Forest Plan to address the fire hazard and fuels reduction needs within the Prairie Project Area. The Forest Plan would guide access and travel management. On and off-road travel is based on Management Area direction.

There is no prescribed burning under Alternative D. Thus, potential effects from prescribed fire described in Alternatives B and C would not occur.

The reduced fire hazard in the treatment areas and the completion of fuel breaks along private lands would increase the likelihood that firefighters would be suppressing fire, from defensible positions, low to moderate fires that may threaten the CARs versus a high intense one.

The majority of the project area (two thirds) would be closed seasonally to off-road travel (MA 5.4). Many Level 1 and unclassified roads would be closed, converted to trails or current travel restrictions more effectively enforced. Conflicts between motorized and non-motorized users would be less than alternative A if travel restrictions were enforced.

Cumulative Effects

The population of Rapid City and surrounding area will continue to grow in the future. The majority of this growth is expected in the forested areas to the south and west of Rapid City, as well as development of private inholdings within the project area.

The expected increase in area population and related increase in both motorized and non-motorized recreation activities, would, in general, lead to more conflicts among users on roads, trails, and areas that remain open to off-road use. All of the alternatives, except the No Action, act to alleviate some of the conflicts between motorized and non-motorized users, which are expected to increase in the future.

Although a small percentage of motorized travel actually occurs off roads and trails, the fact that motorized travel has gradually been restricted on most public lands, would add to some motorized users' concerns regarding control and management of public lands. All alternatives except the No Action could add to these feelings.

The implementation of any of the action alternatives would not significantly impact, and thus impair, human health and safety resources or values.

Environmental Justice

Executive Order 12898 (February 11, 1994) directs Federal agencies to focus attention on the human health and environmental conditions in minority communities and low-income communities. The purpose of the Executive Order is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

During the course of this analysis, no alternative resulted in any identifiable effects or issues specific to any minority or low-income population or community. The agency has considered all input from persons or groups regardless of age, race, income status, or other social and economic characteristics.

Civil Rights

No civil rights effects associated with age, race, creed, color, national origin, or sex have been identified.

ECONOMICS

The following is a summary of the analysis used to calculate a variety of financial measures describing the alternatives in the Prairie EIS. The Quick-Silver program is used to perform the analysis (QS Version 5.004.45 (USDA-Forest Service, North Central Experiment Station, February 16, 2000)). The financial analysis was done both from a short-term and long-term perspective. The complete analysis including reports generated resides in the Prairie project file.

The objective of the analysis is to provide a relative comparison of the costs and revenues associated with implementing the four alternatives being analyzed. There are costs and benefits associated with activities occurring in the Prairie Project Area that are not included in this analysis (e.g., recreation management, Christmas trees, fuelwood gathering). This analysis does not include these activities because they occur across the District and Forest and they are not directly related to the proposed action. The action alternatives will not significantly change these other items.

This EIS discusses three action alternatives for managing the Prairie Project Area for the next ten to fifteen years. The financial analysis includes those actions connected to the vegetation treatment for fire and fuels reduction needs and related actions that are planned over this management timeframe. The only benefits included in the analysis were the revenues generated from the volume of timber and products other than logs (POL) harvested per alternative. This analysis does not include revenues generated in the local and regional economies related to wages, equipment and supplies purchased, and taxes paid.

The action alternatives described in this EIS are consistent with National level initiatives and policy such as the National Fire Plan, Healthy Forest Initiative and direction provided by the

Forest Plan, Phase I Amendment and associated economic assumptions. Any future project proposals will receive a separate environmental analysis, including financial and/or economic analysis, as appropriate. Table 3-31 displays the financial measures summarized by alternative.

Table 3-31 Financial Measures by alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Present Net Value (PNV)	NA	-\$5.1 million	-\$1.9 million	-\$1.2 million
Benefit/Cost Ratio (B/C)	NA	.04	.73	.61
Benefits (PV)	NA	\$0.2 million	\$5.1 million	\$1.9 million
Costs (PV)	NA	-\$5.3 million	-\$7.0 million	-\$3.1 million

High cost and revenue factors influencing the differences in these financial outcomes are:

- The varying revenues (benefits) generated from the alternative volumes removed through commercial vegetation treatment: (3,100 CCF in Alternative B, 74,000 CCF in Alternative C and 27,292 CCF in Alternative D).
- Costs associated with the large number of non-commercial thinning acres planned: (4,700 acres in Alternative B, 6,300 acres in Alternative C, and 4,200 acres in Alternative D).
- Costs associated with the differences in prescribed burning acres: (7,500 acres in Alternative B, 4,200 acres in Alternative C, and 0 acres in Alternative D).
- Costs associated with the anticipated large number of disturbed areas needing noxious and invasive weed treatment: about 4,900 acres in Alternative B, 5,500 acres in Alternative C, and 3,000 acres in Alternative D.

As documented in this EIS, Alternative A (No Action) poses the greatest risk of catastrophic wildfire within the project area. Although potential costs associated with such an occurrence is not integrated into this financial analysis, the actual cost of no action could potentially be much higher than the action alternatives in both economic and environmental terms. Recent wildfires on the Black Hills and in the western USA have experienced costs in the millions of dollars for suppression alone. For example, suppression costs for the recent Battle Creek Fire are estimated at \$6.5 million and the Jasper Fire around \$11.5 million. Costs of rehabilitation, economic loss of resources and property values are significant additional costs of these wildfires.

The cost of implementing Alternative B exceeds the revenues generated by \$5.1 million dollars. There are minimal revenues generated in this alternative because a small amount of commercial harvest is planned. Thus, implementation costs of the alternative are defrayed to a minimal extent by revenues. This means that to implement this alternative additional funding such as appropriated funds dollars or other sources will be necessary to accomplish activities planned. Alternative B has the greatest uncertainty in funding and therefore of not being entirely accomplished. This would equate to an increased risk to catastrophic wildfire and all its economic and environmental effects.

This analysis illustrates that commercial harvest revenues offset costs of alternative implementation in proportion to the value and amount of volume removed. Revenues from

Alternative C offset implementation costs to a much greater degree than Alternative B. As the Table above illustrates, Alternative C generates \$5.1 million and has costs associated with implementing activities totaling \$7.0 million. As with Alternative B, other funding sources such as appropriated funds dollars or external contributions would be needed to accomplish all the activities planned. Because of the greater revenues generated, more activities critical to meeting the purpose and need could be accomplished under Alternative C relative to the other action alternatives.

In similar fashion, the cost of completing activities planned in Alternative D exceeds revenues. Alternative D generates \$1.9 million and has costs associated with implementing activities totaling \$3.1 million. Again, other funding sources would be needed to accomplish all the activities planned. The difference between revenues and costs in Alternative D is the least of the three action alternatives at \$1.2 million. However, this alternative achieves substantially less in terms of fuels and fire hazard reduction projects than Alternative C.

With Alternative C, there is a greater impact in terms of reducing the potential for catastrophic wildfire and the economic and environmental effects associated with such an event. This difference is not reflected in the benefit/cost (b/c) ratio of the respective alternatives as shown in the table above. Alternative B has a very low b/c ratio of .04. Alternative C b/c ratio is .73 as compared to .61 for Alternative D. Alternative D has greater certainty of being fully funded. Revenues come closer to offsetting costs in Alternative D because less work is being accomplished relative to Alternative C.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road. For further discussion of the effects on the resources listed below, see Chapter 3 under the respective resource topics.

There are no **irreversible commitments** of resources with any of the alternatives analyzed.

Irretrievable commitments of resources include the following:

Soil productivity and **timber productivity** is lost where road construction is planned in Alternative C (about 3 miles) and Alternative D (about 1 mile).

Air quality is temporarily impacted (lost) to varying degrees by smoke generated from prescribed burning and dust from road use resulting from implementation of the action alternatives.

Wildlife habitat loss or modification for certain wildlife species is likely under the action alternatives. As vegetation recovers, habitat would eventually return over various periods of time depending on the amount of vegetation treatment and/or disturbance.

Noxious and invasive weeds resulting from alternative implementation could potentially have an irretrievable commitment of resources if allowed to persist. Infestation can impact native plant communities that lead to losses in wildlife habitat, soil productivity, soil erosion, forage for grazing and vegetative diversity.

Travel and Recreation Use such as motorized and non-motorized travel would be curtailed, modified and/or eliminated to varying degrees and in certain portions of the project area depending on the action alternative implemented.

Scenic conditions will be modified to varying degrees depending on the action alternative implemented.

SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). For further discussion of the effects on the resources listed below, see Chapter 3 under the respective resource topics.

Actions under Alternatives B, C and D are implemented using mitigation measures that protect **soil productivity**. Any decrease in long-term soil productivity resulting from actions will be negligible.

As provided for by the Forest Plan, minimum management requirements guide implementation of the action alternatives. Adherence to these requirements ensures that long-term productivity of the land is not impaired by short-term uses. Monitoring specified in this EIS and the Forest Plan validates that the management requirements and mitigation are effective in protecting long-term productivity.

UNAVOIDABLE ADVERSE EFFECTS

The following is a description of adverse effects that are unavoidable with implementation of action alternatives. For further discussion of the effects on the resources listed below, see Chapter 3 under the respective resource topics.

Wildlife habitat for certain species will be adversely affected to varying levels with implementation of the action alternatives. The Wildlife Section of this EIS discloses those effects.

Air quality will be adversely affected on a temporary/seasonal basis as a result of planned prescribed burning and dust from roads and activities.

Travel And Recreation Use on the part of the public will experience some adverse effects in terms of what users are currently used to doing versus changes resulting from implementation of the various alternatives.

Scenic quality will be affected adversely for some observers by the various levels of vegetation treatment and other actions planned.

Fire/Fuels hazard will be increased during the short-term in some areas as a result of slash created from vegetation treatment. With disposal treatment this hazard will be reduced. There exists a higher long-term potential for catastrophic wildfire under Alternative A versus the action alternatives.

Soils can be eroded wherever vegetation and soils are disturbed. Compaction can occur where vehicles and equipment are used.

Heritage resources can be disturbed or destroyed where human or natural activities take place.

Forest insects and disease will continue within the project area at endemic levels.

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CHAPTER 6 GLOSSARY

Access

The opportunity to approach, enter and make use of public or private lands.

Activity Fuels

Fuels resulting from or altered by forestry practices, such as timber harvest or thinning, as opposed to naturally created fuels.

Adaptive Management

Implementing policy decisions as science-driven management experiments that tests assumptions and predictions in management plans.

Age Class

Groups of trees or shrubs approximately the same age.

Arterial Road

(See "Road Functional Classification".)

Basal Area (Timber Resource)

The cross-sectional area of a stand of trees measured at breast height. The area is expressed in square feet per acre.

Best Management Practices (BMPs)

Land management methods, measures or practices intended to minimize or reduce water pollution. Usually, BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic and technical feasibility.

Big Game

Certain wildlife that may be hunted for sport under state laws and regulations. In the Black Hills, these animals include deer, elk, turkey, mountain goats and bighorn sheep.

Big Game Security

Protection that allows an animal to remain in a defined area despite increases in stress and disturbance associated with hunting season or other human activities (Lyon and Christensen 1990).

Biological Diversity

The full variety of life in an area, including the ecosystems, plant and animal communities, species and genes, and the processes through which individual organisms interact with one another and with their environments (Rocky Mountain Regional Guide 1992).

Biological Evaluations

As defined by FSM 2670.5, a biological evaluation is a documented Forest Service review of Forest Service programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered, proposed or sensitive species. FSM 2672.4 identifies biological evaluation objectives and standards.

Black Hills HABCAP Model

A model designed to evaluate the capability of habitats to support individual species based on the combination of plant communities and structural stages.

BMPs

(See "Best Management Practices")

Broadcast Burning

A fire ignited under specific conditions (prescriptions) and within established boundaries to achieve some land management objective.

Browse

That part of the current leaf and twig growth of shrubs, woody vines and trees available for animal consumption (Schwarz et al. 1976).

Canopy Closure (Canopy Cover), Canopy Layer (Silviculture)

Canopy Closure/Cover: The percentage of the ground and/or sky covered by vegetation and/or branches. These are perceived from a human point of view perpendicular to flat ground.

Canopy Layer: Cover by vegetation and branches in different height intervals. These intervals are often defined in terms of vegetation, such as herbaceous or grass/forbs less than 2 feet tall, shrubs less than 6 feet tall, and overstory greater than 6 feet tall.

Cavity Nesting Species

Wildlife species that depend on cavities in trees for their shelter and/or nesting. These species include primary cavity nesters, such as woodpeckers, which excavate cavities in soft or decayed wood for nesting, and secondary cavity nesters that typically nest in natural cavities or those excavated by another species.

CFR

Code of Federal Regulations.

Closed Road

An intermittent service road in Maintenance Level 1 that is closed to all vehicular traffic for more than 1 year. The closure may be ordered under 36 CFR 261.

CMAI

(See "Culmination Mean Annual Increment".)

Commercial Thinning

(See "Thinning".)

Commercial Timber Sales

The selling of timber from National Forest System lands for the manufacture of commercial products such as lumber, plywood, etc.

Conifer

A group of cone-bearing trees, mostly evergreen, such as the pine, spruce and juniper.

Construction (Roads)

The displacement of vegetation, soil and rock, and the installation of human-made structures involved in the process of building a complete, permanent road facility. The activities occur at a location, or corridor, that is not currently occupied by a road.

Continuous Fuel Concentrations (Fire Management)

An uninterrupted distribution of fuel particles (surface or aerial) in a fuel bed, which allows a fire to sustain combustion and actively continue to spread.

Cover Type

The vegetative species that dominates a site. Cover types are named for one plant species or non-vegetated condition presently (not potentially) dominant, using canopy or foliage cover as the measure of dominance. In several cases, sites with different species dominant have been lumped together into one cover type; co-dominance is not necessarily implied.

Critical Habitat (Threatened, Endangered and Proposed Species)

Habitat of federally listed threatened or endangered species where those physical and biological features essential to conservation of the species are found and which may require special management considerations or protection. This habitat may currently be occupied or determined by the Secretary of the Interior to be essential for areas outside the species' current range.

Crown (Vegetation)

The upper part of a tree or other woody plant carrying the main branch system and foliage, and surmounting at the crown base a more or less clean stem.

Crown Closure

(See "Canopy Cover".)

Crown Density

The thickness, both spatially in depth and in closeness of growth (compaction), of an individual crown, such as its opacity as measured by its shade density.

Crown Height

For a standing tree, crown height is the vertical distance from ground level to the base of the crown, measured either to the lowest, live branch-whorl or to the lowest live branch, excluding shoots arising spontaneously from buds on the stem of a woody plant or to a point halfway between.

Culmination Mean Annual Increment (CMAI)

The point at which a tree or stand achieves its greatest average growth, based on expected growth, according to the management systems and utilization standards assumed in the Forest Plan.

Cumulative Effects

Collective results of past, present and reasonably foreseeable future actions, regardless of which agency or person undertakes the actions.

DBH

(See "Diameter at Breast Height".)

Dead Fuels (Fire Management)

Fuels with no living tissue within which moisture content is governed almost entirely by solar radiation.

Dead Woody Material

(See "Down Woody Material".)

Decision Documents

Documents that provide the criteria and information used in the formulation and evaluation of alternatives and the preferred alternative.

Direct Effects

Results of an action occurring when and where that action takes place.

Dispersed Recreation

This type of recreational use requires few, if any, improvements and may occur over a wide area. This type of recreation involves activities related to roads, trails and undeveloped waterways and beaches. The activities do not necessarily take place on or adjacent to a road, trail, or waterway, only in conjunction with them. Activities are often day-use oriented and include hunting, fishing, boating, off-road vehicle use, hiking and others.

Diversity

Diversity refers to the distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. This term is derived from the National Forest Management Act (NFMA). This term is not synonymous with "biological diversity."

Down and Dead Woody Material, Down Logs, Down Woody Material (Vegetation)

Woody material, from any source, that is dead and lying on the forest floor.

Draft Environmental Impact Statement (DEIS)

The statement of environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act and released to the public and other agencies for comment and review.

Effects (Heritage Resources)

Impacts to the characteristics that qualify a heritage resource for the National Register of Historic Places. These can include alterations in location, setting, use, design, materials, feeling and association. Adverse effects include: (1) physical destruction or damage, (2) isolation from or alteration of setting, (3) introduction of visual, audible or atmospheric elements, (4) physical deterioration from neglect or from any action, and (5) transfer, lease or sale.

Egress

Path by which a person goes out; exit. The means or act of going out. Often used with the word "access."

EIS

(See "Environmental Impact Statement".)

Endangered Species

Any species of animal or plant in danger of extinction throughout all or a significant portion of its range and so designated by the Secretary of Interior in accordance with the 1973 Endangered Species Act.

Environmental Impact Statement (EIS)

A document prepared by a federal agency in which anticipated environmental effects of a planned course of action or development are evaluated. A federal statute (Section 102 of the National Environmental Policy Act of 1969) requires that such statements be prepared. It is prepared first in draft or review form and then in a final form. An impact statement includes the following points: (1) the environmental impact of the proposed action, (2) any adverse impacts that cannot be avoided by the action, (3) the alternative

courses of actions, (4) the relationships between local short-term use of the human environment and the maintenance and enhancement of long-term productivity, and (5) a description of the irreversible and irretrievable commitment of resources, which would occur if the action were accomplished.

Ephemeral Streams

(1) A stream or portion of a stream that flows briefly in direct response to precipitation in the immediate vicinity, and whose channel is at all times above the water table. (2) Ephemeral areas drain water to intermittent or perennial stream channels. Any sediment created by soil erosion during logging or road-building activities can be carried by way of the ephemeral, intermittent and perennial stream channels to the watershed outlet. Ephemeral areas generally occur above the upper reaches of intermittent or perennial streams. Since they can direct water into intermittent or perennial stream channels, care should be taken to minimize disturbing soil in these areas.

Erosion

The wearing away of the land surface by running water, wind, ice, gravity or other geological activities.

Even-aged Management

The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (and therefore, tree sizes) throughout the forest area. The difference in age between trees forming the main canopy level on a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time of harvest. Clear-cut, shelterwood or seed-tree cutting methods may produce even-aged stands.

Fire Occurrence

Number of fires per unit time in a specified area (syn. fire frequency).

Fire Protection Assessment (FPA) (Fire Management)

A computer software based analysis to assist managers in determining where specific types and intensities of fire management activities should occur. The analysis uses three map overlays depicting fuel flammability (Hazard), potential value change from fire (Value), and the potential that an ignition will occur (Risk) as a means of identifying and prioritizing appropriate fire management activities for a given land unit.

Risk: A term within the Fire Protection Assessment identifying the potential for an ignition to occur in a given land unit based on historical data associated with frequency of natural ignitions and the probability of human ignitions based on an assessment of human activities.

Hazard: A term within the Fire Protection Assessment which represents a function of potential fire line intensity based on fuels, topography, and weather influences.

Value: In the context of the Fire Protection Assessment, value refers to the potential for negative value change from wildfire. Value considerations would include the value of developments and natural resources, including aesthetics, all of which are subject to change from wildfire.

Fire Risk

The chance of a fire starting, as affected by the nature and incidence of causative agents, including lightning, people and industry. Three risk scales are used: high, moderate and low. High risk areas include locations where lightning, people or industry have commonly caused fire in the past; moderate risk areas include locations where lightning, people or industry have periodically caused fire in the past; low risk areas include locations where lightning, people or industry have infrequently caused fire in the past.

Fire Suppression

All the work and activities connected with fire-extinguishing operations beginning with discovery and continuing until the fire is completely extinguished.

Fireline Intensity

The rate of heat energy released per unit time per unit length of a fire front. Numerically, it is the product of the heat combustion, quality of fuel consumed per unit area in the fire front, and the rate of spread of a fire as measured in BTUs per second per foot of the fire front.

Floodplain

That portion of a river valley, adjacent to the channel, which is built of sediments deposited during the present regimen of the stream and covered with water when the river overflows its banks at flood stages.

Forage

Vegetation used for food by wildlife, particularly ungulate wildlife and domestic livestock (Thomas et al. 1979).

Forbs

Any herbaceous plant other than those in the grass, sedge and rush families. For example, any non-grass-like plant that has little or no woody material (Wildland Planning Glossary 1976).

Forest Development Roads

A Forest road under the jurisdiction of the Forest Service. Forest Development roads are not intended to meet the transportation needs of the public at large. Generally, these are roads constructed to a standard to serve expected traffic generated by resource management. Although generally open and available for public use, the Forest Service may restrict or control use to meet specific management direction.

Forest Interior Habitat

That portion of the stand not affected by edge is termed interior habitat. The value of forest stands in providing interior habitat depends on the effects of edge on the microclimate of the stand (Lehmkuhl and Ruggiero 1991). In the Black Hills, forest interior is defined as that portion of a forest stand more than 300 feet from an opening.

Forest Supervisor

Official responsible for administering the Black Hills National Forest. The Forest Supervisor reports to the Regional Forester.

Forest System Roads

Roads that are part of the Forest Development Transportation System, which includes all existing and planned roads, as well as other special and terminal facilities designated as part of the Forest Development Transportation System.

Fragmentation (Wildlife)

Habitat fragmentation is a process that occurs wherever a large, contiguous habitat is transformed into smaller patches isolated from each other by a landscape matrix unlike the original. This matrix can differ from the original habitat in either composition or structure. The crucial point is that fragmentation functions as either a partial or total barrier to dispersal for species associated with the original habitat (Thomas et al. 1990). A clear threat to population viability occurs when the process of fragmentation isolates populations.

Fuel Breaks

Generally wide strips of land 60 to 1,000 feet in width on which native vegetation has been modified so that fires burning into them can be more readily controlled. Some fuel breaks contain fire lines, such as roads or handlines, which can be widened.

Fuel Continuity

Degree or extent of continuous or uninterrupted distribution of fuel particles (surface or aerial) in a fuel bed, which thus affects a fire's ability to sustain combustion and spread.

Fuel Loading

The volume of the available or burnable fuels in a specified area, usually expressed in tons per acre.

Fuel Treatment

Any manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control, including lopping, chipping, crushing, piling and burning (syn. fuel modification).

Fuels

The organic materials that will support the start and spread of a fire: duff, litter, grass, weeds, forbs, brush, trees and dead woody materials.

Fuelwood

Round, split or sawed wood cut into short lengths for burning as fuel.

Grass/Forb, Grass/Forb Stage

(See Structural Stages)

HABCAP Model

(See "Black Hills HABCAP Model".)

Habitat

The place where an organism (plant or animal) lives (Odum 1971).

Habitat Capability (Wildlife)

The capacity of a certain vegetative community to support selected wildlife species for all or a part of its life cycle. Habitat capability is estimated using the Black Hills HABCAP model.

Habitat Effectiveness (Elk and Deer)

As used in this document, habitat effectiveness refers to the capability of an area to support elk or deer based on forage, cover, open roads and the spatial distribution of the three factors, regardless of the time of year.

Hard Snags (Vegetation)

A dead or partially dead tree composed primarily of sound wood, particularly sound sapwood (Thomas et al. 1979).

Hardwood

Pertains to broadleaf trees or shrubs.

Hazard (Fire Management)

(See "Fire Protection Assessment".)

Hazard Reduction

(See "Fuel Treatment".)

Heritage Resources

The physical remains (including but not limited to artifacts, structures, landscape modifications, rock art, trails or roads) and conceptual content or context (as a setting for legendary, historic or prehistoric events, such as a sacred area for native peoples) of an area.

Hiding Cover (Wildlife)

Vegetation capable of hiding 90 percent of a standing adult deer or elk from the view of a human at a distance equal to or less than 200 feet.

High Risk (Fuels)

(See "Fire Risk".)

Horizontal Diversity (Vegetation)

The diversity in an area that results from the number and arrangement of plant communities or successional stages or both; the greater their number, the greater the horizontal diversity. Also, the greater the amount of edge, the higher the degree of horizontal diversity (Thomas et al. 1979).

ID Team

(See "Interdisciplinary Team".)

Ignition (Fire Management)

The initiation of combustion.

Indirect Effects

Results of an action occurring at a location other than where the action takes place and/or later in time, but in the reasonably foreseeable future.

Insect and Disease Epidemics

High population levels of insect or disease pests that cause substantial injury to plant or animal hosts.

Insect and Disease Suppression

Management practices applied to reduce insect and disease pest populations or damage. Insect and disease suppression includes actions taken to limit the spread of pests or to reduce susceptibility of hosts in imminent danger of being attacked.

Intensity (Fire Management)

How hot a fire is. Specifically, a measure (in BTUs per foot per second) of the energy released per unit of time in an area of actively burning fire. The amount of heat released per foot of fire front per second.

Interdisciplinary Team (IDT)

A group of individuals with different specialized training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view and a broader range of expertise to bear on the problem.

Intermittent Stream

(1) A stream that flows only at certain times of the year, as when it receives water from springs or from a surface source, such as melting snow. (2) A stream that does not flow continuously, as when water losses from evaporation or seepage exceed the available streamflow.

Ips (Pine Engraver Beetle)

A genus of bark beetle that feeds beneath the bark of pines, typically killing branches, tops or entire trees. These beetles often breed in logging slash or attack stressed and injured pines.

Landscape (Silviculture)

The primary unit of analysis for silviculture. A landscape for purposes of silviculture is a diversity unit, or sixth-level watershed.

Landscape Scale

A heterogenous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout. Landscapes vary in size from many thousands of acres to only a few acres (Forman and Godron 1986).

Late Succession

Ecosystems distinguished by old trees and related structural features. This term encompasses the later stages of stand development that typically differ from earlier stages in structure, composition, function and other attributes (Kaufmann et al. 1992).

There are two types of late succession ponderosa pine defined for the Black Hills. The first type, open-canopy late succession ponderosa pine, occurs where periodic, low-intensity fires have been part of the ecosystem. These late successional stands would consist of clumps or groups of trees with grasses in the openings between the clumps. They would contain large old trees with open branches, irregular and flattened crowns. The clumps or groups of trees would contain little down dead material and few small trees (Mehl 1992).

The second type, closed-canopy late succession ponderosa pine occurs where periodic, low-intensity high-frequency fires have not been a significant part of the ecosystem. These stands would contain large old trees with open branches and irregular crowns. The stands would have multiple canopy layers made up of various-aged trees. They would be well stocked with trees and contain standing dead and down trees.

Logging Slash

The wood residue left on the ground after harvesting. It includes unused logs, uprooted stumps, broken or uprooted stems, tops, branches and leaves.

Lopped, Lopping (Timber Management)

Cutting off one or more branches of a tree, whether standing, dead or fallen.

Lopping and Scattering

Lopping logging debris and spreading it more or less evenly on the ground.

Maintenance Levels

(See "Road Maintenance Level".)

Management Indicators (Wildlife)

Plant or animal species or habitat components selected in a planning process that are used to monitor the effects of planned management activities on populations of wildlife and fish, including those that are socially or economically important.

MBF

Thousand board feet.

Meadow

An area of perennial, herbaceous vegetation, usually grass or grass-like. A natural opening in a forest, generally at higher elevations, that produces exceptional levels of herbaceous plants, which is usually a consequence of high soil/water content, or a perched water table. Generally, a prairie grassland will occupy a convex surface, while a meadow will occupy a concave surface.

Mitigation

Includes (a) avoiding the impact altogether by not taking certain action or parts of an action, (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation, (c) rectifying the impacts by repairing, rehabilitating or restoring the affected environment, (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, (e) compensating for the impact by replacing or providing substitute resources or environments (40 CFR 1508.20).

MMBF

Million board feet.

MMCF

Million cubic feet.

Moderate Risk (Fuels)

(See "Fire Risk".)

Moisture Regime (Soils)

The presence or absence of groundwater or water held at a tension of less than 15 bars in the soil or in specified horizons by periods of the year.

Monitoring

The sample collection and analysis of information regarding Forest Plan management practices to determine how well objectives have been met, as well as the effects of those management practices on the land and environment.

Motorized Recreation

A recreational opportunity provided through the use of a motorized vehicle. This includes travel on and off highways, Forest roads, and four-wheel-drive primitive roads and trails. Travel regulations may be established for the protection of forest resources, to minimize use conflicts and to promote user safety.

Multi-storied Stands (Vegetation)

Plant communities having two or more recognizable canopy layers or height levels.

Multiple Use

According to the Multiple-use Sustained-yield Act of 1960, multiple use is the management of all the various renewable surface resources of the National Forest System so that they are utilized in the

combination that will best meet the needs of the American people; such management makes the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions. Some lands will be used for less than all of the resources. Harmonious and coordinated management of the various resources is employed, each with the other, without impairment of the productivity of the land. Consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

National Environmental Policy Act of 1969 (NEPA)

An act declaring a national policy to encourage productive harmony between people and their environment, to promote efforts that will prevent or eliminate damage to the environment and the biosphere and simulate the health and welfare of people, to enrich the understanding of the ecological systems and natural resources important to the nation and to establish a Council on Environmental Quality.

National Forest Management Act (NFMA)

A law passed in 1976 amending the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Regional and Forest Plans and the preparation of regulations to guide that development.

National Forest System (NFS) Land

Federal lands designated by Executive Order or statute as National Forests, National Grasslands or Purchase Units, or other lands under the administration of the Forest Service.

Natural Fuels

Fuels resulting from natural processes and not directly generated or altered by land management practices (compare activity fuels).

Net Public Benefit

The overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index.

Non-motorized Activities

Activities that do not incorporate the use of a motor, engine or other non-living power source. Non-motorized activities exclude such machines as aircraft, hovercraft, motorboats, automobiles, motor bikes, snowmobiles, bulldozers, chainsaws, rock drills and generators.

Noxious Weeds

Those plant species designated as weeds by federal or state laws. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host for serious insects or diseases, and generally non-native (FSM 2080).

Obliteration (Transportation)

The reclamation and/or restoration of the land occupied by a transportation facility for purposes other than transportation.

Off-Highway Vehicle (OHV)

Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, snow, ice, marsh, swampland or other natural terrain.

Off-Road Vehicle (ORV)
(See "Off-Highway Vehicle".)

OHV)
(See "Off-Highway Vehicle".)

Openings (Tree Canopy)
The hole created by removing the majority of the tree canopy. This includes the harvesting of the majority of trees in a given area.

ORV)
Off-Road Vehicle. (See "Off-Highway Vehicle".)

Overstory (Biological Diversity)
The portion of vegetation in a forest forming the uppermost foliage layer.

Pine Engraver Beetle
(See "Ips".)

Piling and Burning (Timber Management)
Piling slash resulting from logging and subsequently burning individual piles.

Prescribed Burning
Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions, that allows the fire to be confined to a predetermined area and, at the same time, to produce the fireline intensity and rate of spread required to attain planned resource management objectives (syn. controlled burning).

Prescribed Fire
A fire burning within prescription, resulting from planned or unplanned ignition.

Prescription (Fire Management)
A written statement defining objectives to be attained, as well as temperature, humidity, wind direction and wind speed, fuel-moisture content, and soil moisture, under which the fire will be allowed to burn, generally expressed as acceptable ranges of the various indices, and the limit of the geographic area to be covered.

Present Net Value (PNV)
The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

Pre-suppression (Fire Management)
Activities required in advance of fire occurrence to ensure an effective suppression action. It includes (1) recruiting and training fire forces, (2) planning and organizing attack methods, (3) procuring and maintaining fire equipment, and (4) maintaining structural improvements necessary for the fire program.

Products Other than Logs (POL), Products Other Than Sawlogs, Products Other Than Sawtimber
Products such as posts, poles and fiber from trees or parts of trees less than sawlog size. POL usually include trees greater than 5 inches diameter breast height (4.5 feet from ground level) and less than 7.9 inches diameter breast height, with tops of trees greater than 4 inches to less than 6 inches in diameter.

Ranger District

Administrative subdivisions of the Forest supervised by a District Ranger who reports to the Forest Supervisor.

Raptor Habitat

Habitat required by hawks, falcons or owls, especially for nesting.

Raptor Nests

Any active nest of eagles, hawks, falcons or owls.

Rate of Spread (Fire Management)

Relative activity of a fire in extending its horizontal dimensions, expressed as rate of increase of the perimeter, rate of increase in area, or rate of advance of its head, depending on the intended use of the information, generally in chains or acres per hour for a specified period in the fire's history.

Recreation Opportunity Spectrum (ROS)

A system for planning and managing recreational resources that categorizes recreation opportunities into seven classes. Each class is defined in terms of the degree to which it satisfies certain recreational experience needs based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area and the relative density of recreation use. The seven classes are:

Primitive: Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

Semi-primitive Non-motorized: Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.

Semi-primitive Motorized: Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Motorized use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motor bikes is permitted.

Roaded Natural: Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of people. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

Roaded Natural Non-motorized: Areas closed to motorized use, yet have been heavily modified or are not large enough to be set aside as semi-primitive non-motorized.

Rural: Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation or pastoral agricultural development. Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate user

densities are present away from developed sites. Facilities for intensified motorized use and parking are available.

Urban: Characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreational activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans are predominant on the site. Large numbers of users can be expected both on the site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

Resource Values

The tangible and intangible worth of forest resources.

Rights-of-way

Land authorized to be used or occupied for the construction, operation, maintenance and termination of a project or facility passing over, upon, under or through such land (36 CFR 251.51). The privilege that one person or persons particularly described may have of passing over the land of another in some particular line (FSH 2709.12).

Rights-of-way Corridors

A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries.

Riparian Area

(See "Riparian Ecosystem".)

Riparian Ecosystem

The moist transition zone between the aquatic ecosystem and the relatively drier, more upland, terrestrial ecosystem(s). This transition zone can extend both laterally and longitudinally away from aquatic ecosystems, sometimes into headwater swales that have no defined stream channel. The riparian ecosystem is the area whose soil is relatively more moist than the adjacent upland and whose vegetation growth reflects the greater accumulation of available water.

Risk (Fire Management)

(See "Fire Protection Assessment".)

Roads

A general term denoting a way with at least two wheel tracks for purposes of travel by vehicles greater than 50 inches in width.

Road Density

Road density refers to the miles of road per square mile. There are different road densities depending on what road types are being considered. These densities include:

Forest Development Road Density: The miles of Forest Development Roads per square mile. This is the road density of the road system managed by the Forest for resource management.

Open Road Density: The miles of Forest Development Road and other private and public roads and highways open for public travel.

Wheel-track Density: The miles of established wheel tracks per square mile. Wheel tracks are not managed as part of the Forest Development Road System and are formed by repeated travel off system roads by Forest users.

Road Maintenance Level

Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria (FSH 7709.58, Section 12.3). The maintenance levels are:

Maintenance Level 1: Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period is 1 year or longer. Basic custodial maintenance is performed.

Maintenance Level 2: Assigned to roads open for use by high-clearance vehicles. Passenger car traffic is not a consideration.

Maintenance Level 3: Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.

Maintenance Level 4: Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds.

Maintenance Level 5: Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-laned and paved, or aggregate-surfaced with dust abatement.

Road Prism

Equivalent to the term "roadway." The portion of the road within the limits of excavation and embankment, including slope rounding. A similar term is "road template," the shape and cross-sectional dimensions of the roadway to be constructed as defined by the construction staking notes and the characteristics of the typical sections.

Salvage Harvest

Removal of damaged, dead or dying trees resulting from insect and disease epidemics, wildfire or storms to recover logs before they have no commercial value for production.

Sawtimber

Trees suitable in size and quality for producing logs that can be processed into lumber. For planning purposes, trees with an 8-inch diameter or more are classified as sawtimber.

Scenery

The composition of basic terrain, geologic features, water features, vegetative patterns, and landrise effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Scenic Integrity (Existing or Objective)

State of naturalness or, conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from the existing landscape character in a national forest. It is the measure of the degree to which a landscape is visually perceived to be complete. The highest scenic integrity ratings are given to those landscapes which have little or no deviation from the character valued by constituents for its aesthetic appeal. Scenic integrity is used to describe an existing situation, standard for management, or desired future conditions.

Very High: A scenic integrity level that generally provides for ecological change only.

High: A scenic integrity level meaning human activities are not visually evident. In high scenic integrity areas, activities may only repeat attributes of form, line, color and texture found in the existing landscape character.

Moderate: A scenic integrity level that refers to landscapes where the valued landscape character "appears slightly altered." Noticeable deviations must remain visually subordinate to the landscape character being viewed.

Low: A scenic integrity referring to the landscapes where the valued landscape character "appears moderately altered." Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, effect and pattern of natural opening, vegetative

type changes or architectural styles within or outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed but compatible or complimentary to the character within.

Very Low: A scenic integrity level that refers to landscapes where the valued landscape character "appears heavily altered." Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles within or outside the landscape being viewed. However, deviations must be shaped and blended with the natural terrain so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.

Unacceptable Low: A scenic integrity level that refers to landscapes where the valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any line, form, color, texture, pattern or scale from the landscape character. Landscapes at this level of integrity need rehabilitation. This level should only be used to inventory existing integrity. It must not be used as a management objective.

Seed Cutting (Silviculture)

A harvest method that removes all mature trees from a stand except for selected seed-bearing trees retained on the site to provide a seed source for stand regeneration. In a two-step shelterwood cutting method, the first of the shelterwood cuttings.

Selection Cut (Silviculture)

A harvest method that periodically removes mature trees individually or in small groups from an uneven-aged forest. By this method, both regeneration cutting and tending of immature stand components are accomplished at each entry.

Sensitive Species

Those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density; (b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (FSM 2670.5.19).

Shelterwood, Shelterwood Method (Silviculture)

A harvest method in which a portion of the mature stand is retained as a source of seed and/or protection during the period of regeneration. The mature stand is removed in two or more cuttings commonly termed seed cutting and removal cutting. The seed cutting may or may not be preceded by a preparatory cutting.

SHPO

(See "State Historic Preservation Officer".)

Silviculture

Generally, the science and art of tree management, based on the study of the life history and general characteristics of forest trees and stands, with particular reference to local factors; more particularly, the theory and practice of controlling the establishment, composition, constitution and growth of forests for desired conditions.

Silvicultural Treatment

A management practice that utilizes a method of tree culture, harvest or replacement (see "Shelterwood Method", "Group Selection", "Even-aged Management", "Uneven-aged Management", and "Clearcutting").

Slash (Timber Management)

The residue left on the ground after harvesting, sanitation operations, windstorm or fire. It includes such material as unutilized logs, uprooted stumps, broken or uprooted stems, tops, branches and leaves.

Snag (Vegetation)

Standing dead tree or standing portion from which at least the leaves and smaller branches have fallen; often called a stub if it is less than 20 feet tall (Thomas et al. 1979).

Snag-dependent Species

(See "Cavity Nesting Species".)

Soft Snags (Vegetation)

A snag composed primarily of wood in advanced stages of decay and deterioration, particularly in the sapwood (outer) portions; generally, there are no live branches on the snag (Thomas et al. 1979).

Soil Compaction

A physical change in soil properties that results in a decrease in porosity and an increase in soil-bulk density and strength.

Special-use Authorization, Special-use Permits

A permit, term permit, lease or easement that allows occupancy or use rights or privileges on National Forest System lands (36 CFR 261.2).

Stand (Vegetation)

A community, particularly of trees, possessing sufficient uniformity as regards to vegetation type, age class, risk class, vigor, size class and stocking class, which distinguishes it from adjacent communities and thus forms a management or silvicultural unity. Within a stand, a dominant or primary species and age class is identifiable, but there may be inclusions or clusters of different species or ages. R2RIS stands are typically greater than 10 acres. IRI stands are typically greater than 5 acres.

Stand-replacing Fire

A fire that kills all or most living overstory trees in a forest and initiates secondary succession or regrowth.

State Historic Preservation Officer (SHPO)

A person appointed by a state's governor to administer the State Historic Preservation Program.

Structural Stages (Vegetation)

Any of several developmental stages of tree stands described in terms of tree size and the extent of canopy closure they create (Hoover and Wills 1987). They include:

Structural Stage 1 (Grass/Forb): An early forest successional stage during which grasses and forbs are the dominant vegetation. At the RIS site level, Structural Stage I is defined as nonstocked, with an AMD less than 10 percent. Small-scale Structural Stage 1 within RIS sites are at least one acre in size, do not meet the seedling stocking criteria (SG2416) and contain no saplings, poles or mature trees.

Structural Stage 2 (Shrubs/Seedlings): Developmental stage dominated by tree seedlings (less than one inch DBH) and shrub species.

Structural Stage 3 (Sapling/Pole): Developmental stage dominated by young trees 1 to 7 inches DBH, 10 to 50 feet tall and usually less than 50 years old. This stage is subdivided into three canopy closure classes: A (less than 40 percent), B (40 to 70 percent) and C (greater than 70 percent).

Structural Stage 4 (Mature): Consists of trees larger and older than Structural Stage 3. Also classified by the same canopy closure categories as Structural Stage 3.

Structural Stage 5 (Old Growth): This structural stage is characterized by trees 160 years of age and older.

Suppression

(See "Fire Suppression" and "Insect and Disease Suppression".)

Temporary Roads

(See "Short-term Transportation Facility".)

Thermal Cover (Wildlife)

Cover used by animals to ameliorate the effects of weather. Optimally, thermal cover is provided by a stand of coniferous trees, 30 to 60 acres in size, at least 40 feet tall, with a canopy cover of at least 70 percent. South of Highway 16, thermal cover may be provided by shorter trees due to poorer site indices.

Thinning (Silviculture)

The practice of removing some of the trees in a stand to meet desired conditions. Two types of thinning may be done:

Pre-commercial, Non-commercial: Removing trees that are too small to make a merchantable product.

Commercial: Removing trees that have reached sufficient size to be manufactured into a product and to improve tree spacing and promote more rapid growth.

Threatened Species

Any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range and that has been designated in the Federal Register by the Secretary of Interior as such (FSM 2670.5).

Timber

A general term applied to tree stands that provide a wood-fiber product.

Timber Production

The purposeful growing, tending, harvesting and regeneration of regulated crops of trees to be cut into logs, bolts or other round sections for industrial or consumer use, except fuelwood.

Timber Stand Improvement (TSI)

The elimination or suppression of the less desirable vegetation in favor of the more desirable tree growth, such as thinning, cleaning, weeding and release cuttings.

Trail

A general term denoting a way usually less than 50 inches wide for purposes of travel by foot, stock or trail vehicle.

Trailheads

The parking, signing and other facilities available at the beginning of a trail.

Travel Management

Travel management is the movement of people and products to and through national forests and grasslands. It connects many different varieties of users and multiple uses on National Forest System lands (Report of the National Access and Travel Management Team 1992).

Understory (Vegetation)

The lowest layer of vegetation in a forest or shrub community composed of grass, forbs, shrubs and trees less than 10 feet tall. Vegetation growing under the tree canopy.

Values at Risk (Fire Management)

Any or all natural resources, improvements or other values that may be jeopardized if a fire occurs (compare "Resource Values-at-risk").

Vegetation Structural Stages**

A generalized description of forest growth and aging stages based on the majority of the trees in the specific diameter distributions of the stand. For the goshawk balance of structural stages for the Phase I Amendment, six growth and aging stages were identified. As an example, if the majority of the stems of a stand (based on basal areas) were in the 9-14 inch diameter class, the stand would be classified as a structural stage 4 (adapted from Reynolds, et.al. 1992, p. 90).

The diameter range and description for the balance of structural stages are:

Stage	DBH range (inches)	Description
1	0-1	Grass/forb/shrub
2	1-5	Seedling/sapling
3	5-9	Young forest
4	9-14	Mid-aged forest
5	14-20	Mature forest
6	20+	Old forest

The following tables show how the vegetation structural stage classes correspond to Region 2's structural stage classes.

Post-Fledging Family Area Balance of Structural Stages:

Vegetation Structural Stages Adapted to the Black Hills				
Tree Size Class	Diameter range (inches)	Minimum canopy closure %	Percent of balance (range)	Correlation to Region 2 Structural Stage*
1 grass/forb/shrub	0-1	None	10 (7-13)	1, 2
2 seedling/sapling	1-5	None	10 (7-13)	3A, 3B, 3C (in part)
3 young forest	5-9	None	20 (15-25)	3A, 3B, 3C (in part)
4 mid-aged forest	9-14	50	13 (8-18)	4B (in part) and 4C
4 mid-aged forest	9-14	60	7 (2-12)	4B (in part) and 4C
5 mature forest	14-20	50	20 (15-25)	4B (in part) and 4C
6 old forest	>= 20	50	20 (15-25)	4B (in part) and 4C

* The Region 2 Structural Stages are provided for comparison purposes only. The percent of balance and canopy closure requirements apply to tree size classes only, not to the Region 2 structural stages. Region 2 structural stage 5 is not shown, as it is not a calculated value in Resource Information System (RIS).

Vegetative Management, Vegetative Manipulation, Vegetative Treatment

Any activities undertaken to modify the existing condition of the vegetation.

Vertical Diversity

The diversity in an area that results from the complexity of the above-ground structure of the vegetation; has two or more layers; the more tiers of vegetation or the more diverse the species makeup, or both, the higher the degree of vertical diversity (Thomas et al. 1979).

Viable Population

Group of individuals of a particular species that produces enough offspring for long-term persistence and adaptation of the species or population in a given place (Soule 1987). 36 CFR 219.19 defines a viable population for planning purposes as one that has the estimated numbers and distribution of reproductive individuals to insure that a continued viable population is well distributed in the planning area. Planning area is further defined by 36 CFR 219.3 as the "area of the National Forest System covered by a regional guide or forest plan." Direction from the Forest Service Manual (FSM 2670.5) defines a viable population as one which has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range (or range required to meet recovery for listed species) within the planning area.

Watershed

The area of land, bounded by a divide, that drains water, sediment and dissolved materials to a common outlet at some point along a stream channel (Dunne and Leopold 1978), or to a lake, reservoir or other body of water. Also called drainage basin or catchment.

Waters of the United States

Waters used for navigation and all other waters such as lakes, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, and their tributaries (33 CFR 328.3(a) and 40 CFR 230.3(s)).

Wildfire

Any wildland fire not designated and managed as a prescribed fire within an approved prescription. All wildfires will be given an appropriate suppression action.

**Indicates an Amendment 1 change.

CHAPTER 7 LIST OF PREPARERS

Interdisciplinary Team

- Robert Thompson** District Ranger - Bachelor of Science, Geology, University of Montana, 1979. Twenty-four years of Forest Service experience at district and forest level in Montana and South Dakota. Fourteen years experience as geologist conducting mineral appraisals, permitting, environmental analysis and compliance. Certified Review Mineral Examiner. Ten years as District Ranger on two ranger districts responsible for managing a full range of resources, goods and services. Fire experience includes firefighter, squad and crew boss, field observer, fire information officer, and agency administrator on Type I and Type II fire incidents.
- Phill Grumstrup** ID Team Leader - Master of Science, Forestry and Remote Sensing, University of Minnesota, 1979; Bachelor of Sciences, Forestry, University of Minnesota, 1974. Five years at U of Minnesota Remote Sensing Laboratory as a Research Specialist; Three years with Bureau of Indian Affairs in Montana as a Timber, Silviculture and Planning Forester; Twenty-one years of Forest Service experience in Montana and South Dakota in Planning, Timber, Silviculture, Wildlife, Fire/fuels, Heritage, Range and Minerals. Fire experience and qualifications include Division Group Supervisor, Infrared Interpreter, Holding Specialist Type 1 and Ignition Specialist Type 2.
- Katie Van Alstyne** Writer/Editor - Bachelor of Arts, Biology, Hollins University, 1990. Eleven years with the National Park Service as an interpreter and law enforcement dispatcher. Two years of Forest Service experience at the district and national level in planning. Fire experiences include: emergency medical technician-basic, initial attack dispatcher, dispatch recorder, aircraft time recorder, and helicopter operations.
- Shirlene Haas** Wildlife Biologist - Master of Science, Wildlife Ecology, Utah State University, 1991. Twelve years of Forest Service experience at the district level in South Dakota, Wyoming, and California in wildlife program management and environmental analysis. Previously line-qualified as firefighter type II and rx fire behavior monitor. Currently qualified as initial attack dispatcher, status-check-in and aircraft time recorder.
- Gale Gire** Silviculturist - Bachelor of Science, Forest Management, Oklahoma State University, 1973. Four years as a Assistant Forest Manager for Hoerner Waldorf Corporation & Champion Timberlands Corporation, Roanoke Rapids, N.C. Twenty-six years of Forest Service experience on the district level in Timber Sale Planning, Silviculture, Timber Sale Preparation, Timber Sale Administration and Timber Stand Improvement. Region 2

Certified Silviculturist since 1982. Thirty-three years of wildland fire fighting and prescribed burning experience. Current qualifications include Type 3 Incident Commander, Division / Group Supervisor, Type 2 Fire Safety Officer, Prescribed Burn Holding Specialist Type 1, and Ignition Specialist Type 1.

Jerry Hepler

GIS – Master of Arts, Geography, Appalachian State University, 2001; Bachelor of Science, Recreation Management, Appalachian State University, 1998. Two years of Forest Service experience at the district level in South Dakota in GIS. Fire Experience include: Geographic Information System Technician (GIST), FFT2, and training for Helicopter Crewmember and Advanced Firefighter/Squad Boss (FFT1)

Juanita Garcia

District Archeologist- Bachelor of Arts, Anthropology/Archeology, California State University, Bakersfield 1991. Masters of Arts, Archeology in Progress. Fourteen years experience as an archeologist, two years as a contractor, and twelve years of Forest Service experience at the district level in California and South Dakota. Nine years of experience in fire support as an archeologist, Cultural Resource Advisor (running Heritage Crews on fires), Resource Advisor, and BAER team Archeologist.

Les Gonyer

Hydrologist - Bachelor of Science, Forestry minor in Hydrology, University of Minnesota, 1977. Twenty-six years of Forest Service experience at the district and forest level in Utah, New Mexico, Oregon, Idaho, Wyoming, California and South Dakota in watershed, timber, special uses, minerals, fire, engineering and environmental analysis. Red carded firefighter, FFT2. BAER and RAT (Rapid Assessment Team) team experience.

Rodney Brown

Lands, Special Uses, Minerals Specialist - Bachelor of Science, Forest Management, Michigan State University, 1977. Twenty-two years of Forest Service experience at the district, forest and region level in Michigan, Colorado & South Dakota in special use permit administration - recreation residences, utility lines, signs, campgrounds & marinas; acquired and granted easements; utility line right-of-ways and mineral management. Fire qualifications include: Air Tanker Base Manager, Ramp Manager, Mixmaster, Fixed Wing Base Manager, Support Dispatcher, and Dispatch Recorder.

Darci Collins

Roads and Travel Management Engineering Technician and Forest Accessibility Coordinator - Nineteen years of Forest Service experience at the district and forest level in transportation planning, road design, contract administration, environmental analysis, law enforcement, timber marking and recreation maintenance and design. Firefighting experience includes fireline construction, squad boss, engine operator, sawyer, ground support, ordering manager, dispatch recorder, radio operator, and food unit leader-in-training.

- Jeff Knutson** Civil Engineering Technician - University of South Dakota; Black Hill State University. Fifteen years of Forest Service experience at the district and forest level in transportation planning, design, contract administration and environmental analysis. Firefighting experience includes fireline construction, ground support, air tanker base retardant mixmaster, and assistant tanker base manager-in-training.
- Henry Goehle** Fire/Fuels Specialist - Master of Science, Fire Science, University of Washington, 1978; Bachelor of Science, Forest Management, University of Minnesota, 1975; Fire Behavior Analyst, USFS Fire Training, 1989; Ecology and Silviculture, Tri-Regional Education, 1987. Twenty-five years experience at the district and forest level as a Fire Management Officer and Assistant Fire Management Officer (9 years); Silviculturist (12 years); Prescribed Fire (25 years); Fire Behavior Analyst (15 years). Fire Experience – Incident Commander Type 4, Incident Commander Type 3, Type I Prescribed Burn Boss, Prescribed Burn Planner, Type I Prescribed Fire Ignition Specialist, Fire Behavior Analysts.
- Steve Keegan** Landscape Architect - Bachelor of Science, Landscape Architecture & Environmental Studies, State University of New York - College of Environmental Science and Forestry (ESF), 1980; Bachelor of Science, (dual degree with ESF), Syracuse University 1980; Associates of Arts, Humanities, State University of New York - Onondaga Community College, 1978. Twenty-two years of Forest Service experience at the forest and zone level in Oregon, South Dakota, Montana, Idaho conducting Scenic Resource Assessments for: vegetation and fuels management, watershed analyses, recreation construction and reconstruction, and burned area emergency rehab. Fire experience in Type 1-4 incidents with USFS; experience as chief and assistant fire chief for City and Rural Fire Departments in New York, Idaho, Oregon and South Dakota.
- Dave Slepnikoff** Resource Assistant – Master of Science, Recreation, San Francisco State University, 1973; Bachelor of Science, Natural Resources/Forestry, Humboldt State University, 1971; Additional graduate studies: Forestry, Humboldt State University; Logging Engineering, Oregon State University; Outdoor Recreation, Utah State University; and Lands Management, George Mason University. Twenty-nine years of Forest Service experience at the district and forest level in timber sale preparation, silviculture, lands management, minerals, fire/fuels management, range management, travel management, and recreation management. Fire experience as a division supervisor; fifteen years as a Fire Information Office Type 2 and six years as a Training Specialist.
- Amy Ballard** Travel Management Specialist - Master of Forestry, Recreation, University of Montana, 1989; Master of Science, Recreation Resources, Colorado State University, 1988; Bachelor of Science, Aquatic Biology and

Ecology, Allegheny College, 1986. Fifteen years of Forest Service experience at the district and forest level in recreation. Fire qualifications include demobilization unit leader and status check-in recorder.

Don Luhrsen

Rangeland Management Specialist - Bachelor of Science, Range Management, Montana State University 1979. Twenty-five years of Forest Service experience at the district and forest level in Montana, South Dakota, and Idaho in range, wildlife, and fire. Fire management includes AFMO and FMO positions, Planning Section Chief on Incident Management Teams, level 2 burn boss and a level 1 burn boss trainee, qualified prescribed burn planner.

Eugene Bolka

Noxious Weed Coordinator - Twenty-six years with the United States Air Force as a Life Support Superintendent. Twelve years of Forest Service experience at the district level as a group leader for the Pactola RD Youth Conservation Corps (YCC), Forestry Technician on the Recreation Team, and a Range Technician Weeds. Fire experience includes working as a Retardant loader at the Rapid City Airport Tanker Base, Information Officers on the Battle Creek fire. Driver, trailer towing, fuels truck and ATV operator for prescribed burns and local fires. Crew Liaison Officer for Severity and Native American Fire Crews.

Ed Fischer

Environmental Coordinator - Bachelor of Science, Forest Management, Michigan State University, 1975. Twenty-five years of Forest Service experience in forestry, silviculture and environmental coordination. Fire experience includes firefighter, squad boss, and facilities unit leader.