

POWER

VEGETATION MANAGEMENT PROJECT ENVIRONMENTAL ASSESSMENT July 2003

Table of Contents

1	PURPOSE AND NEED	1
1.1	INTRODUCTION	1
1.2	PROJECT AREA LOCATION	2
1.3	REVISED FOREST PLAN LAND ALLOCATIONS	2
1.4	PURPOSE AND NEED	3
1.5	ISSUES.....	6
1.6	PROPOSED ACTIONS IN BRIEF	7
1.7	DECISIONS TO BE MADE	7
2	THE PROPOSED ACTION AND ALTERNATIVES	8
2.1	ALTERNATIVES CONSIDERED AND ANALYZED IN DETAIL	8
2.2	ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY	29
2.3	TREATMENT TIMING	30
2.4	ALTERNATIVES COMPARED	31
3	ENVIRONMENTAL CONSEQUENCES	34
3.1	FOREST VEGETATION	35
3.2	FIRE, FUELS, AND AIR QUALITY	43
3.3	WILDLIFE AND SPECIAL PLANTS.....	46
3.4	SOIL AND WATER	71
3.5	RANGELAND	75
3.6	NOXIOUS WEEDS	75
3.7	SCENERY	76
3.8	RECREATION.....	78
3.9	HERITAGE RESOURCES	79
3.10	ACCESS AND TRAVEL MANAGEMENT	79
3.11	TIMBER PRODUCTION AND ECONOMICS.....	80
4	INTERDISCIPLINARY TEAM	81
5	GROUPS AND INDIVIDUALS CONTACTED	82
6	LITERATURE CITED	84
7	CONTENTS OF THE ANALYSIS FILE	87
8	ACRONYM GUIDE	88
9	INDEX	89

Tables

TABLE 1. PROJECT AREA LEGAL DESCRIPTION.....	2
TABLE 2. FUEL TREATMENTS BY SILVICULTURAL PRESCRIPTION	12
TABLE 3. GROUND COVER REQUIREMENTS BY SOIL TYPE AND SLOPE	18
TABLE 4. MONITORING PLAN.....	24
TABLE 5. COMPARISON OF PROPOSED ACTIONS BY ALTERNATIVE	31
TABLE 6. COMPARISON OF EFFECTS BY ALTERNATIVE AND RESOURCE AREA OR ISSUE	33
TABLE 7. STRUCTURAL STAGE DISTRIBUTION BY COVER TYPE – EXISTING ACRES.....	36
TABLE 8. STRUCTURAL STAGE DISTRIBUTION BY COVER TYPE - PROPOSED ACTION ACRES	36
TABLE 9. STRUCTURAL STAGE DISTRIBUTION BY COVER TYPE - ALTERNATIVE A ACRES	36
TABLE 10. SUMMARY OF EFFECTS ON THREATENED, ENDANGERED, AND SENSITIVE WILDLIFE SPECIES	48
TABLE 11. VEGETATION STRUCTURAL STAGE DISTRIBUTION - POST-FLEDGING AREA 1.....	51
TABLE 12. VEGETATION STRUCTURAL STAGE DISTRIBUTION - POST-FLEDGING AREA 2.....	51
TABLE 13. MANAGEMENT INDICATOR SPECIES	63
TABLE 14. HABITAT EFFECTIVENESS FOR DEER AND ELK BY ALTERNATIVE	65

Figures

FIGURE 1. PROPOSED ACTION VEGETATION TREATMENTS.....	11
FIGURE 2. PROPOSED ACTION PRESCRIBED BURNING.....	13
FIGURE 3. PROPOSED ACTION ROAD CLOSURES	15
FIGURE 4. ALTERNATIVE A VEGETATION TREATMENTS.....	26
FIGURE 5. ALTERNATIVE A PRESCRIBED BURNING	27
FIGURE 6. ALTERNATIVE A ROAD CLOSURES.....	28
FIGURE 7. PONDEROSA PINE STRUCTURAL STAGE DISTRIBUTION BY ALTERNATIVE	37

1 PURPOSE AND NEED

1.1 Introduction

Land managers for the Northern Hills Ranger District of the Black Hills National Forest propose vegetation management treatments, road improvements, and road closures in the Power project area. The projects are intended to produce timber, increase habitat diversity, reduce hazardous fuels, increase timber growth and yield, reduce susceptibility to insects and diseases, reduce open road densities and meet relevant environmental standards. This Environmental Assessment (EA) is tiered to:

- 1) The 1997 Revised Land and Resource Management Plan ("Revised Forest Plan") for the Black Hills National Forest.
- 2) The Final Environmental Impact Statement ("FEIS") associated with the Revised Forest Plan.
- 3) The environmental assessment and decision notice for the 2001 Phase I Amendment ("Phase I Amendment") to the Revised Forest Plan.

This project follows the Revised Forest Plan, as required by the Forest and Rangeland Renewable Resources Planning Act of 1974 ("RPA," P.L. 93-378) and the National Forest Management Act of 1976 ("NFMA," P.L. 94-588). This EA does not reconsider the issues or analysis that led up to the Revised Forest Plan land allocations, goals, objectives, standards and guidelines. The FEIS and Revised Forest Plan are available for review at the Spearfish office of the Northern Hills Ranger District, as well as at the Forest Supervisor's Office in Custer, South Dakota.¹

The Power project is specifically intended to respond to two Revised Forest Plan management goals:

"Provide for a variety of life through management of biologically diverse ecosystems."

and

"Provide for sustained commodity uses in an environmentally acceptable manner."

This Environmental Assessment (EA) summarizes relevant information about the project. Further information about the analysis is on file at the Northern Hills Ranger District.

¹ The Black Hills is currently evaluating the Phase II Amendment for the Revised Forest Plan, scheduled for completion in 2004.

1.2 Project Area Location

The project area is located in Lawrence County, South Dakota, in the north-central Black Hills. Legal description is shown in Table 1.

Township	Range	Section (all or portions)
T02N	R01E	1
T02N	R02E	6
T03N	R01E	9-16, 21-28, 34-36
T03N	R02E	7, 18, 19, 29-32
T04N	R01E	3, 4
<i>Black Hills Meridian</i>		

Table 1. Project Area Legal Description

The Power project area is within two 7th-level watersheds that lie partly in the Northern Hills Ranger District. The project area includes only the portions of the watersheds that are inside the boundary of the Northern Hills Ranger District.² The project area includes approximately 12,292 acres of National Forest System lands and 1,684 acres of private land. The remaining parts of the two watersheds are in Hell Canyon Ranger District, and include 2,124 acres of National Forest System lands and 1,049 acres of private land. The entire area of the two watersheds is 17,149 acres.

Vegetation management activities would occur on about 4,000 acres of National Forest system lands on the Northern Hills Ranger District. This project does not include any vegetative management activities within the Hell Canyon Ranger District. Connected actions include reconstruction, maintenance, and closure of roads within Forest Service jurisdiction. Figures 1 through 6 in Chapter 2 display the locations of proposed vegetation management treatments, roads, private lands and the two Management Areas within the Power Analysis Area.³ A vicinity map showing the Power area is displayed inside the front cover.

1.3 Revised Forest Plan Land Allocations

The Power project area includes two land allocations, as designated by the Revised Forest Plan.

Management Area (MA) 4.1 - Limited Motorized Use and Forest Products Emphasis
Approximately 1,232 acres are in MA 4.1. This area includes the Eagle Cliff Cross County Ski Area and is managed for non-motorized recreation, production of timber and forage, scenic quality, and a diversity of wildlife.

Management Area 5.1 - Resource Production Emphasis

About 11,060 acres are in MA 5.1, where management focuses on production of timber and forage, water yield, diversity of wildlife, and a variety of other goods and services.

² Approximately 2.2 miles of non-system roads, affected by the project, are located within the Hell Canyon Ranger District portion of the analysis area.

³ Log hauling may also occur across areas of private land on which the Forest Service has acquired right-of-way.

1.4 Purpose and Need

The Power Vegetation Management Project would implement the Forest Plan, by producing timber, reducing susceptibility to insects and diseases, reducing hazardous fuels, maintaining or enhancing wildlife habitat and sustaining future timber yield. These needs are tied to Forest Service laws, policies, and regulations, especially the Revised Forest Plan and Phase I Amendment objectives, standards, and guidelines. The following is a summary of the objectives and standards that drive the need for action in the Power project area. Chapter 3 provides further details about how the Power project meets Revised Forest Plan direction.

***Forest-wide Objective 201:** Conserve existing hardwood communities and restore historic hardwood communities by 10% over 1995 conditions.*

Hardwood communities are currently in decline from conifer encroachment and increasing density. Hardwood thinning and removal of conifers are needed to conserve hardwood communities and meet Objective 201.

***Forest-wide Objective 204:** Conserve and manage white spruce, lodgepole pine, limber pine and Douglas-fir.*

Approximately 1,294 acres of white spruce cover type exist in the project area. Spruce is also present in pine and hardwood stands as an understory or secondary component. No Douglas-fir, lodgepole pine, or limber pine stands are mapped in the analysis area as separate stands, though scattered individual lodgepole pine trees occur. Phase I Amendment Standards and Guidelines preclude vegetation management treatments in spruce stands.

***Forest-wide Objective 205:** Restore grassland communities to 10% over 1995 conditions; base restoration potential on landform and soils.*

Existing meadows are currently being encroached by conifers and hardwoods. Removal of non-commercial size trees and brush is needed to maintain existing grassland communities and meet Objective 205.

***Forest-wide Objective 207:** Manage at least 5% of the forested landbase for late succession. The 5 percent should include acres in Management Area 3.7, the smaller stands identified in the Resource Information System (RIS) database, and other management areas that provide late succession conditions, such as wilderness...*

***Forest-wide Objective 208:** Provide smaller late succession patches to meet specific resource elements.*

The project area does not contain MA 3.7. There are 710 acres of late-succession forest in smaller stands and patches as referenced in Objectives 207 and 208. Avoiding harvest in these areas could provide important wildlife benefits.

***Forest-wide Objective 209:** Manage at least 5 percent of a timber harvest project area for the grass/forb structural stage.*

There are currently 140 acres of grass/forb structural stage in ponderosa pine and spruce stands (1% of the conifer area). This figure does not include permanent grasslands (see Objective 205 above). It also does not include old log landings, skid trails, utility corridors, or other small, scattered grass/forb openings. In recently harvested areas, these features probably comprise about 5% of the conifer forest.

Forest Wide Objective 221: *Conserve or enhance habitat for sensitive species and species of special interest (management indicator species).*

Several sensitive and management indicator species have been documented in the project area, and habitat exists for others. Specific project design features could benefit sensitive species. This includes road closures, insect control and thinning of conifer stands.

Forest-wide Objective 228: *Within planning units where outbreaks of mountain pine beetles could threaten management objectives, maintain or reduce acreage of ponderosa pine stands that are in medium or high risk condition for infestation.*

Some pine stands are at relatively high risk of mountain pine beetle infestation, potentially threatening management objectives. Commercial thinning from below and regeneration harvesting are needed to reduce acreage of ponderosa pine stands at risk of beetle attack and meet Objective 228.

Forest-wide Objective 303: *Offer 838 MMBF of sawtimber and 21MMCF of roundwood per decade.*

This objective applies to the entire Forest and has not yet been met for the current decade. The Power area is allocated to Management Areas 4.1 and 5.1; lands within these allocations are expected to contribute timber toward the Forest goal. Some of the harvested stands are now revegetated and the residual overstory is slowing the growth of the regenerated stand. Overstory removal is needed to reduce the number of trees that compete with the younger stand. Precommercial thinning from below within younger stands is also needed to reduce understory density and promote tree health and vigor. These treatments would contribute to meeting current and future timber needs.

Forest-wide Objective 224: *Reduce or otherwise treat fuels commensurate with risks (fire occurrence), hazard (fuel flammability), and land and resource values common to the area, using the criteria in Forest-wide Standard 4110.*

Hazardous fuels exist in parts of the project area. There is a need to reduce the fire hazard and an opportunity to do so through mechanical fuel treatments and prescribed fire.

Forest-wide Objective 223: *Use management ignited fires and prescribed natural fires to achieve desirable vegetative diversity and fuel profiles on 8000 acres per year for the next decade. Use natural fire on a limited basis under specifically prescribed conditions.*

There is a need to reduce hazardous fuels and increase habitat diversity and an opportunity to use prescribed burning to achieve these ends.

Forest-wide Standard 9101: *Forest Development Roads (FDR⁴) are open all year to appropriate motorized vehicle use, unless a documented decision shows one or more of the following: a. Motorized use conflicts with Forest Plan objectives; b. Motorized use is incompatible with the recreation opportunity spectrum class; c. Motorized use creates user conflicts that result in unsafe conditions; d. Physical characteristics of travelway(s) preclude any form of motorized use; e. Travelways do not serve an existing or identified future public need; f. Financing is not*

⁴ Forest Development Roads are also known as Forest Service system roads (FSRs) and classified roads.

available for maintenance necessary to protect resources; g. Seasonal travel restrictions are required: (1) To avoid unsafe conditions or to prevent unacceptable damage to soil and water resources due to weather or seasonal conditions; (2) To prevent unacceptable wildlife conflict or habitat degradation; (3) To meet a seasonal public and administrative need; or (4) For area protection or non-use.

Roads were evaluated in a project-level roads analysis that identified candidates for decommissioning of system roads and restoration of non-system roads. This evaluation is available in the analysis file located at the Northern Hills Ranger District. Habitat capability modeling indicates that the existing road network reduces habitat effectiveness for deer and elk below Revised Forest Plan direction. System and non-system road closure would increase habitat effectiveness.

Proposed road closures are needed to follow Forest Service policy. Forest Service Manual 7700 states that many unplanned, unauthorized, and unclassified travel ways exist within National Forest System lands and these are high priority candidates for decommissioning. The manual also states that, "...emphasis would be given to reconstructing and maintaining classified roads while decommissioning unnecessary classified and unclassified roads. It may be necessary to regulate use on some unneeded roads until decommissioning or other approved uses, such as conversion to trails, can be achieved."

Management Area Objectives 4.1-202 and 5.1-202: *Manage forest cover types to provide variety in stand sizes, shape, crown closure, age structure and interspersion.*

Treatments within mature forest stands between 100 and 140 years old (commercial thinning, shelterwood) would promote structural diversity (variety in crown closure, etc.). Phase I Amendment standards and guidelines require a range of ages, densities, and structural classes within certain habitats. The variety and structure diversity standards and guidelines can be met through silvicultural treatments.

Management Area Objective 4.1 and 5.1-3201: *Deer and elk habitat effectiveness (HE) values in a planning unit should at least meet [prescribed] values... Vegetative management projects in planning units currently below these values should result in increased habitat effectiveness.*

Deer and elk habitat effectiveness ratings are below prescribed values for deer and elk summer range in both management areas. Ratings are also below prescribed values for deer and elk winter range in Management Area 4.1. System and non-system road closures are needed to increase habitat effectiveness and meet Objectives 4.1-3201 and 5.1-3201.

Management Area Guideline 4.1-9102: *Motorized road travel is limited to designated routes. Designated routes would vary over time based on the need to do vegetative management. Generally the road system would be closed to motorized travel.*

Currently, not all roads in Management Area 4.1 are closed to summertime motorized travel, creating conflicts with the intent of this guideline. Closure of system roads and a general area closure are needed within the Eagle Cliff Cross Country Ski Area to comply with Guideline 4.1-9102.

1.5 Issues

1.5.1 Public Involvement

Public involvement in this project began in June 2002 when the Power project was listed in the Black Hills National Forest's Quarterly Schedule of Proposed Actions. Scoping was conducted in June 2002. Copies of public involvement documents and record of public responses are contained in the project file.

The scoping comments were utilized in issue development, alternative formulation, and document preparation. Many of the concerns expressed during scoping are addressed in the Phase I Amendment and Revised Forest Plan objectives, standards and guidelines and inclusion of design features and mitigation measures that reduce potential for significant effects. For instance, some scoping comments expressed concern about prescribed burns escaping control. Careful burn planning and implementation procedures minimize the risk of escaped burns. Another example is concern about the existing lack of late-successional and old growth habitats and potential effects on native species associated with these habitats. The Revised Forest Plan provides specific direction related to these species. Design features such as green tree and snag retention adequately address these concerns.

1.5.2 Analysis Issues

The Interdisciplinary Team (IDT) identified issues relating to the proposed action based on input from Forest Service resource specialists, other agencies, organizations, landowners, and members of the general public. Pertinent comments from these sources were used to develop the issues and alternatives to be studied in detail.

Issue 1: Access and Travel Management

Road closures are proposed within the Power area to meet Revised Forest Plan and Phase I Amendment objectives, standards, and guidelines. Most road closures are controversial. Two letters expressed disagreement with proposed road closures. This issue is evaluated based on the number of miles of currently open road that would be closed under each alternative, and a narrative assessment of effects on access for multiple uses. The alternatives vary in how they deal with access and travel management.

Issue 2: Timber Production and Economics

The Revised Forest Plan provides for timber harvest to meet land management objectives. Analysis was completed to consider the economic efficiency of the project. Measures of this issue include potential timber sale volume, Present Net Value and Benefit to Cost ratio. The alternatives vary in how much timber may be produced and the costs and revenues associated with the project.

Issue 3: Threatened, Endangered, Sensitive (TES) and Management Indicator Wildlife Species

Planning requirements for wildlife species and their habitats are extensive. The Biological Evaluation (BE) and Wildlife and Plant Report detail the existing condition

and potential effects of the alternatives on TES and management indicator species. These documents are available in the analysis file and are summarized in Chapter 3. This issue led to the development of design features and mitigation measures included in both action alternatives. In addition, an alternative was developed to attempt to specifically meet deer and elk habitat effectiveness guidelines through vegetation management.

1.6 Proposed Actions in Brief

The Proposed Actions include (all acreage approximate):

- 133 acres of precommercial thinning
- 2,420 acres of commercial thinning
- 107 acres of regeneration harvests (shelterwood seed tree cutting)
- 793 acres of shelterwood overstory removal
- 614 acres of conifer encroachment reduction in hardwood stands and meadows
- 4,067 acres of post-logging slash treatment (including 3,141 acres of prescribed burning) to reduce fuel hazard and prepare sites for regeneration.
- 46.5 miles of pre-use road maintenance
- 7 miles of road reconstruction
- 11 miles of system road closure
- 21 miles of non-system road closure

1.7 Decisions to be Made

The purpose of this EA is to disclose the effects and consequences of proposed actions and alternatives. Based on this analysis, the responsible official will decide:

- Whether to approve the project activities, mitigation measures, design features and monitoring associated with the Proposed Action or an alternative.
- Whether the selected alternative can be supported by a Finding of No Significant Impact.

2 THE PROPOSED ACTION AND ALTERNATIVES

Chapter 2 describes and compares the Proposed Action and two alternatives: No Action and Alternative A (other alternatives were considered but have been eliminated from detailed study).

2.1 Alternatives Considered and Analyzed in Detail

2.1.1 No Action

Consideration of the No Action Alternative is a requirement of the National Environmental Policy Act. The No Action alternative is the only alternative considered that does not meet the Purpose and Need for Action. No Action generally does not have direct effects; however, over time, lack of forest management has environmental consequences.

Under No Action, ongoing road maintenance, noxious weed management, grazing, and activities in ongoing timber sales (Hellsgate, Pond, Bigmac) would continue according to existing management plans. However, treatments considered in the Power project area would be deferred until some future time. Some of the proposed Power projects (nonsystem road closures, precommercial thinning, non-commercial hardwood and meadow treatments) could be accomplished under Categorical Exclusion authority (40 CFR 1508.4) if the No Action Alternative were selected.

2.1.2 Proposed Action

The Proposed Action was developed by the Interdisciplinary Team (IDT) to reduce stand susceptibility to insect infestation, reduce fuel hazard, produce timber, improve future growth and yield, reduce open road densities and address specific Revised Forest Plan direction in the Power project area. The IDT reviewed the existing conditions throughout the project area and proposed vegetation and road treatments to help reach desired conditions as identified in the Forest Plan. A preliminary Proposed Action was developed and distributed publicly for scoping in June 2002. The IDT continued to gather information and refine the proposal to better respond to direction and public input.

An EA was drafted and circulated for comment in December 2002. Black Hills National Forest managers identified omissions and inconsistencies in that document. As a result, a revised EA was prepared and circulated for another 30-day comment period in April 2003.

The Proposed Action proposes treatments in ponderosa pine and hardwood forest stands and meadows. Activities are not proposed in spruce stands in compliance with Revised Forest Plan direction for American marten, a sensitive wildlife species. Treatment was not proposed in some other stands to protect special habitats such as late-successional forests, goshawk nest sites and territories, and connecting habitats between spruce stands. Treatment was only proposed in stands where needed in the next five to ten years.

Stands that do not require treatment at this time will probably be reviewed for treatment needs again in the future. See the Proposed Action Vegetation, Prescribed Burn, and Road Treatment maps in Chapter 2 for spatial information.

Vegetation Management Proposals

Commercial thinning is proposed on 2,420 acres. Stands would be thinned to 50-80 square feet of basal area per acre. The largest trees in the stands would be retained. Spacing between trees would vary due to leaving the largest trees (thinning from below). Pole stands would be thinned to between 12 and 20 foot spacing, with leave trees selected for their quality.

These treatments would reduce stand density while maintaining moderate crown cover and favoring large-diameter trees. Primary goals include improving the growth of the remaining trees in order to increase the number of large-diameter trees, reducing risk of loss to pathogens and producing wood products. All trees over 20" in diameter would be retained.

Harvest would be accomplished with tractor yarding. These treatments would produce approximately 4.2 million board feet (MMBF) of sawtimber and 2,500 hundred cubic feet (CCF) of roundwood.

Thinning slash that exceeds fuel guidelines or visual standards would be piled, chipped, burned, or otherwise reduced.

Precommercial thinning is proposed on 133 acres. Trees less than 5 " in diameter would be thinned. This treatment would reduce stand density through selection of the best-formed, healthiest trees within the spacing guidelines. Primary goals would be to improve growth, preclude stand stagnation, and reduce continuity of fuels. Thinning slash in excess of fuel guidelines may be piled, chipped, or removed to reduce fire danger and pathogen habitat.

Regeneration harvest would take place on 107 acres. The silvicultural method would be shelterwood seed tree cutting. Most of the existing forest canopy would be removed except for about 20-40 square feet of basal area per acre of large, well-formed shelterwood trees. All trees greater than 20" in diameter would be retained. Additional live trees, representative of the largest diameter classes in the stand, would be retained as needed to meet basal area goals.

This treatment would reduce stand density to allow regeneration of pine while maintaining enough large trees to provide a seed source and future large-diameter snags. The primary goal is to obtain pine regeneration.

Where a spruce understory is present, regeneration harvest followed by fuel treatment and prescribed burning would provide site preparation and maintain the current seral stage. Poles would be removed and may be sold, chipped or burned depending on market conditions.

Harvest would be accomplished with tractor yarding. These treatments would yield approximately 170,400 board feet of sawtimber and approximately 66 CCF of roundwood.

The National Forest Management Act (NFMA) requires regeneration within five years. Cutting units would be designed to promote natural regeneration. Trees may be planted if stocking goals are not achieved naturally.

Overstory removal is proposed for 793 acres. The silvicultural objective is to improve growth of established seedlings, saplings, and poles. Existing large trees (formerly seed trees) would be removed to allow the new stand to make full use of the light, nutrients, and water available on site. This is the final harvest of the original stand, and an improvement cut for the new stand. Precommercial and pole thinning, favoring dominant trees, would accompany the overstory removal to improve the condition of the new stand. Poles would be removed and may be sold depending on market conditions.

All trees greater than 20" in diameter would be retained within the overstory. Additional live trees would be retained as needed to leave an average across the stand of two live trees per acre on south and west slopes, and four live trees per acre on north and east slopes. Leave trees would be representative of the largest diameter classes in the stand.

These treatments would yield approximately 1.5 MMBF of sawtimber and approximately 368 CCF of roundwood. Harvest would be accomplished with tractor yarding. Fuels would be treated by piling or lopping. To prevent damage to regeneration, broadcast burning to dispose of fuels is not proposed in these stands.

Hardwood treatments would take place on 190 acres. Conifers growing into stands of aspen and birch would be removed. On 127 acres, the conifers removed would be small and non-commercial. Commercial-size conifers would be removed on 63 acres, yielding about 68,000 board feet of timber. Hardwoods would also be thinned to a spacing of one to two hardwood leave trees greater than 6" in diameter every 100 feet. Prescribed fire is proposed to encourage re-sprouting of the stand.

Meadow enhancement is proposed for 424 acres to maintain natural openings that provide foraging habitat and structural diversity. Small, non-commercial size, conifers would be removed where they encroach on existing openings. No commercial timber exists within any of the meadows proposed for treatment. Hand-piling and prescribed burning would dispose of fuels and help stimulate development of grass communities.

All treatments are displayed in Figure 1, Proposed Action Vegetation Treatments. Total volume produced would be approximately 6 MMBF of sawtimber and 2,910 CCF of roundwood.

Figure 1. Proposed Action Vegetation Treatments

Fuel Treatments

Fuel treatments are proposed as part of the silvicultural prescription where necessary to meet Revised Forest Plan direction. Objectives include reducing natural and activity fuels, stimulating sprouting of aspen, and preparing sites for natural regeneration. Prescribed burning would take place on about 3,141 acres under this alternative.

Fuel treatments would involve: 1) disposal of larger size material as a product (sawlog, post/pole), 2) pulling back fuels from residual trees prior to burning, 3) piling of heavier fuels either by equipment or hand, 4) lopping and scattering slash, and 5) underburning existing fuels and activity-created slash in cutting units and log landings. More than one fuel treatment may occur on each unit.

Fuel loading in some multi-storied stands may be too high following thinning to burn without pre-treatment of slash. Whole-tree yarding may occur as part of the sawtimber cutting prescription. Whole-tree yarding concentrates fine material from tops and limbs at a landing to be chipped, used as fuelwood, or piled for burning. Remaining concentrations of fuels would be burned in stands that have been whole-tree yarded.

Cut-to-length systems may also be used. Cut-to-length systems tend to leave more slash on the ground. More than one burn could be needed if slash concentrations are heavy over more than 50 percent of a cutting unit. Slash would be pulled back from residual trees where needed prior to burning. Lopping may also be needed ahead of a prescribed burn to reduce the fuel-bed depth and heat intensity and to distribute fine fuels to increase fire spread and hasten decomposition.

Fuels created during logging should cure for one to two years to reduce fuel-bed depth, reducing flame lengths and consequent heat damage to residual trees.

Areas proposed for prescribed burning are displayed on Figure 2.

Silvicultural Treatment Units	Acres	Fuel Treatments
Overstory Removal	793	Release and weed, lop
Commercial Thinning	2,420	Release and weed, pull-back, burn
Regeneration Harvest	107	Pull-back, burn
Hardwood Enhancement	190	Burn
Meadow Enhancement	424	Hand pile, burn
Precommercial Thinning	133	Lop
Total	4,067	

Table 2. Fuel Treatments by Silvicultural Prescription

Figure 2. Proposed Action Prescribed Burning

Road Proposals

Road Improvement

Proposed road work would facilitate vegetation management treatments. About 46.5 miles of pre-use maintenance would be needed on existing Forest Service system roads (also referred to as Forest Development Roads or FDRs). About seven miles of road reconstruction would also be required.

Several Best Management Practices are associated with road improvements. These are described in the transportation plan in the analysis file, located at the Northern Hills Ranger District.

Road Closure

Road closures are also proposed to follow Forest Service policy (see FSM 7700) and Revised Forest Plan direction. About 11 miles of currently open system roads would be closed. An additional 21 miles of non-system roads are proposed for closure. Approximately 18.8 miles of the non-system roads are located within the Northern Hills Ranger District and the remaining 2.2 miles are located within the Hell Canyon Ranger District. Proposed Action road closures are shown on Figure 3.

Figure 3. Proposed Action Road Closures

Mitigation Measures and Design Features

The following design features and mitigation measures would prevent or reduce the duration, intensity, or extent of potential adverse impacts and assure that Revised Forest Plan direction is met. A detailed review of project effects in relation to Revised Forest Plan standards and guidelines is in Chapter 3.

Forest Vegetation

- Regeneration harvest units would not be yarded when the ground is frozen in order to ensure site preparation for pine regeneration. Pine regeneration would generally be protected during harvest activities except where production of forage or non-pine species is the objective of harvest (hardwood and meadow restoration treatments).
- The minimum number of leave trees in any prescription is 2 – 4 per acre (2 on south and west aspects, 4 on north and east aspects). All prescriptions will retain at least the minimum number of leave trees. All live conifers 20 inches and larger will be retained in all stands to provide future large-diameter snags. Existing snags would be retained unless they pose safety hazards to workers or the public. Snags may be created to meet Revised Forest Plan Standard 2301.
- Leave trees would be representative of the largest trees on all sites and could be clumped rather than evenly distributed across the stand. Where possible, leave trees would be grouped with existing snags, away from roads, in areas where snags are least likely to be safety hazards.
- Sufficient down woody debris would be retained in ponderosa pine treatment areas to meet Revised Forest Plan Standard 2308.⁵
- Regeneration surveys would be included in funded (essential) post-sale activities for shelterwood harvest units.

Fuel Treatments

- Prescribed burn plans would be developed and approved prior to implementation of any prescribed burns. These plans would describe the objectives for each burn and identify acceptable levels of tree mortality, incorporate Forest Plan standards and guidelines, and establish burn organizations and weather/fuels parameters in order to safely and successfully accomplish the project.
- When feasible and appropriate, broadcast burning would be used to dispose of slash.
- To comply with smoke management direction, burning would be conducted when smoke dispersal conditions are favorable. All burning would be coordinated with the State of South Dakota.
- Slash piling would occur in areas where fuel loading is too heavy for prescribed fire use. Mechanical piling would be done in a manner that reduces damage to residual trees. In regeneration harvest units, burning would be designed to

⁵ In case of conflicts, Standard 2308 would take precedence over standards related to visuals and fuels management due to its environmentally protective nature.

maintain five to ten tons large woody material per acre as required by the Revised Forest Plan.

- Burns would be conducted when soil moisture is such that duff and microorganisms are not consumed (except where site preparation for natural regeneration is desirable).
- Burns would be designed so that snags greater than 10" in diameter are not appreciably damaged.
- Prescribed burn areas may be deferred from livestock grazing for a portion or all of the following growing season to ensure re-growth of forage species.
- Slash piles would be located out of meadows.

Wildlife and Plants

- Snags would be retained unless they pose safety hazards to workers or the public. Snags may be created to meet Standard 2301.
- The project area would not be designated as a standing firewood area unless a snag survey shows that snag density meets Revised Forest Plan direction.
- Raptor nests, bald eagle winter roost sites, and snail colonies found during project layout or implementation would be reported to a district biologist and appropriately protected.
- Sensitive species located after contract would be managed by active coordination between contractor or purchaser, Forest Service line officer, project administrator, and biologist.
- One pile of woody material would be maintained per two acres to create near-ground structure for marten prey species (Standard 3117) in the following stands: 0712050036, 0712050004, 0713020002, 0713020006, 0713020019, 0713020018, 0713020026, 0713020053, 0713020050, 0713020031, 0713050005, 0713050008, 0713050009, 0713060040, 0713060042, 0713060044, 0713060045, 0713060049, 0713060055, 0713080008, 0713080029, and 0713080041.
- At least two to six turkey-roost sites would be provided per section, consisting of mature trees with an average diameter of 10-14", widely spaced horizontal branches, and basal area of at least 90 square feet per acre. Sites would be at least one-fourth acre in size and not isolated from adjacent forested stands. Emphasis would be on the upper third of east-facing slopes if available.
- Sensitive plant populations would be protected from disturbance by avoiding known sites during logging operations and associated activities. Site-specific information on sensitive plant populations is in the project analysis file at the Northern Hills Ranger District office. Timber sale layout personnel would consult this information and/or the district botanist prior to layout of units.
- Where possible, existing screening cover would be maintained along roads for big game security.

Soils and Water

- For those timber harvest units intended as regeneration treatments (where it is desirable to disturb the ground vegetation and expose bare mineral soil to promote conifer natural regeneration) skidding should only occur when the soil is dry (soil moisture below the plastic limit). Site preparation by skidder

disturbance will be done in a manner which does not result in adverse soil conditions over more than 15% of the stand.

- Skid trails would be designated except in regeneration harvest units where site preparation is desired and Revised Forest Plan direction would not be violated.
- Five to ten tons per acre of down woody material at least 3 inches in diameter would be retained in regeneration harvest units.
- Ground cover (including vegetation, litter, and slash) would be retained as displayed in Table 3, below. A map was developed to show the amount of minimum cover to be retained in all treatment units.
- Soil disturbance would be avoided in ephemeral draws and swales.
- Culverts may be removed from closed roads if a hydrologist's assessment shows unacceptable risk of erosion if the culvert becomes blocked.
- The following mandatory management requirements would be applied: (1) State of South Dakota Best Management Practices (BMPs); (2) BMPs contained in 36 CFR 323.4 (a) (6); (3) Revised Forest Plan standards and guidelines; and (4) requirements in the Watershed Conservation Practices Handbook (Forest Service Handbook 2509.25).
- Revegetation of disturbed areas such as landings would be initiated as soon as possible, not to exceed 6 months, after termination of ground-disturbing activities. Disturbed soils would be revegetated with native species (when available) in seed/plant mixtures that are free of noxious weeds. If mulches are used, they will be free of noxious weeds. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulch as necessary.

Soil Type*		
Stovho-Trebor Association	Stovho-Trebor Association, steep	Trebor-Rock Association
10% slope—40% cover	30% slope—70% cover	10% slope—40% cover
20% slope—60% cover	40% slope—80% cover	20% slope—60% cover
30% slope—70% cover	50% slope—>80% cover	30% slope—70% cover

*Source: Lawrence County Soil Survey

Table 3. Ground Cover Requirements by Soil Type and Slope

Noxious Weeds

- Guidelines to prevent the spread of noxious weeds for prescribed fire, road maintenance/rehab, and timber harvest activities are identified in the Black Hills National Forest Weed Management Plan (approved January 18, 2003), and would be included in all contracts and permits issued as part of this project. Where proposed activities would occur in areas infested with high densities of noxious weeds considered to be at high risk for spread, off-road equipment associated with the activity would be washed before leaving the site to prevent spread of weeds to adjacent National Forest and private lands. Known areas meeting these criteria would be identified by District staff prior to completion of any timber sale contract associated with this project.
- The timber sale contract would include provisions to ensure operations in uninfested areas are completed before operations begin in infested areas

- The timber sale contract would include provisions to ensure that travel through areas infested with noxious weeds is minimized or restricted to periods when the spread of seed is least likely.
- District staff responsible for the noxious weed program would, in coordination with the project engineer, inspect gravel pits for noxious weed infestation before transport and use of gravel and other material. Infestations would be treated to prevent spread.
- District staff responsible for the noxious weed program would inspect stockpiled gravel annually for weed infestation in coordination with the project engineer.
- Native vegetation would be retained in and around project area activities to the maximum extent possible consistent with project objectives.
- Disturbed soil would be revegetated in a manner that optimizes plant establishment for that specific site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulch as necessary.

Recreation, Scenery, Range, and Heritage Resource Management

- Silvicultural prescriptions adjacent to the Eagle Cliff Trails would be designed to consider the aesthetics and improve diversity of forest structure and vegetation. This may be done by leaving a variety of size and age classes near the trails and breaking up large blocks of the same type of treatment.
- Snowmobile trails would be depicted as improvements on Timber Sale Area maps and protected during harvest operations.
- Where possible, log hauling schedules would avoid conflicts with popular snowmobile routes. Winter operations of timber sale units that necessitate skidding across a snowmobile trail, but do not otherwise affect the trail, may be allowed.
- Interpretive signs may be placed along trails and heavily traveled roads to inform and educate the public about forest management activities.
- Several cultural resource sites are known to exist in the Power project area. No piling or burning of timber or slash would be allowed within 200 feet of a significant cultural resource site. Any cultural artifacts found during implementation would be reported to the district archeologist and adequately protected. Heritage site locations are not listed in this environmental assessment to protect site integrity.
- No caves are known to exist in the project area. Any caves discovered during project implementation would be protected in accordance with Revised Forest Plan direction.
- The following mitigation measures would apply to areas in the immediate foreground (300 feet or sight distance, whichever is less) of US Highway 85, FDR 231, and the Eagle Cliff Trails. A list of stands meeting these criteria is in the visual resource report.
 - Trees would be marked on the side away from roads where possible. Cut tree marking would be favored over leave tree marking.
 - Shelterwood seed trees would be randomly spaced, with concentrations blending into adjacent stands. Large platy barked pines, aspen, and birch would be retained.

- Stumps would be no more than 8" high. Stumps that are pulled up as a part of road work would be buried, scattered or removed unless needed for other purposes.
 - Slash would be minimized beyond woody material required for other resources.
 - Elements of a park-like setting (larger yellowbark pines, random tree spacing, understory grasses and shrubs) would be retained for visual variety.
- The following mitigation would apply to areas in the immediate foreground (300 feet or sight distance, whichever is less) of areas adjacent to residential developments on private land. The objective of these measures is to reduce negative visual effects of logging slash and other harvest-related disturbances.
 - Whole-tree harvesting would be used where possible.
 - Slash piles, skid trails, and landing areas would be made as small and unobtrusive as possible, and returned to as natural a condition as possible.
- A landscape architect would be involved in the layout of units along US Highway 85 and adjacent to private lands to assure scenic integrity objectives are met.
- All Forest Service-authorized improvements, such as fences, trails, mining claim corners, and utility lines, would be displayed on timber sale maps and protected during management activities.
- Roads, landings, and slash piles would be located out of meadows and draw bottoms whenever possible to reduce loss of forage and protect key grazing areas. Slash would in general be piled off livestock trails.
- All pasture gates would be identified on Timber Sale Area maps and kept closed during the grazing season (June through October). Fences would be protected during logging operations to maintain proper distribution of livestock and prevent unauthorized use.

Monitoring

Monitoring is recommended to assure that the project is implemented as planned and that Revised Forest Plan direction is met. The district interdisciplinary team would monitor implementation of the selected alternative. At least one interdisciplinary team meeting and/or field review would occur prior to the award of any commercial timber sale to ensure that the objectives in this EA are carried through the layout phase of the timber sale. The project area would also be reviewed following project implementation to ensure that objectives were met and mitigation measures were followed and were effective. The final monitoring review would be conducted two years after a timber sale is closed. All interdisciplinary team field reviews would be documented and a final monitoring report completed after project implementation.

The timber sale administrator or other contract administrators would do some of the project monitoring during implementation. Other resource specialists would be involved in monitoring the implementation and effectiveness of specific mitigation measures relating to their particular resource area. Monitoring would occur throughout project layout and contract administration, and could continue after project completion. Monitoring results could lead to adaptations to the project or be used to improve future project design.

Table 4 summarizes monitoring recommendations for the Power project. Additional monitoring may occur as part of the Revised Forest Plan, Allotment Management Plans, Noxious Weeds Management Plans, and other project plans.

Monitoring Plan

Action, effect, or resource	Method	Frequency of measure	Purpose	Responsible party
Biology				
Bald eagle winter roosts	Winter field review of likely winter roosts	Annually	To assess bald eagle presence and habitat	Wildlife biologist
Sensitive and management indicator bird species	Forest-wide field surveys	Annually	To determine presence and population trends of various bird species across the Forest	Forest wildlife biologist or monitoring coordinator
Goshawk use of project area	Field surveys during nesting and fledging seasons	Annually	To find any new or unknown nests that may need protection during proposed activities	Wildlife biologist
Goshawk nests	Field visits to each known active or historical nest during nesting season	Annually	To determine presence of breeding goshawks	Wildlife biologist
Big game and game fish species	Determined by State agency	Determined by State agency	To determine presence and population trends of game species across the Black Hills	South Dakota Department of Game, Fish and Parks
Snags and down wood	Field surveys	Before and After timber harvest	To ensure snag and down wood mitigation measures are effective and provide for their retention during post-harvest fuel treatments	Wildlife biologist and/or silviculturist
Soil and Water				
Soil erosion on sale area roads	Contract inspections	During road reconstruction, sale operations, contracted post-sale activities	To determine whether road drainage structures are working as planned and road bed seeding has been accomplished in a timely manner, and to determine effectiveness of mitigation	Administrators of road contract, timber sale contract, post-sale activities; soil or hydrology specialist.
Log landing design and layout	Field approval of sites	Prior to development of landings	To avoid soil erosion and sediment transport	Timber sale contract administrator, hydrologist

*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

Action, effect, or resource	Method	Frequency of measure	Purpose	Responsible party
Timely erosion control	Enforcement of contract provisions and BMPs	During road construction (when roads are not yet completely constructed).	To assess effectiveness of mitigation and determine need for additional erosion control	Administrators of road and timber sale contracts
Revegetation of disturbed areas	Inspect seeded areas	Growing season following seeding, after major runoff events	To assess effectiveness of seeding and seed mixture, and determine re-seeding or erosion control needs	Timber sale contract administrator, post-sale activity administrators
Status of road construction excavation and sidecast material	Enforcement of contract provisions and BMPs	During road construction	To assess effectiveness of mitigation and determine need for additional erosion control	Road contract administrator
Soil erosion on skid/ forwarder trails, landings, and temporary roads	Cutting or payment unit inspections, final contract inspections	Duration of timber sale contract and post-sale operations	To identify areas needing erosion control and determine effectiveness of mitigation	Timber sale contract administrator, post-sale activity administrators
Noxious Weeds				
Noxious weed prevention on roads, skid trails, and landings	Contract inspection and post-sale evaluation	1 through 5 years following harvest	To reduce new weed infestations and determine treatment needs, and determine effectiveness of mitigation	Timber sale contract administrator, weed specialist, and/or botanist
Noxious weed prevention on burned landings	Field inspection of landings	1 and 3 years following burn/seeding	To assess effectiveness of mitigation and determine need for treatment	Fire specialist, botanist, and/or weed specialist
Newly closed roads	Check for indications of road closure violations, damage to closures	Ongoing after closure	To determine effectiveness of road closure methods and show where more work is needed	Travel management specialist, wildlife biologist
Fire and Fuels				
Fuel loading	Site visit	Following prescribed burns	To determine post-burn fuel loading and effectiveness of burn	Fuel specialist
Rehabilitation of fire control lines	Field inspection of fire control lines	1 and 3 years following fire line rehabilitation	To assess effectiveness of rehabilitation and determine need for further treatment	Prescribed burn specialist, botanist, weed specialist

*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

Action, effect, or resource	Method	Frequency of measure	Purpose	Responsible party
Timber Sale				
Timber volume calculations	Compare timber volume predicted in the EA and expected by the Forest Plan to actual sale volume	Following sale layout and cruise	To monitor accuracy of silvicultural calculations and Forest Plan assumptions	Presale forester and silviculturist
Conifer regeneration in openings	Regeneration surveys	1, 3 and 5 years following harvest	To assess stocking and need for site preparation or planting	Silviculturist
Protection of regeneration during timber sale	Inspection of operator compliance with provisions to protect existing regeneration	During harvest of each timber sale cutting unit	To prevent loss of existing regeneration	Timber sale administrator
Visual quality	Field review of visually sensitive harvest and road work areas	During and after timber harvest	To ensure visual quality objectives are met and assess effectiveness of mitigation	Landscape architect
Timber sale layout	Office and field review of layout	Following layout, prior to bid offering	To evaluate sale implementation and assumptions used in planning	Planning team, timber sale prep forester
Timber sale implementation	Office and field review of completed timber sale	Following timber sale closure	To evaluate sale implementation and assumptions used in planning and effectiveness of mitigation	Planning team, administrators of timber sale and road contracts

Table 4. Monitoring Plan

2.1.3 Alternative A

Alternative A was developed in response to public concerns about road closures. Under the Proposed Action, 21 miles of non-system roads and 11 miles of Forest Service system roads would be closed. Under Alternative A, the same amount of non-system roads would be closed, but the Forest Service system roads would remain open. In addition to this difference, Alternative A includes fewer acres of commercial thinning (2,391 as compared to 2,420 in the Proposed Action) and would treat a total of 4,169 acres as compared to 4,067 under the Proposed Action. This alternative would produce approximately 900,000 more board feet of commercial timber than the Proposed Action.

Leaving these Forest Service system roads open would, in combination with proposed timber harvest, cause habitat effectiveness values for deer and elk to remain or fall below Revised Forest Plan direction. Habitat effectiveness is determined by the amount and distribution on the landscape of open roads, cover, and forage. To counteract this effect, a number of small clearcuts were proposed to increase forage near quality cover areas. Figure 4 shows the stands in which the clearcuts would take place. About 30% of each stand would be cut in patches, each no more than five acres in size. A total of 131 acres would be cut. All trees would be cut, except those greater than 20" in diameter. This treatment would produce approximately 1.0 MMBF of sawtimber and approximately 62 CCF of roundwood.

Whole-tree yarding would take place in most of the patch clearcuts. Slash would be pulled back from leave trees where necessary before burning for site preparation takes place. Prescribed burning is proposed on a total of 3,243 acres under Alternative A, slightly more than under the Proposed Action due to the additional patch clear cut acres.

Figure 4 (Alternative A Vegetation Treatments) displays the locations of the patch clearcuts and other vegetation management treatments. Prescribed burn areas are shown on Figure 5. Road closures for Alternative A are shown on Figure 6. All other proposed treatments, mitigation measures, and monitoring recommendations are the same as under the Proposed Action. Total volume that would be produced by Alternative A is estimated at 6.9 MMBF and 2,960 CCF of roundwood.

Figure 4. Alternative A Vegetation Treatments

Figure 5. Alternative A Prescribed Burning

Figure 6. Alternative A Road Closures

2.2 Alternatives Considered but Eliminated from Detailed Study

The IDT considered a number of alternatives to the proposed action. Following are brief descriptions of alternatives not considered in detail and reasons for eliminating them from detailed analysis.

Timber volume emphasis. The planning team considered an alternative that would have responded to all silvicultural needs in the project area. This alternative would have violated Revised Forest Plan and Phase I Amendment direction by treating stands deferred under the Proposed Action and Alternative A to provide habitat for American marten, northern goshawk, and snag-associated species. Trees over 20" in diameter would not have been retained. Forest vegetation modeling indicates that if trees of this size are cut, there will be too few in the project area to provide the prescribed level of large-diameter snags in the near future. This alternative also included harvest in a few areas dropped from other alternatives due to the need for prohibitively expensive logging systems. This alternative was not analyzed in detail because it would not have complied with Revised Forest Plan direction.

No commercial timber output. A commentator suggested an alternative that would not produce a commercial product. Prescribed burning was suggested as an alternative to logging. Some of the needs discussed in Chapter 1 could be met without a commercial timber sale; for instance, thinning and burning could reduce the risk of mountain pine beetle infestation even if no logs were sold as a product of the thinning. If no logs were yarded from a site, thinning and burning would have to occur over repeated entries to avoid unmanageable fuel loads. These entries would require appropriated funding, since no logs would be sold to pay for the treatment. Burning without thinning would not meet silvicultural goals, and would have an associated high risk of burns escaping control in heavy fuel areas.

The Responsible Official considered these facts and decided not to consider a no-timber alternative. The alternative would not follow the direction of the Forest Plan or the goals and objectives for Management Areas 5.1 or 4.1.

Fuel breaks. The Lawrence County Timber Committee suggested fuel breaks as a method to reduce risk to communities from wildfire. A fuel break strategy would focus on modifying vegetation along roads and ridges. This strategy would not consider existing stand structure and capability, and may or may not coincide with the silvicultural prescription intended to best promote a healthy, sustainable forest resource for the future. In the Power project area, the combination of existing openings and vegetation treatments intended to meet Revised Forest Plan direction would eliminate the need for fuel breaks. Therefore, the Responsible Official decided not to consider this alternative.

Treatments to increase water yield. A member of the public suggested that a purpose of the project should be increasing water yield. Water yields would probably be increased if treatments that substantially reduced forest cover took place across a large percentage of the watershed. Such treatments are unlikely to meet all of the other multiple-use objectives related to the Purpose and Need for this project. Increased water yield could be expected from the types of vegetation treatments proposed to meet Revised Forest Plan direction. These increases, however, would be transitory and would not likely result in more water availability when it is most needed (drought years, dry season). If water yield were increased by vegetation management, there could be adverse effects to stream channel morphology from increased peak flows. This issue was addressed in the Revised Forest Plan. Therefore, the Responsible Official determined that increasing water yield is not part of the purpose and need for the project.

No road closures. The Meade County Commissioners and Lawrence County Timber Committee both requested that existing roads be maintained in an open condition. Forest Service roads analysis concluded that many of the non-system roads in the project area are candidates for road closure according to Forest Service roads management policies (FSM 7700). These roads were not built or sanctioned by the Forest Service, nor has the Forest Service maintained them.

The IDT considered the condition and use of non-system roads. In most cases, these roads are not needed for access for multiple uses in the Power area⁶, and are unlikely to be needed in the future.

The Proposed Action also includes some system (FDR) road closures. These closures are intended to meet Revised Forest Plan and Phase I Amendment objectives, standards and guidelines. The Responsible Official decided to consider an alternative that leaves system roads open, but closes non-system roads (Alternative A). The Responsible Official decided not to develop an alternative that closes no roads, because such an alternative would not meet the goals and objectives of the Forest Plan or the wildlife objectives identified in the Purpose and Need.

2.3 Treatment Timing

The law generally prohibits the harvest of stands before they reach their maximum growth rate (NFMA, 16 U.S.C. 1604(m)). Exceptions in the law allow the harvest of individual trees, or even parts or whole stands of trees, before this time to thin and improve timber stands and salvage damaged stands of trees (part m1 of the law). Further exceptions are allowed in order to achieve multiple-use objectives other than timber harvest (part m2).

⁶ One non-system road would not be proposed for closure under any alternative because it provides needed access to a cattle watering area.

The Proposed Action and Alternative A would harvest some stands before their maximum potential growth rate has been reached. These harvest treatments are consistent with the exceptions provided in part m2 of the law, and include the following: precommercial thinning, commercial thinning, patch clearcuts, cutting of conifer encroachment in hardwood stands and meadows, and fuel treatments. These treatments are proposed to meet Revised Forest Plan multiple-use objectives stated earlier in this chapter.

2.4 Alternatives Compared

Comparison of Proposed Actions by Alternative

Alternative Components	Proposed Action	Alternative A	No Action
Acres Precommercial Thinning	133	133	0
Acres Commercial Thinning	2,420	2,391	0
Acres Regeneration Harvest	107	107	0
Acres Overstory Removal	793	793	0
Acres Patch Cut	0	131	0
Acres Conifer Encroachment Reduction in Meadows	424	424	0
Acres Conifer Encroachment Reduction in Hardwood Stands	190	190	0
Total Acres Vegetation Management	4,067	4,169	0
Total Acres Prescribed Burning	3,141	3,243	0
Miles of Road Reconstruction	7	7	0
Miles of Road Pre-use Maintenance	46.5	46.5	0
Miles of System Road Closure	11	0	0
Miles of Non-system Road Closure	21	21	0

Table 5. Comparison of Proposed Actions by Alternative

*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

Comparison of Effects by Alternative and Resource Area/Issue

	Proposed Action	Alternative A	No Action
Forest Plan Standards and Guidelines			
Forest Vegetation	Would meet Forest Plan direction by producing timber, increasing early seral habitat, and thinning dense, mature stands. Would treat 4,067 acres.	Would meet Forest Plan direction by producing the most timber and early seral habitat and thinning dense, mature stands. Would treat 4,169 acres.	Would not treat any acres to meet vegetation objectives, standards, and guidelines.
Late-succession Habitat	Would maintain all trees over 20" in diameter, would not harvest late succession stands.	Same as Proposed Action.	No change in late succession habitat.
Timber Production	Would meet all standards and guidelines.	Would meet all standards and guidelines.	Would not produce timber at this time or increase growth or yield.
Wildlife and Plants	Would increase deer and elk habitat effectiveness by closing system and nonsystem roads. Other wildlife and plant standards and guidelines would be met.	Would violate deer and elk habitat effectiveness direction. Other wildlife and plant standards and guidelines would be met.	Deer and elk habitat effectiveness would remain low.
Soils and Water	Would meet all standards and guidelines.	Would meet all standards and guidelines.	No direct effects.
Air Quality	Would meet all standards and guidelines.	Would meet all standards and guidelines.	No direct effects.
Noxious Weeds	Would apply forest-wide noxious weed management plan to all project activities.	Would apply forest-wide noxious weed management plan to all project activities.	Would apply forest-wide noxious weed management plan to ongoing activities. No direct effects.
Recreation and Scenery Management	Would meet ROS and SIO requirements and address inconsistencies between current condition and management requirements.	Would meet ROS and SIO requirements and address some inconsistencies between current condition and management requirements, except system roads in MA 4.1 would remain open.	Would not address inconsistencies between current condition and management requirements.
Heritage Resources	Would meet all standards and guidelines.	Would meet all standards and guidelines.	No direct effects.
Issue 1: Access and Travel Management			
Miles of Road Proposed For Closure	32	21	0

*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

	Proposed Action	Alternative A	No Action
Effects on Users	Closes 32 miles of existing road. Impact on users dependent upon personal preferences.	Closes 21 miles of existing road. Impact on users dependent upon personal preferences.	No change.
Issue 2: Timber Production and Economics			
Potential Sale Volume	6.0 MMBF	6.9 MMBF	0 MMBF
Present Net Value	-\$363,871	-\$294,990	0
Benefit-to-Cost Ratio	0.69	0.76	0
Issue 3: Effects on Threatened, Endangered, Sensitive (TES) and Management Indicator Wildlife Species			
Threatened and Endangered Species (Bald Eagle)	No effect	No effect	No effect
Sensitive Species	May impact individuals, but would not impact populations.	May impact individuals, but would not impact populations.	No impact.
Management Indicator Species	Would meet all standards and guidelines.	Habitat effectiveness for deer and elk would not meet guidelines (to be treated as standards). If selected, this alternative would require a site-specific Forest Plan amendment or would need to be modified to meet habitat effectiveness guidelines.	No direct effects.

Table 6. Comparison of Effects by Alternative and Resource Area or Issue

3 ENVIRONMENTAL CONSEQUENCES

This section describes the scientific and analytical basis for the alternative comparison shown in Chapter 2 of this EA. Chapter 3 of the Revised Forest Plan FEIS discusses short- and long-term effects, irreversible and irretrievable commitment of resources, and adverse environmental effects that cannot be avoided when implementing vegetation management in the Black Hills forest environment. This EA is tiered to the FEIS; effects that are described in the FEIS are not necessarily repeated here. This EA focuses on analysis demonstrating how the project complies with the Revised Forest Plan and Phase I Amendment. Site-specific direct, indirect, and cumulative effects are also disclosed.

The Power project area includes 12,292 acres of National Forest System land and is further described in Chapter 1. Direct and indirect effects analyses were conducted on the project area only.

The cumulative effects analysis area consists of two 7th-field watersheds. These watersheds are located mostly on the Northern Hills Ranger District, with a smaller portion of each on the Hell Canyon Ranger District (see map inside front cover). The total area in these watersheds equals 17,149 acres. Cumulative effects analysis was conducted on this area.

Cumulative effects analysis considered past, present and reasonably foreseeable future actions within the cumulative effects analysis area, including timber harvest, grazing, recreational activities such as hunting and snowmobiling, prescribed fire and fire suppression, road management (building, reconstructing and decommissioning), and activities on private land.

Recently completed, active, and planned timber sales include Pond, Hellsgate, and Bigmac Timber Sales, all of which are active and overlap parts of the analysis area, and Tower Timber Sale, which was completed about 10 years ago. A limited amount of subdivision and development of private property has occurred or is occurring. No vegetation management projects are known to be occurring or planned on private land in the analysis area. Private land accounts for about 16% of the cumulative effects analysis area.

All of the units proposed for harvest under the Proposed Action or Alternative A have previously been selectively logged. Cumulative effects analysis includes immediate effects and those that may occur within five to twenty years.

3.1 Forest Vegetation

3.1.1 Effects on Vegetation – Resource Elements

Hardwoods

The Revised Forest Plan identified 387 acres of hardwood communities (base year 1995) in the project area. An updated inventory found 841 acres of aspen, birch, and other hardwood cover types. This increase is due more to improved inventory than an actual increase in hardwood acreage. The Proposed Action and Alternative A would thin and remove conifer encroachment from 190 acres of aspen and birch. Prescribed burning within these stands would help regenerate and invigorate hardwoods.

The ponderosa pine stands prescribed for treatment include small pockets of hardwoods. Conifers would be cleared 100 feet around hardwood pockets in pine stands to encourage aspen regeneration following treatment.

The Proposed Action and Alternative A would meet Forest-wide Objective 201 in the short term by conserving hardwood communities within pine and hardwood cover types.

The No Action Alternative would not conserve hardwood communities. In the absence of management or natural disturbances, conifers would gradually out-compete hardwoods. Although the changes may not be noticeable in the short term, over time, these sites would convert to pine and spruce, and acreage of hardwood cover would decrease.

Forest Stand Diversity

Both Management Areas include diversity objectives (4.1-202 and 5.1-202).

Forest stands in the project area vary in size from one to 190 acres. The shape of each treated area would vary depending on factors such as scenic integrity. Edges of harvest areas would be deliberately blended with vegetation on the surrounding landscape.

Forests in the project area are dominated by pine, spruce, and hardwoods. The area also contains some meadows. Tables 7-9 and Figure 7 display habitat structural stage (SS) by forest cover type and alternative. Maps showing spatial distribution of habitat structural stages are in the analysis files at the Northern Hills Ranger District. Habitat structural stages are defined as follows:

- SS 1: Grasses and forbs
- SS 2: Seedlings and saplings under 5" in diameter
- SS 3A: Trees 5-9" in diameter, canopy closure under 40%
- SS 3B: Trees 5-9" in diameter, canopy closure 40-70%
- SS 3C: Trees 5-9" in diameter, canopy closure over 70%
- SS 4A: Trees over 9" in diameter, canopy closure under 40%
- SS 4B: Trees over 9" in diameter, canopy closure 40-70%
- SS 4C: Trees over 9" in diameter, canopy closure over 70%
- SS 5: Late succession

*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

Cover Type	Structural Stage								Total
	1	2	3A	3B	3C	4A	4B	4C	
Ponderosa pine	140	391	148	268	95	761	4,937	3,009	9,749
White spruce	47	0	40	25	0	346	533	303	1,294
Quaking aspen/ paper birch	90	303	64	70	236	0	38	40	841
Grass	358	0	0	0	0	0	0	0	358
Non-forested	50	0	0	0	0	0	0	0	50
Total	685	694	252	363	331	1,107	5,508	3,352	12,292

Table 7. Structural Stage Distribution by Cover Type – Existing Acres

Cover Type	Structural Stage								Total
	1	2	3A	3B	3C	4A	4B	4C	
Ponderosa pine	140	1,152	148	270	93	552	5,639	1,755	9,749
White spruce	47	0	40	25	0	346	533	303	1,294
Quaking aspen/ paper birch	90	303	232	56	82	0	38	40	841
Grass	358	0	0	0	0	0	0	0	358
Non-forested	50	0	0	0	0	0	0	0	50
Total	685	1,455	420	351	175	898	6,210	2,098	12,292

Table 8. Structural Stage Distribution by Cover Type - Proposed Action Acres

Cover Type	Structural Stage								Total
	1	2	3A	3B	3C	4A	4B	4C	
Ponderosa pine	299	1,152	148	270	93	552	5,480	1,755	9,749
White spruce	47	0	40	25	0	346	533	303	1,294
Quaking aspen/ paper birch	90	303	232	56	82	0	38	40	841
Grass	358	0	0	0	0	0	0	0	358
Non-forested	50	0	0	0	0	0	0	0	50
Total	844	1,455	420	351	175	898	6,051	2,098	12,292

Table 9. Structural Stage Distribution by Cover Type - Alternative A Acres

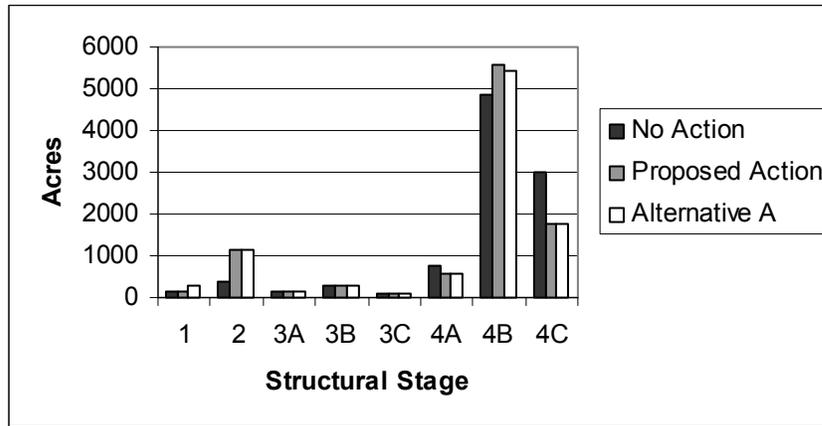


Figure 7. Ponderosa Pine Structural Stage Distribution by Alternative

On about 7,348 acres of pine, the dominant trees are greater than 100 years old. The dominant trees are at least 140 years old on about 806 acres of pine. Treatments proposed under the action alternatives focus on stands between 100 and 140 years old.

Management Areas 4.1 and 5.1 are both expected to contribute a sustainable supply of timber. Crown closure has a direct effect on the growth and vigor of trees in a stand. When crown closure is greater than 60%, growth decreases and risk of insect infestation and mortality increase. Conversely, if crown closure is less than 40%, the site is not being used to its full potential.

About 1,371 acres (16% of the mature ponderosa pine acres) have less than 40% crown closure, while 4,505 acres (52% of the mature ponderosa pine acres) exceed 60% crown closure. Under the Proposed Action, mature pine forest with over 60% crown closure would decrease to 2,419 acres (28%). Under Alternative A, this figure would decrease further to 2,270 acres (26%). Crown closure in stands treated with a regeneration harvest (107 acres under the Proposed Action, 238 acres under Alternative A) would decrease below 40% until the stands are fully occupied by pine regeneration.

Currently, about 5% of the ponderosa pine stands in the analysis area are younger than 20 years. Both the Proposed Action and Alternative A would increase acreage in stands younger than 20 years by 793 acres of shelterwood overstory removal. Alternative A would reduce stand age to less than 20 years on another 131 acres where patch clearcuts are proposed.

Under the No Action Alternative, forest stands would continue to grow older and denser in the absence of natural disturbances. Risk of insect infestation and mortality would increase while growth would decrease. Without disturbance, there would continue to be few young stands.

About 4,895 acres (41%) are multistoried and thus provide vertical diversity. The No Action Alternative would maintain the present condition in the near future with no increase or decrease in multistoried stands.

The Proposed Action would convert 793 acres of multi-storied forest to single-storied through shelterwood overstory removals. Another 107 acres of currently single-storied forest would be multi-storied after seed tree harvest for a net decrease of 686 acres. As a result, about 36% of the forested area would be in a multi-storied condition.

Alternative A would convert 924 acres of multi-storied forest to single-storied through shelterwood overstory removals and patch clearcuts. Like the proposed action, another 107 acres of currently single-storied forest would be multi-storied after seed tree harvest for a net decrease of 817 acres. As a result, about 34% of the forested area would be in a multi-storied condition.

White Spruce

Approximately 1,294 acres of white spruce cover type exist in the project area. Spruce stands were excluded from treatment to meet Revised Forest Plan standards and guidelines. Spruce is also present in pine and hardwood stands as an understory or secondary component.

Grasslands

The Revised Forest Plan identified 358 acres of grassland communities (base year 1995) in the project area. An updated inventory found 456 acres. This increase is due to improved inventory rather than an actual increase in grassland acreage. Grassland communities are not the same as forest stands in structural stage 1 (grass/forb). Grasslands are permanent openings, whereas structural stage 1 in a forest community is a transitory opening. Plant community types generally differ between meadows and temporary forest openings.

The IDT did not identify any opportunities to increase grassland acreage in the Power project area. Pine and spruce are, however, growing into some existing grasslands, and would eventually convert the meadows to forest in the absence of disturbance. To maintain current meadows, small conifers would be removed from the edges of meadows under both action alternatives.

The No Action Alternative would not meet Forest-wide Objective 205. Grassland acreage would continue to decrease through forest succession.

Late Succession

The project area does not contain Management Area 3.7 (late successional forest landscapes). There are, however, 710 acres of stands that have been managed as late-successional stands. This acreage comprises approximately 4% of the forested National Forest land in the project area. None of these stands would be treated under any alternative.

Smaller late-succession patches in other stands would be retained under all alternatives to provide goshawk and American marten habitat. No activities would take place in these areas.

Thinning from below, proposed under both action alternatives in stands not currently showing late succession characteristics, would encourage the development of large trees. Sites proposed for regeneration harvest or patch clearcut would not develop into late-succession habitat for many decades. Such features of late succession forest as large trees, snags, and down woody material would be retained as noted elsewhere in this section. No trees greater than 20" in diameter would be cut.

Grass/forb Structural Stage

There are currently 140 acres of grass/forb structural stage in ponderosa pine and spruce stands. This figure does not include permanent grasslands (see Objective 205 above). It also does not include old log landings, skid trails, utility corridors, or other small, scattered grass/forb openings. Field observation indicates that grass/forb habitat is probably provided on at least 5% of the previously harvested areas. Hardwood stands are not considered to provide grass/forb stage, since any openings usually progress to seedling/sapling stage within one growing season.

The No Action Alternative would not create any additional grass/forb stage. Existing openings would eventually become forested.

The Proposed Action and Alternative A would increase grass/forb structural stage in stands regenerated using seed tree or patch clearcut methods. Under the Proposed Action, it is estimated that about 10% of seed tree harvest units would be in grass/forb stage, for a total of 11 acres. Alternative A increases this figure by 131 acres due to patch clearcuts. Additional grass/forb habitat may result from new log landings and skid trails.

Snags

Management of snags is regulated by Revised Forest Plan Standards 2301 and 2302 and Guidelines 2303 and 2306, both to be treated as standards under the Phase I Amendment.

Stand inventory results suggest that large-diameter snags are in relatively short supply and project area watersheds do not meet Standard 2301. Forest vegetation modeling indicates that live trees greater than 20" in diameter are also currently deficient in most parts of the project area watersheds. On average, fewer than 0.5 trees of this size exist per acre.

To meet Guideline 2306 and assure an adequate future supply of snags and down woody material, no trees over 20" in diameter would be cut under any alternative. Sufficient trees in other diameter classes would be retained as needed to assure that future large snag needs can be met. Modeling indicates that, under all of the alternatives, enough large-diameter green trees would be present across project area watersheds within 20 years to meet Standard 2301 over time.

Down Woody Material

Existing amounts of down woody material vary across the project area. Mitigation measures included in Chapter 2 would provide down woody material in harvest units in accordance with Revised Forest Plan Objective 212.

Mountain Pine Beetle

Mountain pine beetle populations are at endemic (low) levels in the Power project area. Approximately 4,505 acres (46%) of ponderosa pine in the project area are at relatively high risk of future infestation. The No Action Alternative would not reduce this risk.

The Proposed Action would reduce density on 2,086 acres currently at medium or high risk of beetle infestation. Alternative A would treat 2,235 acres in this condition. These alternatives would reduce risk of mountain pine beetle infestation on 46% and 50%, respectively, of the forest currently at relatively high risk of infestation. Risk of an epidemic would be substantially reduced across the project area.

<u>Alternative</u>	<u>Acres at Relatively High Risk of Beetle Infestation</u>
No Action	4,505
Proposed Action	2,419
Alternative A	2,270

3.1.2 Effects on Vegetation by Alternative

Direct and Indirect Effects on Vegetation – No Action Alternative

This alternative would defer all treatment to some time in the future. Risk of insect and disease infestation would increase with stand density, which could lead to high mortality and stand-replacing fire. Overstocking (high stand density) would cause trees to grow more slowly. Hardwood and meadow stands would be likely to succeed to conifers in the absence of natural disturbance.

Snags and down woody material would increase over the long term as trees die, decompose and fall. The No Action alternative would probably result in more natural mortality of trees than would the Proposed Action or Alternative A.

Over the long term, without disturbance, canopy closures and stand ages would increase, providing habitat for species associated with older forest conditions. Early structural stage acreage would decrease, leaving fewer habitats available for species associated with early seral and open forest conditions.

Direct and Indirect Effects on Vegetation – Proposed Action

The Proposed Action would treat approximately 3,453 acres of ponderosa pine forest, 424 acres of meadow, and 190 acres of hardwood stands. Treatments would reduce the number of trees less than 20" in diameter and younger than 140 years old.

Regeneration harvest, overstory removal, and commercial thinning are proposed in ponderosa pine stands. Regeneration harvest would take place on 107 acres in three stands. This treatment type would remove most of the mature trees but leave enough to provide seed to naturally regenerate the stand. Seed trees would also provide within-stand structural diversity. Sufficient live trees would remain to meet Revised Forest Plan snag direction over time.

Stands proposed for regeneration harvest have achieved culmination of mean annual increment (CMAI) and are suitable and available for regeneration. Methodology for determining culmination of mean annual increment is described in the project silviculturist's report, located in the project file at the Northern Hills Ranger District office. Overstory removal harvest would remove most of the seed trees from 793 acres of pine that have successfully regenerated. This treatment would provide more growing space for seedlings and saplings, improving their growth and vigor. Trees greater than 20" in diameter would not be cut. Additional trees would be retained as needed to meet green tree and snag retention direction. Overstory removal treatments would reduce the number of mature trees in the watershed. By definition, stands proposed for overstory removal have already met CMAI requirements (demonstrated before they were seed tree cut).

Commercial thinning treatments would give the largest, best-formed trees in the stand more room to grow (2,420 acres). After treatment, basal area per acre would range from 50-80 square feet. Where pine seedlings and saplings are crowded, precommercial thinning would take place to reduce the number of stems and increase growth rates. Thinning would reduce susceptibility to insects and disease, reduce fuel hazard, and increase growth and vigor. Without natural disturbance, unthinned ponderosa pine stands can stagnate, reducing the chance that large-diameter trees will develop. Proposed thinning would increase the chance that stands composed of relatively small-diameter trees will develop a substantial number of trees greater than 20" in diameter. Stands proposed for commercial thinning are excepted from the CMAI requirements.

Following all of these treatments, the forest floor would receive more light and precipitation. Growth of trees and understory forage plants would increase and remain at elevated levels until the stands regenerate to pine or crowns begin to close.

Hardwood stands and meadows would be treated to reduce conifer encroachment. These habitats would be retained through vegetation management.

Under the Proposed Action, some existing live green trees would no longer be available for recruitment to snags. Proposed treatments would leave sufficient green trees to meet the target snag levels over time. Road closures would help deter illegal firewood cutting and further protect snags. Snag densities would continue to increase in trees 20" in diameter and larger.

Direct and Indirect Effects on Vegetation – Alternative A

Alternative A would treat 4,169 acres. Effects would be similar to the Proposed Action, except that the addition of 131 acres of patch clearcuts would increase grass/forb structural stage and further increase forage for wildlife. Patch clearcuts are excepted from CMAI requirements. Compared to the Proposed Action, Alternative A would result in less deterrence of illegal firewood cutting because of fewer road closures.

Cumulative Effects on Vegetation – All Alternatives

Pond, Hellsgate, and Bigmac timber sales would continue under all alternatives. Pond includes treatment of 530 acres in the analysis area: 322 acres of commercial thinning, 45 acres of overstory removal, and 163 acres of regeneration harvest. Hellsgate treated 28 acres of the project area with a seed tree cut. Bigmac includes treatment of 434 acres: 200 acres of commercial thinning, 76 acres of regeneration harvest, 62 acres of group selection (affecting 25% of the stand's acreage), and 32 acres of removal of commercial pine from grass communities.

All of the stands proposed for harvest under this project have previously been selectively harvested. Agriculture on private land has altered the landscape. Utility corridors bisect the area and affect the vegetation within and adjacent to the corridors. The effects of past timber sales on structural stage distribution are reflected by the existing condition (Table 7).

As stated in the Revised Forest Plan FEIS (page III-131):

“The current age distribution...reflects the unregulated harvests of the 19th century, widespread regeneration early in the 20th century, and subsequent timber management.”

These existing conditions were considered in the Revised Forest Plan and factored into the standards and guidelines for age and structural class distribution.

The Black Hills forest historically depended on fire to maintain ecosystem structure and function. There is no known evidence that the Black Hills ecosystem was historically stable or dominated by mature, dense conifer forests. The forest was probably always changing from the effects of disturbance, particularly fire and mountain pine beetles.

Today the pine forest is structurally different from historic conditions. The original old-tree component has been mostly removed by harvest during the past century; tree densities are higher; the pine forest has encroached into meadows, grasslands, and hardwood stands; and pine age-class distribution may be more uniform (USDA 1996).

In the absence of fire, stands become denser, natural fuels are allowed to accumulate, and conifers encroach on meadows and prairies. Additionally, shrub and herbaceous growth is stunted, and there is a reduction in development of snags and an early seral component. Without a natural fire regime, fire-tolerant ponderosa pine stands may convert to spruce, especially on northerly aspects.

Should any fires start in the project area, fire suppression efforts would contribute to this trend. Timber harvest can act as an alternate means of disturbance, setting back succession and regenerating forest stands.

The Revised Forest Plan also discusses the impacts of vegetation management such as the thinning proposed under the Proposed Action and Alternative A. The Forest Plan notes on page III-160 that thinning reduces potential tree mortality.

Under the Proposed Action and Alternative A, about one-third of each project area watershed would be treated over a ten-year period. Most of the ponderosa pine treatments maintain current structural class distribution while reducing susceptibility to mountain pine beetle.

Tables 7-9 and Figure 2 display project area acres in each structural stage by alternative for ponderosa pine. Maps displaying the spatial distribution of the structural stages are in the analysis files, located at the Northern Hills Ranger District office.

3.2 Fire, Fuels, and Air Quality

Prescribed fire is planned in this analysis area to reduce fuels and help sustain the forest over the long term. The best available predictive methods, models, and cost-efficient technology would be used to avoid or reduce smoke impacts to smoke-sensitive areas within or near the National Forest. Appropriate air quality regulatory agencies would be involved before prescribed burns are ignited.

A burn plan would be prepared to minimize the risk of a prescribed burn. It would provide specific direction using site information only available once harvest is complete. Prescribed burning operations would comply with procedures identified in the Forest and local Air Quality and Smoke Management Plans. Appropriate smoke management strategies such as reduction, dilution, and avoidance would be addressed in the burn plan. Adjacent private lands may be evaluated for partnerships to help achieve a strategy of long-term fire protection throughout the watershed.

3.2.1 Effects on Fuels, Fire and Air Quality

Historically, vegetative communities in the project area were shaped and maintained by fire. Limited timber harvest and fire exclusion practices have increased the amount of vegetation in the Power project area and created the current fuel characteristics. Insect infestations and weather events have also contributed to current fuel characteristics. Resulting major differences between historic and existing fuel characteristics include: a) higher fuel loading (amount of fuel at the ground surface), b) more continuous horizontal arrangement of surface fuels, c) increased vertical continuity of fuels (ladder effect), and d) increased crown density. Together these characteristics have increased the probability that wildfires could cause serious damage.

Major vegetation cover types responsible for the fuel and its characteristics in this analysis area are ponderosa pine, white spruce, hardwoods, and grasses. These same vegetative types likely existed historically, but in different proportions.

Currently, some pine and most spruce stands have a multi-storied structure. Many of these stands are dense and pose a risk of rapidly growing, high-intensity fire. A stand-replacement fire could threaten intermingled private property, some with dwellings, existing near the project area. Wind and heavy snow have resulted in small concentrations of heavy fuel loadings scattered throughout these stands.

If fire had exhibited its natural role in the past century, forest stands would be less dense, acreage of white spruce would be lower, fewer stands would have multiple canopy layers, and amount of ground and ladder fuels would tend to be lower. Meadows would be larger and have greater abundance and diversity of grasses and forbs. Periodic fires would have consumed downed fuels, lessened the number of small trees, reduced the presence of brush, increased the height of the lowest tree branches, stimulated grass/forb development in meadows, and reduced forest stand densities by killing individual or clumps of trees.

Direct and Indirect Effects on Fuels, Fire, and Air Quality – No Action Alternative

The No Action Alternative would have no direct effects. No fuels reduction would occur, no smoke would be produced, and no prescribed burning could potentially escape control.

Indirect effects would include increased tree density, multi-story structure development, and crown closure over time. In the long term, effects of potential wildfires would be more likely to be detrimental to timber, soil productivity, wildlife habitat, and other resources. Understory vegetation (grasses and forbs) would decrease until natural or human-caused disturbance resulted in fewer trees and more sunlight.

Direct and Indirect Effects on Fuels, Fire, and Air Quality – Proposed Action and Alternative A

The Proposed Action and Alternative A would reduce fuel accumulations and probable fire severity in the event of a wildfire. About 25% of the analysis would be treated under these alternatives.

One potential indirect effect of the Proposed Action and Alternative A would be escape of a prescribed burn. Attempts are made to minimize the risk of prescribed burning by burn planning and implementation precautions. The usual seasons of burning (early spring and late fall) and contingencies to deal with escaped fire (suppression forces on call, identification of potential control features) that are contained in every burn plan reduces the potential consequence of an escaped burn.

Another indirect impact would be the generation by prescribed burning of various pollutants (gases and particulate emissions) in smoke. The primary gases produced are water vapor, carbon dioxide (CO₂) and carbon monoxide (CO). Also produced are negligible amounts of other gases such as the oxides of nitrogen and sulfur.

Particulate emissions limit visibility (both onsite and potentially offsite), absorb harmful gases, and aggravate respiratory conditions in susceptible individuals. Over 90% of particulate emissions from prescribed burning are 10 microns (PM₁₀) or less in diameter. Research indicates that particles less than 10 microns in diameter can be inhaled. Particles less than 2.5 microns (PM_{2.5}) in diameter are respirable.

The degree to which these cause negative health effects depends upon the person's general respiratory condition and sensitivity to such emissions as well as the type, amount or size of particulate emissions, the type of material burned, fuel moisture, weather conditions, wind direction and speed, atmospheric stability/instability (the resistance of the atmosphere to vertical motion), density of emissions, proximity of the person to smoke/emission source, and overall sensitivity of the person to such emissions. The potential exists for both short- and long-term effects to both workers and the general public.

Short-term effects on the average prescribed fire worker or the general public with general good health (good respiratory condition and low sensitivity) may include eye irritation, coughing, and shortness of breath in light, moderate, or heavy smoke. Sensitive individuals may experience severe respiratory problems that could be life-threatening depending on the individual's sensitivity and respiratory condition.

Generally, such individuals are aware of the potential for such problems and follow certain precautions, such as avoiding an area during prescribed burning.

The primary air quality concern identified for the proposed project is PM₁₀ particulate smoke emissions that can result in a visual impairment (haziness) in Class 1 airsheds (such as wilderness) and in Class II air sheds (communities surrounding National Forest lands).

Any prescribed burning would be required to meet applicable State and Federal air quality and visibility enhancement strategies. Burning when smoke dispersion conditions are favorable and compliance with daily State smoke management direction would minimize adverse effects.

Experience has shown that significant air quality impacts are limited in scope to the general burn area and are generally of short duration. Most significant impacts occur under strong, persistent atmospheric inversions or highly stable air masses. Both phenomena are uncommon during the primary burning seasons (early spring and late fall). Long-term effects of burning result from low levels of smoke that have a transitory effect on air quality. Both alternatives emphasize fuel removal first by utilization and then by prescribed fire, mechanical, or manual methods.

Fuel hazard may be increased temporarily between the end of logging and the time the slash is treated, but the long-term impact would be reduced hazard. All prescribed burning would be accomplished according to the approved prescribed fire burn plan. If adequate weather parameters do not occur, burning could be delayed. In this event, reduction of activity fuels could be delayed for a few years following harvest.

Cumulative Effects on Fuels, Fire and Air Quality

Completion of the proposed project, along with past and ongoing activities, would reduce fire hazard to acceptable levels across the watershed. Continued vegetation management would be needed to maintain reduced fire hazard levels. Reduced density in the commercial thin stands would result in fuel models that are more like historic fire regimes. Reduced density would also result in reduced risk of insect and disease, which in turn reduces potential for damaging wildfire.

The Pond, Hellsgate and Bigmac Timber Sales treated a total of nearly 1,000 acres in the Power project area. The action alternatives would treat an additional 4,000 acres more, cumulatively amounting to about 30% of the 17,000-acre analysis area. This level of treatment would reduce the ability of damaging fires to spread within the area. Pastures maintained on private lands also provide fuel breaks that reduce the ability of damaging fires to spread.

3.3 Wildlife and Special Plants

The Power project area supports a variety of wildlife and plant species. Tables 10 and 11 display the threatened, endangered, sensitive, and management indicator species that are the focus of this effects analysis. There is no management direction specific to landbirds included in the Revised Forest Plan, but the Regional Forester has been directed to consider comprehensive bird planning efforts such as Partners-in-Flight as part of the appeal resolution for the Revised Forest Plan. These efforts are discussed in the section on landbirds.

The Biological Evaluation/Biological Assessment (BE/BA) and Analysis Report for Threatened, Endangered, Sensitive, and Management Indicator Wildlife and Plant Species are contained in the project file, located at the Northern Hills Ranger District office.

3.3.1 Effects on Wildlife and Special Plants

Resource areas related to wildlife and plants are listed below⁷. Project design features and mitigation measures discussed in Chapter 2 are intended to ensure that the project meets Plan direction.

Threatened, Endangered, and Proposed Wildlife and Plant Species

A BE/BA was prepared to evaluate effects on species listed under the Endangered Species Act. The U. S. Fish and Wildlife Service (USFWS) list of endangered and threatened species for South Dakota was revised on October 11, 2001. The list for Lawrence County includes the bald eagle, whooping crane, and black-footed ferret. There are no listed plant species in Lawrence County.

The bald eagle is the only federally listed species known or likely to occur in the Power project area. Suitable habitat for whooping crane and black-footed ferret does not exist in the project area.

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles have not been documented in the project area and would not be affected by any of the alternatives. Any eagles using areas in or near harvest units could temporarily be displaced by harvest-related activities. The displacement could last as long as the harvest operation. Sufficient large trees would be retained in all stands for potential winter roosts. The project would not affect carrion supply.

If any previously unknown bald eagle roost sites are discovered, or if any stands proposed for harvest are found to be used by eagles, Revised Forest Plan Standard 3101 would provide protection.

⁷ No fish species are present in the project area or would be affected by project activities.

Petitioned Species

American Dipper (*Cinclus mexicanus*)

The USFWS was petitioned in March 2003 to list the American dipper in the Black Hills as a "Distinct Population Segment." The petitioners also requested USFWS to list the species under emergency provisions. This species is not currently listed as threatened or endangered.

The American dipper is a bird associated with mountain streams, and can be affected by changes in water quality and quantity. The project area is in the Upper Spearfish Creek watershed, which drains into Spearfish Creek, the only stream in the Black Hills currently known to support a sustainable population of dippers. The Proposed Action and Alternative A are not expected to affect perennial or intermittent streams below the project area (see Soil and Water section below) and would have no effect on this species.

Sensitive and Management Indicator Wildlife Species

Sensitive species in the Black Hills have a variety of habitat associations. Practices to enhance habitat for one species or group of species may have adverse effects on another. Table 10 summarizes the determinations of effect for sensitive wildlife species. Detailed discussions follow.

*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

Species	Potential Suitable Habitat In Project Area	Species Recorded in Project Area	Determination		
			No Effect/No Impact	May Impact Individuals*	May Impact Populations
American Marten	x	x	NA ¹	PA ² , A ³	
Black Hills Red-bellied Snake	x		NA	PA, A	
Black-backed Woodpecker	x		NA	PA, A	
Cooper's Rocky Mountain Snail	x		All		
Dwarf Shrew			All		
Flammulated Owl	x		NA	PA, A	
Fox Sparrow			All		
Fringed-tailed Myotis	x		NA	PA, A	
Golden-crowned Kinglet	x		All		
Lewis's Woodpecker	x		NA	PA, A	
Loggerhead Shrike			All		
Merlin			All		
Northern Goshawk	x	x	NA	PA, A	
Northern Leopard Frog			All		
Northern Three-toed Woodpecker	x		NA	PA, A	
Olive-sided Flycatcher	x		NA	PA, A	
Osprey			All		
Pale Milk Snake	x		NA	PA, A	
Purple Martin			All		
Pygmy Nuthatch	x		NA	PA, A	
Regal Fritillary			All		
Striate Disc Snail	x		NA	PA, A	
Swift Fox			All		
Tiger Salamander	x		NA	PA, A	
Tawny Crescent			All		
Townsend's Big-eared Bat	x		NA	PA, A	
Upland Sandpiper			All		

*"May impact individuals" = "May adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide."

¹ NA = No Action Alternative

² PA = Proposed Action

³ A = Alternative A

Table 10. Summary of Effects on Threatened, Endangered, and Sensitive Wildlife Species

American Marten (*Martes americana*)

Marten generally prefer mature or mixed conifer forests, but may adapt to a variety of habitat types. In the Black Hills, marten are seen most often in spruce forest followed by mixed spruce/pine stands. Jenks (USDA 2000), however, suggests that habitat connectivity may have never existed for marten due to the mixed and fragmented nature of the forest.

The project area contains about 1,294 acres dominated by spruce. Many pine and hardwood stands include a lesser component of mature or sapling spruce. One occurrence of marten has been documented in the project area. Track plate surveys conducted in 2002 resulted in no detections.

Down woody material is an important habitat factor for marten and is present throughout the project area. No quantitative measure of this habitat component exists.

Direct and Indirect Effects on Marten - All Alternatives

Under all of the alternatives, spruce habitat is likely to continue to develop through natural succession. Ponderosa pine stands with a significant spruce component would convert to spruce over the long term in the absence of natural disturbance. This is especially true for stands on cool, shady north aspects. Fire suppression would continue to contribute to the conversion of fire-tolerant pine stands.

No treatment is proposed under any alternative in high-potential marten habitat. Retention of connectivity habitat is expected to facilitate the movement and dispersal of marten through the project and adjoining areas.

Direct and Indirect Effects on Marten - Action Alternatives

Road closures associated with both action alternatives would benefit marten by reducing access and disturbance. This effect would be greatest under the Proposed Action. Displacement of individuals may occur during harvest operations in stands adjacent to marten habitat. This disturbance would not last beyond the duration of operations.

Indirect effects may result from timber harvest in pine stands adjacent to marten habitat. Reduction in canopy in adjacent stands could result in blowdown of spruce. Commercial thins could lead to an increase in spruce regeneration under the pine canopy. Conversely, regeneration harvests and overstory removal may open the canopy sufficiently to limit spruce reproduction in those stands. About 75 acres of overstory removal and 336 acres of commercial thinning are proposed adjacent to spruce stands in both action alternatives.

Cumulative Effects on Marten

Timber sales in the project area have cut a total of 95 acres of spruce in the last five years. Ponderosa pine stands with a substantial spruce component may also have been harvested. Both high-potential marten habitat and habitat connectivity were likely reduced.

The Power project does not convert any spruce stands to pine and leaves connectivity corridors intact, consequently, the project does not result in any additional cumulative impact to the marten. Silvicultural prescriptions that are designed to favor pine over spruce would limit the development of marten habitat in areas managed primarily for timber production.

Northern Goshawk (*Accipiter gentilis*)

Goshawks use a variety of forested habitats from closed canopy, mature to old forests for nesting, to more open, younger forests for foraging. Preferred nest sites in the Black Hills are mature ponderosa pine stands with greater than 60 percent canopy closure (Bartelt 1977, Erickson 1987). In the Black Hills, ponderosa pine is the only tree species goshawks are known to use for nesting. Nest stands in the Black Hills tend to be in pure ponderosa pine or pine/spruce mixtures (unpublished data, Black Hills National Forest, Erickson 1987, Bartelt 1977 as cited in USDA 1996). Breeding Bird Survey (BBS) data show an upward trend for the goshawk in the Black Hills since 1988.

No active or historic goshawk nests have been documented in the project area. One nest is known to occur just outside the project area, so part of the associated territory falls within the project area. Goshawk surveys were conducted in 2002, resulting in documentation of mature and young goshawks but no new nests were found in the project area.

One treatment is proposed within a half-mile of the known nest. The proposed treatment would remove conifers encroaching on a meadow, maintaining diversity of prey species habitat. None of the protected acreage associated with this nest would otherwise be affected by any of the alternatives.

There are gaps in the project area between known goshawk territories. As directed by Forest Service Manual Supplement 2600-2001-1 (Black Hills National Forest), the planning team identified suitable nesting and post-fledging habitat in these gaps to provide potential future habitat and in case undiscovered territories exist. The team identified two post-fledging areas around the best potential nesting habitat using a combination of field review, aerial photo interpretation, stand exam data, and computer modeling. Maps and data regarding these stands are located in Biological Evaluation/Biological Assessment in the project file.

Direct and Indirect Effects on Goshawk – No Action Alternative

Under the No Action Alternative, without disturbance, natural succession would continue and stands would become denser. Changes in habitat due to natural succession would occur. More stands would develop characteristics of suitable nesting habitat. The distribution of vegetation structural stages would move more towards mature and old forest. This would improve nesting habitat but not post-fledging or foraging habitat.

Direct and Indirect Effects on Goshawk – Action Alternatives

The planning team identified potential nest stands and post-fledging areas (PFAs) in gaps between known territories. No treatments would take place in the potential nest stands. Under both action alternatives, 208 acres would be treated in potential PFA 1 (146 acres of commercial thinning and 62 acres of overstory removal). These treatments would move the PFA toward the desired balance of vegetation structural stages described in Revised Forest Plan Guideline 3114 (to be treated as a standard). Vegetation structural stages differ from habitat structural stages and are defined below.

Under the Proposed Action, 83 acres of potential PFA 2 would be treated with regeneration harvest. Under Alternative A, 140 acres of this same PFA would be treated (83 acres of regeneration harvest and 57 acres of patch clearcuts). Both of the alternatives would move PFA 2 closer to the desired balance of structural stages.

*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

Without further management or disturbance, both PFAs would become deficient in vegetation structural stages 1 and 2. Road closures that would be implemented under both action alternatives would reduce disturbance and human access to potential nesting areas and would benefit goshawk. This effect would be greatest under the Proposed Action.

Tables 11 and 12 display the current and proposed distribution of vegetative structural stages for both PFAs and both action alternatives. Values are percentage of the PFA in each structural stage.

Vegetation Structural Stage	No Action Alternative	Proposed Action and Alternative A	Desired Range
VSS1 (grass/forb/shrub, trees 0-1" in diameter)	0%	2%	7-13%
VSS2 (trees 1-5" in diameter)	6%	11%	7-13%
VSS3 (trees 5-9" in diameter)	3%	8%	15-25%
VSS450 (trees 9-14" in diameter, at least 50% canopy closure)	34%	22%	8-18%
VSS460 (trees 9-14" in diameter, at least 60% canopy closure)	0%	0%	2-12%
VSS550 (trees 14-20" in diameter, at least 50% canopy closure)	57%	57%	15-25%
VSS650 (trees more than 20" in diameter, at least 50% canopy closure)	0%	0%	15-25%

Table 11. Vegetation Structural Stage Distribution - Post-fledging Area 1

Vegetation Structural Stage	No Action Alternative	Proposed Action	Alternative A	Desired Range
VSS1 (grass/forb/shrub, trees 0-1" in diameter)	2%	2%	11%	7-13%
VSS2 (trees 1-5" in diameter)	0%	14%	14%	7-13%
VSS3 (trees 5-9" in diameter)	0%	0%	0%	15-25%
VSS450 (trees 9-14" in diameter, at least 50% canopy closure)	18%	18%	18%	8-18%
VSS460 (trees 9-14" in diameter, at least 60% canopy closure)	63%	49%	40%	2-12%
VSS550 (trees 14-20" in diameter, at least 50% canopy closure)	17%	17%	17%	15-25%
VSS650 (trees more than 20" in diameter, at least 50% canopy closure)	0%	0%	0%	15-25%

Table 12. Vegetation Structural Stage Distribution - Post-fledging Area 2

Cumulative Effects on Goshawk

Recent timber harvest reduced the amount of potential nesting habitat by approximately 900 acres. The action alternatives would cut some stands that may be suitable nesting habitat, but would retain this habitat in gaps between known territories, where nests are most likely to exist. Because key habitat would be retained, no cumulatively significant effects are anticipated.

Some of the past harvest created more desirable foraging conditions for goshawks, especially where small openings were created in larger, relatively dense stands. Patch clearcuts proposed under Alternative A would add to this effect. Retention of existing snags and live trees to provide future large-diameter snags would prevent the action alternatives from adding to past losses of snags and large-diameter trees, important habitat components for many goshawk prey species. Meadow and hardwood enhancements proposed under both action alternatives would retain habitat diversity, another factor in prey availability. Other proposed treatments would have little influence on overall cumulative effects.

Flammulated Owl (*Otus flammeolus*)

Flammulated owls inhabit open ponderosa pine forests and dry montane conifer or aspen forests, often with dense saplings, oak, or other brushy understory growth. This owl is primarily insectivorous, but is known to prey on small mammals and birds as well. Nests are in natural cavities or old woodpecker holes and are reused year after year. Nest sites providing open, mature canopy conditions (providing an open flight path to the nest) appear to be preferred (McCallum 1994). Data suggest that this species may be a long-distance north-south migrant.

This species had not been confirmed in the Black Hills before the summer of 2002. In June 2002, at least one flammulated owl was detected in the north-central hills (Panjabi 2003). These observations do not necessarily prove that a flammulated owl population has become established in the Black Hills; further monitoring is needed.

No owl surveys were done in the Power project area. Based on published information, it is reasonable to expect that suitable habitat for flammulated owls is present.

Direct and Indirect Effects on Flammulated Owl

If this species occurs in the project area, cutting of snags or other trees with cavities for firewood could result in loss of occupied nests under any alternative. Cutting of snags for safety reasons under the Proposed Action and Alternative A could also result in loss of nests.

Under the No Action Alternative, snags with cavities could continue to be lost to firewood cutting due to high open road density. In the absence of management, however, natural mortality of trees would gradually increase snag numbers. Over time, risk of stand-replacing fire would increase; catastrophic fire could destroy flammulated owl habitat.

The action alternatives could reduce preferred habitat for this species by removing overstory trees and cutting hazardous snags. All trees greater than 20" in diameter would be left standing, and sufficient green trees would remain across the landscape to provide large-diameter trees and snags over time. The owl's prey base may increase due to harvest that would release understory vegetation and improve habitat for insects and small mammals. Proposed thinning and low-intensity prescribed burns would aid in development of owl habitat by reducing stand density and promoting development of understory vegetation.

Cumulative Effects on Flammulated Owl

Fire suppression has decreased open habitats over time, and vegetation management has probably decreased density of large-diameter snags. The action alternatives would help counteract cumulative effects on flammulated owl habitat through prescribed fire, some types of harvest, and mitigation to ensure that large-diameter trees and snags are present across the landscape.

Black-backed Woodpecker (*Picoides arcticus*)

The black-backed woodpecker is a primary cavity excavator/nester, and in the Black Hills and Idaho occurs in the ponderosa pine cover type. The black-backed woodpecker is a permanent resident in the Black Hills, with no seasonal migration in or out of the area. The species reaches highest abundance in large areas where insects are prolific, such as areas experiencing epidemic levels of insect outbreak or the aftermath of stand-replacing fires (USDA 2000). It has been shown to inhabit burned stands that had high canopy closure and large-diameter trees before the fire (Saab and Dudley 1998).

There have been no large wildfires in the project area in many decades, and mountain pine beetle populations appear to be at endemic levels. Large wildfires and insect epidemics have, however, taken place in other parts of the Black Hills in the last five years, providing habitat for this species. The project area contains approximately 3,009 acres of dense, mature pine forest that would provide suitable habitat if it burned or became heavily infested with insects. There are also 303 acres of dense, mature white spruce. Stand exam data suggest that existing snag density is lower than desired.

Direct and Indirect Effects on Black-backed Woodpecker - No Action Alternative

This alternative would allow natural successional changes to occur in vegetation. Existing dense stands would persist, and if affected by fire, storms, or pathogens could provide suitable black-backed woodpecker habitat. Competition among trees for water and nutrients in highly stocked stands would stress the trees, making them more susceptible to insect and disease outbreaks. An increase in insect populations would provide more food for woodpeckers, and trees killed by insects would provide snags for nest sites. In the absence of disturbance, younger, more open stands would become denser over time. This alternative would provide for the greatest increase in black-backed woodpecker habitat over the long term.

Direct and Indirect Effects on Black-backed Woodpecker - Action Alternatives

A major objective of the action alternatives is to reduce fire hazard and beetle susceptibility. By definition, these alternatives would decrease the probability that habitat preferred by black-backed woodpeckers (burned or insect-infested forest) would form. Since preferred habitat for this species currently is limited in the project area to scattered pockets of insect infestation and snags caused by storms or other events, the primary effect of these alternatives would be a decrease in possible future habitat.

The action alternatives would decrease dense, mature pine forest (structural stage 4C) by 1,254 acres (42%). Existing snags would be retained under both alternatives unless they posed a safety hazard. Large green trees would be retained at levels at or above Phase I Amendment direction to ensure snag recruitment over the long term. In the near future, snag numbers would remain low unless natural events cause extensive mortality. Silvicultural treatments would cause natural mortality rates to decline in treated stands.

Trees over 20" in diameter would not be cut, but the number of trees in other diameter classes would decrease. This effect would be slightly greater under Alternative A due to the additional acres of patch clearcuts.

Road closures proposed under the Proposed Action and, to a lesser degree, Alternative A would benefit woodpeckers. These closures would reduce disturbance and access to fuelwood gatherers who may remove existing snags. Both action alternatives may disturb nesting if harvest occurs during the nesting season. This impact is expected to be of short duration, affecting one brood.

Cumulative Effects on Black-backed Woodpecker

Over 100,000 acres of Black Hills forest burned between 1999 and 2003. These fires created extensive habitat for black-backed woodpeckers. Although none of the burned areas are within or adjacent to Power, they provide excellent areas of source habitat from which individuals may colonize other areas. Black-backed woodpeckers are expected to use these burned areas for several years.

Past and active timber sales in the cumulative effects area have reduced acreage of potential habitat for this species. Fire suppression has minimized the development of black-backed woodpecker habitat. Fire suppression would continue under all alternatives. The No Action Alternative would add to the effects of fire suppression, but would not otherwise increase cumulative effects. The action alternatives would add to cumulative effects on this species, though provision of large-diameter trees for future snags would offset effects somewhat. Mitigation and availability of preferred habitat in other parts of the Black Hills would prevent significant cumulative effects.

Northern Three-toed Woodpecker (*Picoides tridactylus*)

This species is a primary cavity nester, requiring hard snags at least 16" in diameter. Spruce is preferred habitat in the Black Hills, particularly where a developed understory occurs (USDA 2000). Mature pine may also be used. Territory size is estimated at 75 to 105 acres.

Like the black-backed woodpecker, the three-toed woodpecker reaches highest abundance in areas where insects are prolific. The best conditions are provided during the first ten years after a fire or beetle outbreak. Pine beetles and other bark beetles are a very important year-round food source, and have a great effect on the woodpecker's abundance and distribution.

In order for this species to persist between fire or insect events, the forest matrix must include large stands of old or large trees. These areas can maintain woodpecker populations until an insect outbreak or fire promotes the species to higher abundance (USDA 2001).

The project area contains approximately 1,182 acres of spruce, of which 303 acres are in dense, mature stands. There are 3,009 acres of dense, mature pine. Density of existing snags appears to be low. See also "Black-backed Woodpecker," above.

Direct and Indirect Effects on Three-toed Woodpecker - No Action Alternative

Effects would be similar to those discussed above for the black-backed woodpecker. Additionally, the No Action Alternative would result in the development of more spruce habitat through natural succession. In the absence of disturbance, ponderosa pine stands with a substantial component of overstory or understory spruce would gradually succeed to mostly spruce over the next few decades. This is especially likely to occur on cool, shady north aspects. This change would increase three-toed woodpecker habitat.

Direct and Indirect Effects on Three-toed Woodpecker - Action Alternatives

No treatments would take place under either action alternative in spruce stands or pine stands with a substantial amount of spruce. Timber harvest and prescribed fire would generally set back succession and slow the conversion of pine stands to spruce. Other effects would be similar to those discussed above for the black-backed woodpecker.

Cumulative Effects on Three-toed Woodpecker

Recent timber sales harvested 95 acres of spruce habitat in the cumulative effects area. None of the alternatives would add to this effect. In the near term, implementation of Phase I direction will prevent conversion of spruce stands to pine and promote development of spruce habitat.

Fire suppression has had both positive and negative effects on three-toed woodpeckers. Prevention of large fires has decreased suitable habitat, but expansion of spruce in the absence of fire has created habitat. All alternatives would continue these trends.

See also "Cumulative Effects on Black-backed Woodpecker," above.

Lewis's Woodpecker (*Melanerpes lewis*)

Habitat for this species includes open forest and woodland, often burned, including oak, coniferous forest (primarily ponderosa pine), riparian woodlands, and orchards. Their distribution is closely associated with open ponderosa pine forest in western North America, and is strongly associated with fire-maintained old-growth ponderosa pine. Overall, suitable conditions include an open canopy, availability of nest cavities and perches, abundant arthropod prey, and a shrubby understory (Saab and Dudley 1998). Lewis's woodpecker forages by hawking (flying from a perch to catch insects in the air), so perches near openings or in open-canopy forest are important habitat (NatureServe 2001). Reintroducing fire into the ecosystem by way of prescribed burns can benefit this species.

The project area currently contains approximately 909 acres of open-canopy ponderosa pine habitat (structural stages 3A and 4A). Additionally, there are 4,878 acres of structural stage 4B, containing a range of moderately open forest. Snag density in open stands appears to be quite low. There have been no large fires in the project area in recent decades, and mountain pine beetle populations are at endemic levels. These habitat components do, however, exist across large areas in other parts of the Black Hills. There are no documented occurrences of Lewis's woodpecker in the project area.

Information from the Expert Interview Summary for the Phase I Amendment (USDA 2000) indicated several areas in the Black Hills that currently provide Lewis's woodpecker habitat, including Beaver Park, the Boundary Gulch burn, close to the Forest boundary near Sundance, Wyoming, and in cottonwood zones around the perimeter of the Black Hills.

Direct and Indirect Effects on Lewis's Woodpecker - No Action Alternative

See "Direct and Indirect Effects on Black-backed Woodpecker - No Action Alternative," above. The changes described would decrease habitat for this species.

Direct and Indirect Effects on Lewis's Woodpecker - Action Alternatives

Lewis's woodpecker prefers relatively open areas. Commercial thinning, overstory removal and regeneration harvests would reduce basal area and canopy closure. Patch clearcuts proposed on 131 acres under Alternative A would provide openings surrounded by mature forest and would maintain the largest diameter trees for snag recruitment. This treatment would provide suitable habitat for Lewis's woodpecker. All trees over 20" in diameter would be retained in all harvest units under both action alternatives, providing large-diameter trees for future snag recruitment. Existing snags would be retained unless they posed a safety hazard.

See also discussion of snags and road closures under "Direct and Indirect Effects on Black-backed Woodpeckers - Action Alternatives," above.

Cumulative Effects on Lewis's Woodpecker

Over 100,000 acres of Black Hills forest burned between 1999 and 2003. These fires created extensive habitat for Lewis's woodpecker. Although none of the burned areas are within or adjacent to Power, they provide excellent areas of source habitat from which individuals may colonize other areas.

Past and active timber sales in the cumulative effects area have increased acreage of potential habitat for this species. Fire suppression has minimized the development of preferred (burned) habitat. Fire suppression would continue under all alternatives. The No Action Alternative would add to the effects of fire suppression and would not otherwise create habitat in the absence of natural disturbance. The action alternatives would create open habitat used by this species. They would also reduce fire danger, possibly preventing large fires and creation of preferred habitat. Provision of large-diameter trees for future snags would offset effects somewhat. Mitigation and availability of preferred habitat in other parts of the Black Hills would prevent significant cumulative effects.

Fringe-tailed myotis (Myotis thysanodes pahasapensis)

The fringe-tailed myotis is a year-round resident in the Black Hills. Habitat requirements for this bat species vary across its range. The species is found in extreme areas such as Death Valley, and in other places is tied to ponderosa pine, larger trees, and less-managed forests (USDA 2000). Hibernacula have been found both in abandoned mines and natural caves affording protection and a stable microclimate, although they may also be using deep cracks and crevices (Tigner as cited in USDA 2000). Caves, abandoned mines, rock outcrops and, occasionally, human structures serve as roost sites. Snags are also used for maternity roosts and sometimes day roosts.

There are no known caves or mines in the project area. Snag density appears to be low.

Direct and Indirect Effects on Fringe-tailed Myotis – No Action Alternative

This alternative would allow natural successional changes to occur in vegetation. In the absence of disturbance, average stand density would increase over time. Natural mortality would be highest under this alternative, providing more snags for use as maternity or day roosts.

Direct and Indirect Effects on Fringe-tailed Myotis – Action Alternatives

Existing snags would be retained under both action alternatives unless they posed a safety hazard. Large green trees would be retained at levels at or above Phase I Amendment standards to ensure snag recruitment over the long term. Proposed treatments would decrease the availability and mortality rates of large-diameter trees.

Cumulative Effects on Fringe-tailed Myotis

Snag removal associated with past harvest of timber and firewood has contributed to the existing low snag density across the cumulative effects area. Due to the current prohibition on cutting of standing snags, none of the alternatives would add to this cumulative effect. Road closures included in the Proposed Action and, to a lesser extent, Alternative A, would further discourage cutting of snags for firewood. Mitigation and design criteria related to snags would prevent further loss of habitat, except where snags are cut as safety hazards.

Townsend's Big-eared Bat (*Plecotus townsendii*)

This bat inhabits shrub-steppe, forest edge, pinyon-juniper, and moist forest types. It usually roosts in caves, abandoned mines, rock outcrops, and occasionally buildings. Tree cavities may be used for daytime roosting. This bat feeds mainly on small moths high in the forest canopy and will glean insects from leaves. In the Black Hills, this species is the most commonly encountered hibernating bat. Disturbance by humans, especially to hibernacula and maternity roosts, can be a threat to survival of these animals (Barbour and Davis 1969). This species has not been documented in the project area.

Direct and Indirect Effects on Townsend's Big-eared Bat – No Action Alternative

This alternative would allow natural successional changes to occur in vegetation. In the absence of disturbance, average stand density would increase over time. Natural mortality would be highest under this alternative, providing more snags for use as maternity or day roosts. Conversely, snags along open roads could continue to be lost to firewood cutters.

Direct and Indirect Effects on Townsend's Big-eared Bat – Action Alternatives

Individuals could be affected if occupied daytime roost trees are cut for firewood under any alternative or during activities proposed under Alternatives 2 and 3. Only hazardous snags would be cut, so effect is expected to be negligible. No caves or mines are known to exist in the project area.

Proposed treatments could benefit this species by increasing habitat diversity. Road closures included in the Proposed Action and, to a lesser degree, Alternative A, may decrease loss of snags as firewood. Protective measures for snags and retention of green trees for snag replacements would provide roosting habitat over time.

Cumulative Effects on Townsend's Big-eared Bat

Since there are no known caves or other sites for hibernacula or maternity roosts in the project area, cumulative effects on this species have probably been minimal. Past timber harvest and fire exclusion may have cumulatively altered historic snag distribution and characteristics. Protective measures for snags would prevent any addition by this project to cumulative effects.

Golden-crowned kinglet (*Regulus satrapa*)

The golden-crowned kinglet is found in spruce habitat. It prefers mid- to late-seral forest with large-diameter trees. They tend to nest high in the canopy of a dominant tree and place their nests out on a limb. They may use deciduous forests during winter (USDA 2000). Territory size is estimated at 10 acres per pair (USDA 2001).

The project area currently contains about 1,294 acres of spruce. There are no documented occurrences of golden-crowned kinglet in the project area. Breeding bird survey data show a significant upward trend in population for the golden-crowned kinglet in South Dakota.

Direct and Indirect Effects on Golden-crowned Kinglet - No Action Alternative

Natural succession would continue to move pine stands toward spruce under the No Action Alternative. Without disturbance, stands would progressively become more dominated by spruce, especially on moist, shady north aspects. An increase in spruce would benefit the golden-crowned kinglet.

Direct and Indirect Effects on Golden-crowned Kinglet - Action Alternatives

No activities are proposed in spruce habitat under either action alternative. Phase I Amendment direction for protection of American marten precludes treatment in spruce stands (and pine stands with a substantial component of spruce).

Seventy-five acres of overstory removal and 336 acres of commercial thinning are proposed adjacent to spruce stands. Harvest in pine stands adjacent to spruce could have indirect effects on golden-crowned kinglets. Opening the canopy of an adjacent stand could increase the chance of windthrow, to which spruce is susceptible because of its shallow root system. Treatments that leave a very open stand (seed tree cut, overstory removal, patch clearcut) would result in drier conditions, which may hinder the expansion of spruce. Conversely, thinning may allow establishment or release of spruce seedlings in a pine stand.

Cumulative Effects on Golden-crowned Kinglet

Recent timber sales harvested 95 acres of spruce habitat in the cumulative effects area. None of the alternatives would add to this effect. In the near term, implementation of Phase I direction will prevent conversion of spruce stands to pine and promote development of spruce habitat.

Fire suppression has had a positive effect on this species. Expansion of spruce in the absence of fire has created habitat. All alternatives would continue this trend. Probably some past timber harvest has emphasized removal of spruce to prevent stand succession away from higher-value pine; none of the alternatives would add to this effect.

Olive-sided Flycatcher (*Contopus borealis*)

Olive-sided flycatchers use snags, spike-topped trees, or dead branches in trees that occur along edges of conifer forest. They are often associated with meadows and riparian areas, but have also been observed both in open and dense forests. This species forages on flying insects, often hawking from a spike-topped tree above the forest canopy. Preferred nesting habitat includes openings with dead standing trees, burns, and blowdowns (NatureServe 2001).

In South Dakota, the olive-sided flycatcher is an uncommon migrant and possible breeder in the Black Hills (SDOU 1991). There are no documented occurrences of olive-sided flycatcher in the project area.

Direct and Indirect Effects on Olive-sided Flycatcher - No Action Alternative

The No Action Alternative would allow natural successional changes to occur in vegetation. Existing dense stands would be maintained, and younger, more open stands would develop into mature stands with a denser canopy, decreasing habitat for the olive-sided flycatcher. Large-diameter trees and snags along habitat interface zones would continue to contribute habitat for this species. Natural disturbances, such as small-scale mountain pine beetle outbreaks, would create additional habitat for this species.

Direct and Indirect Effects on Olive-sided Flycatcher - Action Alternatives

The olive-sided flycatcher is associated with openings and open forest (structural stages 1, 2, 3A, and 4A). This habitat currently comprises 2,294 acres (19% of the forested area). The Proposed Action would increase this area to 2,425 acres (26%). Alternative A would increase it to 3,209 acres (27%). Because harvest can create edges, which this species prefers, effects would be beneficial.

Cumulative Effects on Olive-sided Flycatcher

Recent timber sales increased habitat for this species by about 288 acres in the cumulative effects area. Both action alternatives would add to this effect. Conversely, fire suppression and removal of snags have probably decreased habitat. All alternatives would continue the trend of effects due to fire suppression, but proposed road closures, mitigation, and design standards included in the action alternatives would minimize additional effects on snag habitat.

Pygmy Nuthatch (*Sitta pygmaea*)

The pygmy nuthatch is generally associated with open ponderosa pine forest with grass understory (AOU 1983). DeGraff (1991) notes that open, park-like pine stands are preferred. According to one expert interviewed for the Phase I Amendment (USDA 2000), this species prefers dense, old spruce stands. Another of the experts indicated that, at least in Colorado, the species is more likely to be found in open, mid- to late-seral ponderosa pine.

While there is some disagreement among experts on habitat type in the Black Hills, there is agreement that large trees (greater than 19" in diameter) are an important habitat component. Territory size is estimated at 2.0 to 3.7 acres (Kistler and Fager 1981).

Stand exam data indicate that the project area currently averages 3.5 live trees per acre 16" and greater in diameter. These data also suggest that large-diameter snags are, on average, not common.

Direct and Indirect Effects on Pygmy Nuthatch – No Action Alternative

This alternative would allow natural successional changes to occur in vegetation. Existing dense stands would be maintained, and younger, more open stands would develop into more mature stands with a denser canopy. In the absence of disturbance, stands would become denser and habitat for this species would decrease. Large diameter snags would increase over the long-term, which would benefit the species.

Direct and Indirect Effects on Pygmy Nuthatch – Action Alternatives

Both action alternatives would decrease stand density on 2,527 acres through commercial thinning and regeneration harvest. This would benefit pygmy nuthatches, as they prefer open habitats. Thinning would reduce susceptibility of stands to insect infestation; since beetles are part of the pygmy nuthatch diet, an increase in beetle population would be a positive effect. Existing snags would be retained unless a safety hazard, and sufficient green trees would be retained to provide large-diameter snags in the future. Natural tree mortality would probably be less than under the No Action Alternative, decreasing the rate at which new snags would become available.

Overstory removal harvest would decrease suitable habitat on 793 acres under both alternatives, and Alternative A would decrease suitable habitat on an additional 131 acres through patch clearcuts.

Road closures included in the Proposed Action and, to a lesser degree, Alternative A, would benefit the pygmy nuthatch. Road closures would reduce disturbance and access for firewood cutters.

Cumulative Effects on Pygmy Nuthatch

Recent timber harvest in the cumulative effects area has increased habitat for the nuthatch by approximately 288 acres. Both action alternatives would add to this effect. Conversely, fire suppression and removal of snags have probably decreased habitat. Snag removal associated with past harvest of timber and firewood has contributed to the existing low density of large-diameter snags across the cumulative effects area. Due to the current prohibition on cutting of standing snags, none of the alternatives would increase this cumulative effect. Road closures included in the Proposed Action and, to a lesser extent, Alternative A, would further discourage cutting of snags for firewood. Mitigation and design criteria related to snags would prevent further loss of habitat, except where snags are cut as safety hazards. All alternatives would continue the trend of effects due to fire suppression.

Cooper's Rocky Mountain Snail (*Oreohelix strigosa cooperi*) and Cockerell's Striate Disc (*Discus shimeki*)

These snails are not known to exist in the project area (Frest and Johannes 2002). Neither action alternative would affect these species or their typical habitat. Any new snail colonies found during project implementation would be protected (mitigation section, Chapter 2).

Tiger Salamander (*Ambystoma tigrinum*)

Tiger salamanders occur in a variety of habitat, from sagebrush plains to mountain forests. They dig burrows and are also known to use mammal and invertebrate burrows (Bebler and King 1979). Breeding sites for salamanders include ponds or any sort of non-flowing system where water is present for six to eight weeks (USDA 2000). Adult tiger salamanders spend most of their lives underground or beneath debris near water and emerge infrequently, mainly on wet nights.

Springs found in the project area may be used by salamanders. This species has been observed in the project area.

Direct and Indirect Effects on Tiger Salamander - No Action Alternative

The No Action Alternative would maintain existing conditions for this species.

Direct and Indirect Effects on Tiger Salamander - Action Alternatives

Disturbance or loss of individuals may occur during road reconstruction and other ground-disturbing activities proposed under the action alternatives. Mitigation to provide down woody material would minimize negative effects. Loss of down wood due to prescribed burning could reduce habitat quality. Springs would be protected from disturbance under the action alternatives (mitigation section, Chapter 2).

Cumulative Effects on Tiger Salamander

Past timber harvest may have reduced the amount of large-diameter woody debris in some stands. The action alternatives would add to this effect by removing mature trees, but mitigation to ensure retention of woody debris would minimize negative effects. Though livestock can negatively affect amphibians by decreasing water quality, the cumulative effects of livestock on this species have most likely been minimal due to the project area's lack of perennial or intermittent streams and standing water. This effect would not increase under the action alternatives.

Black Hills Red-bellied Snake (*Storeria occipitomaculata pahasapae*)

This species occurs in the Black Hills of South Dakota and Wyoming (Ashton and Dowd 1992). It is found in moist woodlands with rocks, logs, leaf litter, and other cover. Red-bellied snakes often hibernate in rocky areas and may be killed crossing roads that run between rocky hibernation sites and riparian woodlands. This species feeds on slugs, earthworms, and soft-bodied insects, and are inactive from November through March (Bebler and King 1979). This species has not been observed in the project area.

Direct and Indirect Effects on Black Hills Red-bellied Snake - No Action Alternative

The No Action Alternative would have no immediate indirect effects on this species. In the long term, lack of management or natural disturbance could reduce habitat diversity. Existing high open road density could result in road kill of snakes.

Direct and Indirect Effects on Black Hills Red-bellied Snake - Action Alternatives

Closure of roads under the action alternatives would reduce the chances of vehicle-caused mortality of snakes on these roads. This effect would be greater under the Proposed Action. Attempts to escape from prescribed fire could result in mortality due to predation and roadkill. No new barriers would be created between damp areas and potential hibernacula (Standard 3116).

Cumulative Effects on Black Hills Red-bellied Snake

Fire exclusion has resulted in a more pine-dominated, continuously forested landscape. The No Action Alternative would continue this trend. The action alternatives would counteract effects of prior management to some degree by reintroducing fire, enhancing non-pine habitat, and closing roads. These changes would benefit red-bellied snakes.

Pale Milk Snake (*Lampropeltis triangulum*)

This species is a habitat generalist and occupies very diverse habitat types, from sand dunes to Rocky Mountain forests 8,000 feet in elevation. Pale milk snakes are secretive and nocturnal, generally found under rotting logs, stumps, or brush. They feed on small rodents, lizards, birds, and other snakes (Bebler and King 1979).

Effects on Pale Milk Snake - No Action Alternative

The No Action Alternative would have no known effect on this species.

Effects on Pale Milk Snake - Action Alternatives

Disturbance or loss of individuals may occur during road reconstruction and other ground-disturbing activities proposed under the action alternatives. Individuals could be displaced during logging activities, but downed logs would not be removed from the site. This effect would not last beyond harvest operations, and mitigation to provide down woody material would minimize negative effects. Loss of down wood due to prescribed burning could reduce habitat quality. Proposed hardwood and meadow enhancement would probably benefit milk snakes; these treatments would result in greater understory biomass, enhancing habitat for the snakes and their invertebrate prey.

Cumulative Effects

Past timber harvest may have reduced the amount of large-diameter woody debris in some stands. The action alternatives would add to this effect by removing mature trees, but mitigation to ensure retention of woody debris would minimize negative effects (mitigation section, Chapter 2).

Management Indicator Species

Table 13 describes management indicator species selected for analysis in the project area. Threatened, endangered, and sensitive species are discussed above. Detailed discussions for the others follow.

Species	MIS Category or Habitat Represented	Habitat Exists in Project Area	Known to Occur in Project Area
American Marten	Sensitive species	x	x
Bald Eagle	Threatened/endangered species	x	
Black-backed Woodpecker	Sensitive species	x	
Brown Creeper	Dense, mature to old growth conifer forest	x	x
Cockerell's Striate Disc	Sensitive species	x	
Cooper's Rocky Mountain Snail	Sensitive species	x	
Fringe-tailed Myotis	Sensitive species	x	
Merriam's Turkey	Species of special interest	x	x
Mountain Lion	Species of special interest	x	
Mule Deer*	Species of special interest	x	x
Northern Goshawk	Sensitive species	x	x
Northern Three-toed Woodpecker	Sensitive species	x	
Pygmy Nuthatch	Sensitive species	x	
Rocky Mountain Elk	Species of special interest	x	x
Townsend's Big-eared Bat	Sensitive species	x	
White-tailed Deer	Species of special interest	x	x

*See white-tailed deer discussion below.

Table 13. Management Indicator Species

Other potential management indicator species include osprey, regal fritillary butterfly, several fish species, and mountain goat. These species are associated with lakes, streams, native grasslands, or rugged, rocky terrain. These habitat types do not exist in the project area.

White-tailed Deer (*Odocoileus virginianus*) and Rocky Mountain Elk (*Cervus elaphus*)

The deer population in the Black Hills is comprised of approximately 75% white-tailed deer and 25% mule deer. Because white-tailed deer are more closely associated with the type of habitat provided by the Power project area, this species was selected for effects analysis.

The important components of quality deer habitat are forage and cover, the ratio and juxtaposition of these features, water sources, and secure areas for fawning. Open road density is an important factor contributing to the effectiveness of deer habitat.

Black Hills deer populations have been decreasing in recent years, while elk herds have increased. Research efforts have been underway for several years to attempt to determine the underlying causes of the deer declines. Poor quality forage on summer range has been identified as one problem, along with road kill and other factors (DePerno 1998). The Black Hills deer population is currently about 32,400, below the objective of 40,000.

The Rocky Mountain subspecies of elk was successfully reintroduced to this area from Wyoming and Montana in the early 1900s. Elk use a variety of habitats during the course of a year. They show a preference for forested riparian areas, forest stringers in meadows, dense forests for thermal and hiding cover, and openings for forage. Forests with a diversity of age classes, canopy closure, and density can supply both forage and cover requirements.

Elk tend to be more sensitive to human disturbance than deer. The most important influences on habitat use are logging, open roads, and hunting seasons. Vehicle traffic associated with open road density greatly affects elk habitat use. The project area currently provides elk summer range habitat. Habitat components present include meadows, openings, aspen stands, a calving area, and dense forest.

Habitat Effectiveness

Habitat effectiveness is an area's capability to support elk or deer based on amount and spatial distribution of forage, cover, and open roads. Revised Forest Plan Guidelines 4.1-3201 and 5.1-3201 (to be treated as standards) designate minimum acceptable values for habitat effectiveness. Habitat effectiveness values are below prescribed values in Management Area 4.1, and in Management Area 5.1 in summer. Open road density of approximately 3.8 miles per square mile of land is the main contributor to low habitat effectiveness values.

Direct and Indirect Effects on Deer and Elk - No Action Alternative

Under this alternative, without future disturbances, forest would continue to become denser and provide better cover. Pine would continue to encroach into meadows and hardwoods, reducing the amount of quality forage. This may increase competition for forage between livestock and big game. Open road density would continue to compromise habitat effectiveness.

Direct and Indirect Effects on Deer and Elk - Action Alternatives

Some stands that currently provide cover would be thinned under either action alternative. These stands would provide more forage after thinning, though the quality of the forage would be lower than in openings. Proposed meadow and hardwood enhancements would improve forage quality and quantity.

Under the Proposed Action, habitat effectiveness values would increase steeply and surpass the minimum values prescribed by the Revised Forest Plan.

Under Alternative A, habitat effectiveness values for deer in winter and elk in summer would decrease in Management Area 4.1, and the value for elk in winter would decrease sharply in Management Area 5.1. These changes would violate Revised Forest Plan Guidelines 4.1-3201 and 5.1-3201, which are to be treated as standards under the Phase I Amendment. Before Alternative A could be implemented, it would need to be modified to bring it into compliance with the guidelines (less thinning and/or more road closures), or the Revised Forest Plan would need to be amended to allow a project-specific violation of the guidelines. Other values would increase under this alternative, but in most cases not enough to achieve the minimum values prescribed by the Revised Forest Plan.

The ARC/HABCAP model was used to calculate habitat effectiveness for deer and elk. Table 14 displays overall habitat values by management area. Individual forage, cover, and distribution values are documented in the project file.

*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

Species and Season	No Action	Proposed Action	Alternative A	Guideline (Minimum)
Management Area 4.1				
Deer – summer	.201	.463	.227	.410
Deer – winter	.329	.712	.176*	.350
Elk – summer	.204	.435	.196*	.390
Elk – winter	.197	.687	.322	.360
Management Area 5.1				
Deer – summer	.339	.444	.364	.400
Deer – winter	.522	.408	.553	.350
Elk – summer	.369	.438	.373	.430
Elk – winter	.532	.625	.300*	.340

*Violates Revised Forest Plan direction

Table 14. Habitat Effectiveness for Deer and Elk by Alternative

Cumulative Effects on Deer and Elk

Recent timber harvest has done little to improve foraging conditions for deer and elk, while roading has decreased security and cover has been lost. The Proposed Action would counteract these effects somewhat by improving foraging conditions through regeneration harvest and prescribed burning. Proposed road closures would decrease disturbance. Conversely, thinning would reduce the value of additional cover stands, though this treatment would also allow growth that would once again improve the cover value and decrease the chance that these stands would be lost to insect infestation.

Alternative A would create more foraging habitat than the Proposed Action but close fewer roads. As a result, this alternative would counteract negative cumulative effects on deer and elk habitat less than the Proposed Action, and could increase effects in areas where additional thinning is proposed without road closures.

Merriam’s Turkey (*Meleagris gallopavo merriami*)

Merriam’s turkey is native to conifer forests in the southwestern United States. Successful introduction of this species to the Black Hills occurred in the late 1940s and early 1950s from Colorado and New Mexico. Turkeys may be found anywhere in the Black Hills during the summer but often move to lower elevations in winter to escape deep snow. This species uses a variety of habitats during the year, ranging from dense conifer stands in winter for pine seed forage and thermal cover to forest openings during early brood rearing. Nesting can occur in forest stands or meadows, but characteristically is associated with rock outcrops or shrubs that form horizontal cover (Rumble and Anderson 1992). Roost trees are characteristically found near ridge tops and consist of multi-storied pine at least 9” diameter with horizontal branches.

In South Dakota, the Black Hills turkey population has declined the past few years due to unseasonably cold, wet springs that negatively affected poult survival. Currently the population is estimated at 10,000 to 15,000 birds. The South Dakota Department of Game, Fish and Parks population goal is 20,000 to 30,000 birds.

Roosting habitat exists in the project area, but no roost sites have been documented. The project area provides a variety of habitat types used by the turkey for foraging, nesting, and cover. Turkeys are known to use the project area.

Direct and Indirect Effects on Merriam's Turkey – No Action Alternative

This alternative would allow natural successional changes to occur in vegetation. Existing dense stands would remain dense unless disturbed by natural events, and younger, more open stands would develop into more mature stands with a denser canopy. Winter habitat for turkeys would increase. Turkeys do not generally use the project area in wintertime, due to typically deep snow. Summer habitat would decrease as stand density increases and openings become forested.

Direct and Indirect Effects on Merriam's Turkey – Action Alternatives

Both action alternatives would decrease optimal winter habitat for turkeys. Dense conifer stands would decrease from 3,407 acres to 1,848 acres (-46%). This change would probably have little effect on turkeys due to their limited use of the project area in winter. Optimal summer habitat would increase from 2,738 acres to 3,458 acres (26%) under the Proposed Action and 3,617 acres (32%) under Alternative A. Proposed road closures would also benefit this species by reducing disturbance and easy access during hunting seasons. The effect of these changes may be overshadowed by factors such as hunting pressure and spring weather, which play a large part in determining turkey populations.

Cumulative Effects on Merriam's Turkey

The cumulative effect of past, current, and foreseeable actions on Merriam's turkey include an increase in preferred summer habitat and decrease in winter habitat over time. The action alternatives would continue these trends. The cumulative decrease in winter habitat is not expected to cause significant effects due to this species' seasonal pattern of use of the project area. Harvest of mature trees has probably resulted in loss of roosting habitat, though potential roosting habitat still exists across the cumulative effects area. None of the alternatives would substantially change the availability of roosting habitat. Proposed road closures would decrease cumulative effects of roading.

Brown Creeper (*Certhia americana*)

This small, inconspicuous forest bird is an uncommon permanent resident of the Black Hills. Its preferred habitats include dense conifers and deciduous and mixed woodlands, especially areas containing trees with loose bark and a minimum diameter of 10" (DeGraaf 1991).

Although this species will occasionally nest in abandoned woodpecker holes or natural cavities, nests are most often found between the loose bark and trunks of dead trees, especially ponderosa pine. Black Hills summer habitat has been described as pine and spruce forests, late-successional forests, and areas infested with bark beetles (SDOU 1991). During winter, habitat shifts to deciduous forests and woody vegetation in towns. Although found at higher elevations in the Black Hills, the brown creeper also ranges into lower elevations. There is no local population data, but regional population trend is upward since 1980 (Sauer et al. 2001). This species has been documented in the project area.

Direct and Indirect Effects on Brown Creeper - No Action Alternative

This alternative would allow natural successional changes to occur in vegetation. Existing dense stands would remain dense unless disturbed by natural events, and younger, more open stands would develop into more mature stands with a denser canopy. Tree mortality rates would increase, providing more habitat for this species.

Direct and Indirect Effects on Brown Creeper - Action Alternatives

Dense, mature conifer stands would decrease from 3,352 acres to 2,098 acres (-37%) under both action alternatives. Large-diameter snags appear to be in short supply across the project area; both action alternatives would leave standing all live trees over 20" in diameter and all existing snags, except those that would compromise safety, ensuring an adequate supply of large-diameter snags in the future. Likelihood of tree mortality and snag development may be lower in treated stands. Hardwood enhancement treatments would improve brown creeper winter habitat. Road closures included in the Proposed Action and, to a lesser degree, Alternative A, would help discourage illegal cutting of snags for firewood.

Cumulative Effects on Brown Creeper

Past and active timber sales in the cumulative effects area have reduced acreage of potential habitat for this species. The No Action Alternative would not increase cumulative effects. The action alternatives would add to cumulative effects on this species, though provision of large-diameter trees for future snags would offset effects somewhat. Snag mitigation listed in Chapter 2 would prevent detrimental cumulative effects.

Mountain Lion (*Felis concolor*)

Mountain lions are solitary animals that prefer rough, rocky terrain that is remote or undisturbed. Habitat quality depends largely on the abundance of preferred prey species and the ease with which prey may be taken. Mountain lions prey on a variety of large and small mammals; deer are the most important prey species. Home range size varies by sex, with male activity areas possibly exceeding 35 square miles, and female activity areas typically 15 to 30 square miles (USDA 1996).

Mountain lion numbers have been increasing recently both in the Black Hills and on adjacent prairies. The mountain lion has historically been observed in all counties in the Black Hills. The number of lions that could be sustained in the Black Hills is not known. Suitable habitat has not been delineated for the Black Hills, but given the large home ranges, a single individual's habitat most likely contains a variety of habitats.

An important aspect of lion presence is the availability of large ungulate prey (deer and elk). Lion habitat capability trends are probably similar to those of their prey. During winter, lions may concentrate on big game winter ranges, because of the abundance of prey. No deer or elk winter range exists within the project area.

Direct and Indirect Effects on Mountain Lion - No Action Alternative

High road density would continue to facilitate disturbance of mountain lions. Changes in habitat due to natural succession would increase big game winter habitat but decrease summer habitat, which is when the main use of the project area by deer and elk occurs. This could affect mountain lions, as deer are their main prey item.

Direct and Indirect Effects on Mountain Lion – Action Alternatives

The action alternatives could cause a short-term increase in mountain lion hunting success due to loss of cover for prey in treated areas. Over time, the reduction in pine overstory in these stands would result in understory growth and an increase in horizontal screening cover, which would benefit deer. Prescribed burning would also increase screening cover by stimulating growth of understory vegetation. Improvement of habitat for deer would indirectly benefit mountain lions. Road restrictions proposed under the Proposed Action and, to a lesser extent, Alternative A would reduce disturbance of lions and their prey.

Cumulative Effects on Mountain Lion

Road construction, increased human presence, and some types of timber harvest have probably had a negative effect on mountain lions over time. Conversely, timber harvest that has improved forage conditions for lion prey species has mostly likely had a beneficial effect. Because the action alternatives would reduce open road density and increase forage, they would reduce negative cumulative effects and add to positive ones.

Landbirds

No management direction specific to landbirds is included in the Revised Forest Plan or Phase I Amendment. The decision on appeals of the Revised Forest Plan appeal directs consideration of “comprehensive bird planning efforts, such as Partners in Flight.” Dark-eyed junco is the only Partners in Flight priority landbird for which suitable habitat is found in the project area.

Dark-eyed Junco (*Junco hyemalis*)

Habitat for this species is provided by coniferous and deciduous forest, forest edge, clearings, bogs, open woodland, brushy areas adjacent to forest, and burned-over lands. In migration and winter it uses a variety of open woodland and brushy and grassy habitats (AOU 1983). Dark-eyed juncos nest in scrapes on the ground, often concealed by a log, rock, tree roots, leaves, or ground vegetation.

The entire project area provides habitat for this species. Breeding bird survey data shows an upward population trend in South Dakota since 1992. Juncos have been documented in the project area.

Direct and Indirect Effects on Dark-eyed Junco – No Action Alternative

This alternative would allow natural successional changes to occur in vegetation. Existing dense stands would remain dense unless disturbed by natural events, and younger, more open stands would develop into more mature stands with a denser canopy. Meadows, forest edge, and hardwood habitat would decrease over the long term, resulting in less diversity of habitat for this species.

Direct and Indirect Effects on Dark-eyed Junco – Action Alternatives

Both action alternatives would provide more diversity of habitat for this forest generalist. In particular, hardwood and meadow restoration treatments would maintain desired habitats.

Cumulative Effects on Dark-eyed Junco

Fire suppression and timber harvest favoring pine have generally decreased acreage of meadows and hardwoods while resulting in fairly homogenous, continuous pine forest.

The action alternatives would counteract these effects somewhat by removing encroaching pine from meadows and hardwood stands and reintroducing fire. Increased habitat diversity would benefit this species.

Sensitive Plants

One sensitive plant species is known to occur in the project area. Northern arnica was located on north aspects in spruce stands during surveys conducted in 2002. No activities are proposed in these stands, and effects would be minimal under all alternatives. Due to more abundant and widespread distributions than previously believed, and the apparently limited effects of management activities, this species has been determined to no longer merit status on the Region 2 Sensitive Species list by state and regional authorities (Black Hills Sensitive Plant Task Team 2000).

Other Plant Species of Concern

The following plant species are known to occur in the project area and are listed as sensitive by the state of South Dakota or considered species of special interest by Black Hills National Forest botanists:

- Smallflower columbine (*Aquilegia brevistyla*)
- Bristleleaf sedge (*Carex eburnea*)
- Fairy slipper (*Calypso bulbosa*)
- Oniongrass (*Melica subulata*)
- Longbract frog orchid (*Coeloglossum viride*)
- Squashberry (*Viburnum edule*)

No species-specific management direction exists for these plants. Most are associated with spruce habitat type, in which no activities are proposed. Oniongrass and longbract frog orchid are also associated with aspen communities. A botanist would be involved in design of activities proposed in aspen stands to ensure that these species are appropriately protected (mitigation section, Chapter 2). Effects on these species would be minimal to nonexistent under all alternatives.

3.3.2 Cumulative Effects Summary for Wildlife and Plants

The cumulative effects analysis area is described at the beginning of this chapter. Its size 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 different birds and animals. Vegetation management projects would improve habitat for some species at the expense of others. Proposed activities that may contribute to cumulative effects include timber harvest, prescribed burning, and road management (reconstructing and decommissioning). Past, current, and foreseeable activities taking place on private land, such as timber harvest, road construction, and development, also contribute to cumulative effects.

Timber Harvest

Past, current, and foreseeable timber harvest activities are described at the beginning of Chapter 3. No additional timber sales are planned in the area for at least the next five years.

Cumulative effects of past and current projects include reducing density within some mature stands and converting old stands to young forest. This is advantageous to species that are associated with young forest or more open conditions, such as olive-sided flycatcher, Lewis' woodpecker, and for goshawk foraging habitat. Species associated with mature forest with high canopy closure, such as the brown creeper, black-backed and three-toed woodpecker, and goshawk (nesting habitat), have lost habitat.

Fire

Natural structure and ecosystem functions in the Black Hills forest were historically maintained by fire. The forest was always changing due to disturbance, particularly fire but also insect infestations and weather events. Today the pine forest is structurally different from historic conditions. The original old-tree component was mostly removed by timber harvest during the past century. Pine forest has encroached into meadows, grasslands, and hardwood stands, and pine age-class distribution may be more uniform (USDA 1996).

In the absence of fire, stands become denser, natural fuels are allowed to accumulate, and conifers grow into meadows. Shrub and herbaceous growth is stunted, and there is a reduction in development of snags and an early seral component. Without the historical fire regime, fire-tolerant ponderosa pine stands may become dominated by spruce, especially on northerly aspects. Species that are associated with early seral conditions and snags would benefit from large natural fires. Additionally, fires benefit game species by stimulating shrub and herbaceous growth, providing browse and forage.

Timber harvest can act as an alternate means of disturbance, setting back succession and regenerating forest stands. Fire, insect infestations, and disease, however, include ecosystem benefits that do not result from timber harvest. Species such as woodpeckers reach highest abundance during or after insect outbreaks or after stand-replacing fires. Cumulative effects of fire suppression, along with past, present, and future timber harvest as the only means of disturbance, may cause abundance of some wildlife species to decline within the analysis area.

Prescribed fire proposed under the action alternatives would enhance shrub and herbaceous growth on the burned units while reducing fuel loading.

Roads

Road use can disturb wildlife and substantially decrease habitat capability for big game. High density of open roads makes the forest more easily accessible and facilitates illegal removal of snags for firewood. Road closures proposed under this project combined with past road closures in and near the analysis area would benefit wildlife.

3.4 Soil and Water

Existing Soil and Water Conditions

Landtype in the Power project area is characterized by very broad ridges, long, smooth side slopes, and wide valleys. Soils are typically formed in material weathered from limestone and calcareous sandstone. Erosion hazard is moderate in most areas but very high on steep Stovho-Trebor soils. When soils are wet, activities such as log skidding and road construction can cause surface compaction and formation of ruts. Windthrow hazard is moderate on Trebor soils.

The project area is located in two 7th-field watersheds, designated 10120203030101 (8,480 acres) and 10120203030102 (8,669 acres), within the 6th-field Upper Spearfish Creek watershed. This area is tributary to Spearfish Creek, Redwater Creek, and the Belle Fourche River. There are no perennial or intermittent streams in the project area, only grassy ephemeral channels that show little evidence of scour. Channel beds and banks are stable. Small pockets of riparian habitat scattered throughout the project area are associated with springs and seeps.

In watersheds with perennial or intermittent streams, roads increase the drainage density (Wemple 1994) and contribute to increased sediment loads. In the project area, however, the ephemeral nature of the runoff combined with the grassy channels and surrounding meadows minimizes the amount of soil transported by surface flows beyond the source. Because of this relationship, the current road density has no measurable effect on water quality in the project area or downstream where perennial streams occur. Native-surface roads are subject to rutting during wet weather, and mudholes can develop where poor drainage exists, but these problems appear to be localized and not subject to movement off site.

Adequate stubble heights exist where cattle have grazed. This activity does not appear to be causing adverse effects on soils or water in the project area.

Direct and Indirect Effects on Soil and Water – No Action Alternative

The risk to soil and watershed resources as a result of deferring action is low. Ephemeral streams are stable and well vegetated, and ground cover in meadows and uplands is good. Although road density is high and some drainage problems exist, the ephemeral nature of the streamflow and the filtering effect of the meadows and vegetated channels minimize any off-site movement of sediment.

Direct and Indirect Effects on Soil and Water – Action Alternatives

Revised Forest Plan soil and water direction was developed to meet Rocky Mountain Regional supplements to FSH 2509.18 (Soil Management Handbook) and FSH 2509.25 (Watershed Conservation Practices (WCP) Handbook). The WCP Handbook states that, if used properly, its standards and design criteria will meet or exceed State Best Management Practices (BMPs).

Black Hills National Forest monitoring of BMPs in 2001 indicated that the application rating received a Forest-wide score of 79 percent and the effectiveness rating received a Forest-wide score of 81 percent. "The compliance scores ... indicate that BMP objectives are being met" (USDA 2002).

Water

With implementation of Revised Forest Plan direction, WCPs, BMPs, and mitigation measures, the effects of either action alternative to soil and water resources would be within acceptable tolerances and immeasurable.

The amount of accelerated soil erosion is expected to be minimal and local (see discussion of accelerated soil erosion below) as a result of applying standards and guides, WCPs, and BMPs. Any sediment entering the fluvial system past the meadow filter as a direct effect of roads or an indirect effect of timber harvest would be further filtered by the vegetation in the stream channels. Perennial and intermittent streams below these two watersheds would likely not experience an increase in sediment loads as a result of the proposed activities.

No new roads are planned and no activities are expected to have direct or indirect adverse effects on the stability of the streams' banks or beds. As system roads are closed, culverts may need to be removed to prevent damage to the road during periods of high runoff. The rehabilitation of non-system roads following use may have a short-term impact at channel crossings, but downstream filtering would minimize sediment introduction and revegetation would eliminate any long-term impact.

The flow regime for these watersheds is ephemeral, influenced primarily by geology and only partially by vegetation. The proposed vegetative treatments would have only minor impacts on the watersheds' vegetation; therefore, no change to flow regime is expected.

Due to the ephemeral nature of the surface flow, which tends to occur each spring as the snow melts and following infrequent high-intensity rainstorm events that exceed the soil's infiltration capacity, stream temperature and oxygen levels would not likely be altered within the project area or downstream by the proposed treatments.

The ephemeral nature of surface flow reduces the risk of the action alternatives affecting water purity. Proposed activities would not occur during the spring snowmelt period. There is always the possibility of an accident involving the spilling of petroleum products immediately before or during a high-intensity rainstorm event sufficient to produce surface flow. However, risk is low compared to similar activities in areas with perennial or intermittent stream flow.

None of the proposed activities would impact riparian areas, floodplains, or the vegetation of riparian areas.

Water quality was raised as an issue during public scoping. This topic is addressed in the Revised Forest Plan. Standards and guidelines, WCPs, and South Dakota BMPs are designed to protect the soil resource and water quality.

The subject of water yield was also raised during public scoping. Water yields attributable to vegetation treatments at this level are transitory and unpredictable because of the variables involved. Any increased yield caused by timber harvest would likely return to the base level as treated stands grow and fully occupy the sites. As timber stands develop following treatment and re-occupy a site, an increase in evapotranspiration would occur, reducing water yield incrementally. This trend would continue until natural disturbance agents, such as bark beetles, or vegetation treatments reduce stand densities.

Soils

Timber harvest activities, including felling, skidding, decking, transporting of logs off-site, and slash disposal, can impact the soil resource. Impacts can include soil compaction, displacement, puddling, and severe burning (soil heating) as a direct effect and nutrient removal with the harvested trees as an indirect effect. The Revised Forest Plan limits detrimental soil impacts to 15% of any treatment unit (Standard 1103) and requires that treatments occur only when the soil is most impervious to impacts (Standard 1104).

Under the Proposed Action, the proposed 107 acres of regeneration harvest with dispersed skidding may create detrimental soils conditions that would be counted against the 15%. Under Alternative A, the same 107 acres of regeneration harvest plus 131 acres of patch clearcuts could also create detrimental soils conditions that would be counted against the 15%. The objective of the dispersed skidding is to expose more mineral soil, well distributed across the units, to promote natural regeneration of ponderosa pine. If skidding is done when the soil is dry (soil moisture below the plastic limit), the effect of a single pass (up and back) would not increase the bulk density enough to be regarded as detrimental compaction (Froehlich and McNabb 1983). Mitigation to this effect is prescribed in Chapter 2.

Soil heating from prescribed burning for slash disposal and site preparation can be minimized by incorporating into burn plans minimum levels of soil, duff, and large-fuel moisture levels that protect the soil. Prescribed burning would also leave sufficient ground cover and down wood to meet Revised Forest Plan standards and guidelines (mitigation, Chapter 2).

The relative distribution of nutrients throughout each tree varies with age. The bole contains some of the macronutrients, but the majority is concentrated in the foliage, branches, and the root system (Kimmins 1987). Cut-to-length logging, in which each tree is processed along the skid trail and only the bole removed, leaves the most nutrients on site. Another advantage of the cut-to-length harvesting system is that forwarders are used as part of the system and provide full suspension of the logs, minimizing soil displacement and cover reduction.

Whole-tree yarding removes the entire above-stump tree to the landing. This method can displace soils and uproot vegetation; mitigation measures are included to protect soils. If whole-tree yarding is used, returning slash from the landing to the unit as the skidder returns for another load can reduce nutrient removal. Returning slash to the unit would also keep the size of the landing needed for safe operations to a minimum.

Accelerated soil erosion is likely to occur following ground-disturbing activities as mineral soils are exposed to the forces of the weather, especially raindrop impact. Some exposed mineral soil is desirable to facilitate the natural regeneration of ponderosa pine on the 107 acres of regeneration harvest under the Proposed Action, and the same 107 acres plus 131 acres of patch clearcuts under Alternative A. Erosion hazard is moderate, increasing for the Stovho-Trebor soil type very high on steep slopes. Only minor inclusions of slopes over 35% fall within the proposed harvest units, and these are usually associated with rock outcrops where skidding equipment would not be driven.

Minimizing the detrimental impact to soils to 15% or less of the area, maintaining minimum levels of ground cover (Standard 1112), and installing structures in temporary roads, skid trails, and landings to divert runoff when needed would minimize accelerated soil erosion to acceptable levels and minimize the distance of travel. No potential mass movement areas were identified in the affected area.

Depending on the circumstances at the time of harvesting, some soil compaction is likely and may persist for 10 years and longer. Factors influencing the longevity of compaction include root growth and penetration into the compacted soil layer, burrowing animals, and freeze-thaw cycles. Due to snow depths in the analysis area acting as an insulating blanket most winters, freeze-thaw cycles would have few opportunities to break up compaction. Tree root growth is most rapid in the spring (Smith 1962), however, and the precipitation patterns promote root growth of herbaceous and woody plants in the late spring and early summer. Soil strength is minimal when wet, reducing the resistance to root penetration. The percent of each unit detrimentally impacted by the logging operation would be minimal and would recover with time.

Cumulative Effects on Soil and Water

The cumulative effects analysis area is described at the beginning of Chapter 3. Recent or active timber sales in the cumulative effects analysis area include Pond, Tower, Hellsgate, and Bigmac. Walk-through surveys were done in selected Pond units in May 2002 for evidence of soil compaction, displacement, and residual ground cover. Detrimental soil compaction was found only at the log landings and in the main skid trails near the landings, representing an estimated impact of less than 5% of the units, well within the Forest Plan standard of 15%. Soil displacement was minimal, and effective ground cover was estimated to be above 70% on 10-20% slopes.

In a Tower Timber Sale unit harvested about 10 years ago, some residual compaction was evident at the landing and in the main skid trail near the landing. Compaction was not detected away from the high-use areas and represented less than 5% percent of the unit.

Hellsgate Timber Sale treated 26 acres in the cumulative effects analysis area. Bigmac Timber Sale on Hell Canyon Ranger District will treat 490 acres. No impacts to soil and water resources that exceed Revised Forest Plan direction are anticipated from these actions.

All timber harvest proposed under the action alternatives would take place in stands previously harvested and use existing landings and skid trails whenever possible to minimize additional soil compaction. None of the alternatives would cause significant cumulative effects on soil or water resources. With application of Revised Forest Plan direction, WCPs, and BMPs, changes would be within acceptable limits.

Some of the roads within the area currently violate Best Management Practices. Road surface stabilization and drainage improvement would bring these roads up to standards.

3.5 Rangeland

The Power project area encompasses three active grazing allotments and one allotment that is currently vacant. Deadman allotment currently runs 139 cow/calf pairs, Griffith allotment has 252 pairs, and Wildcat allotment has 184 pairs. Season of use in these three allotments is June 15 to October 15. Clayton Draw allotment is vacant.

Livestock grazing would not increase under any alternative, but meadow enhancement, prescribed fire, and timber harvest would create additional secondary forage. Modest, transitory increases in water yield can have a beneficial impact on allotment conditions and increase forage availability.

Road closures would have no effect on the range resource. If access is needed for maintenance of range improvements, roads could be temporarily opened. These improvements, including cattleguards, fences, spring developments, and water storage tanks, would be protected during proposed activities.

None of the alternatives would be expected to cause significant cumulative effects on range resources. Meadow acreage has decreased over the years through conifer encroachment, reducing available forage; proposed meadow enhancement treatments would work towards counteracting this effect.

3.6 Noxious Weeds

Past road construction, logging, livestock grazing, recreational use, motor vehicle use and other ground-disturbing activities have aided the introduction and spread of noxious weeds in the Power project area. Noxious weed species known to exist in the project area include leafy spurge, common tansy, yellow toadflax, musk thistle, houndstongue, and Canada thistle. Leafy spurge is found in only two locations, but all other species are scattered throughout the project area.

Under all alternatives, noxious weed infestations could expand as a result of ground-disturbing activities and movement of vehicles and materials from one part of the project area to another. The effect of an increase in noxious weeds would be competition with and displacement of native forb and grass communities. New infestations also would slightly reduce forage and browse production. While the No Action Alternative proposes no new activities, ongoing uses such as recreational driving, road maintenance, and livestock grazing would continue to carry a risk. Under the action alternatives, various strategies listed in the mitigation section in Chapter 2 would be used to prevent spread of infestations due to timber harvest, prescribed fire, and road work. Closure of roads under the Proposed Action and, to a lesser extent, Alternative A, would help reduce weed spread.

Cumulative Effects on Noxious Weeds

The cumulative effects analysis area is described at the beginning of this chapter.

Noxious weeds arrived in the Black Hills via contaminated hay, livestock, vehicles, and many other vectors. Ground disturbed by timber harvest, roads, fire, livestock grazing, development, and mining may be colonized by noxious weeds. Proposed actions would disturb ground through timber harvest, road work, and prescribed burning, and could add to cumulative effects. Protective measures (see mitigation section in Chapter 2) are designed to minimize the potential for noxious weed spread and prevent any significant cumulative effects.

3.7 Scenery

Direct and Indirect Effects on Scenery - No Action Alternative

Under the No Action Alternative, no apparent changes to scenery resources would occur in the near future. Without vegetative treatments, stands would continue to grow at current or reduced levels; eventually, in the absence of natural disturbances, diversity of vegetation would decrease. The overstory would remain homogenous while conifers would continue to encroach on and eventually replace hardwood and meadows. Increased forest density would reduce the viewing depth from roads and private lands and the potential for fire and disease would increase. Depending on the severity and scope of these events, it may not be possible to meet the recommended scenic integrity objectives.

Direct and Indirect Effects on Scenery - Proposed Action

Proposed hardwood and meadow enhancements would help create and maintain openings and vegetative diversity. Where stands are opened, the line, form, and color of the viewshed would be diversified. Commercial thinning would change stand textures and color in foreground and middleground views, but the changes would not have a high visual impact because the landscape character of the area is dominated by a relatively open forest. Stumps and skid trails would be evident in the short term, but with implementation of prescribed mitigation would be visually acceptable.

Regeneration harvests and overstory removals would reduce stand densities, creating lighter textured stands with greater viewing depth. Features that would reduce visual impacts include variation in stand density, patches of existing regeneration, irregular unit edges, simulation of natural meadows, emphasis of natural features, and creation of vistas. Proposed regeneration harvests would decrease homogeneity, increase the number of trees of different sizes and age classes, open stands and remove some screening. The tall remaining trees may tend to resemble telephone poles in the foreground and create a very distinct vertical line. Variation in stand density would mitigate this effect. Tree boles and hardwood inclusions would become more visible in foreground views, increasing dominance of vertical lines created by tree trunks and lighter colors from understory shrubs, grasses, and other vegetation. At middle-ground views, the lighter colors and texture changes would be visible in areas of heavier regeneration harvests. Visual mitigation measures would minimize the visibility of tree marking paint. Stumps and skid trails would be evident in the short term. Again, these changes would be visually acceptable because they would not substantially deviate from the characteristic landscape for this area of the Black Hills.

Skid trails, landings, and slash piles would have a direct effect on the scenic integrity of the project area. Slash piles and landings would be minimized within the immediate foreground of primary and secondary travelways and private lands. Where this cannot be avoided, slash piles would be removed or burned within one year of completion of the project. Pile sites would be seeded and monitored for noxious weed infestation.

Regeneration harvest and patch clearcuts would create a park-like setting, increasing visibility into the forest. The proposed cuts would maintain the scenic integrity of the area and provide opportunities for a healthier forest while preserving the valued landscape character.

Proposed precommercial thinning would have fewer impacts than commercial thinning, since only small trees would be cut. This treatment would help reduce risk of insect and disease problems. Healthy forest stands are generally more scenic than diseased or dead stands. Precommercial thinning would retain the existing diversity of native conifer and hardwood species, along with variety of color and texture.

Prescribed burning would occur in conjunction with mechanical treatment under both action alternatives to reduce down woody fuels and duff and litter layers that could inhibit hardwood or conifer establishment. The effects of these low-intensity burns would no longer be visually evident to most viewers after one or two growing seasons. Short-term direct effects of prescribed burning would include the presence of charred vegetation.

Site-specific prescriptions for individual stands are included in the scenery specialist's report, found in the project file at the Northern Hills Ranger District office.

The Proposed Action proposes closure of 21 miles of Forest Development Roads and 11 miles of non-system roads. Closure and rehabilitation of these roads would improve visual quality. Vegetative regrowth would help blend the line, form, and color of the road prism into the surrounding landscape.

Direct and Indirect Effects on Scenery - Alternative A

The effects of Alternative A would be similar to those of the Proposed Action with the addition of patch clearcuts. Patch clearcuts would be designed to visually extend existing meadows and blend back into denser stands. Stumps would be visible at first, but over time would be hidden by grass and eventually disintegrate.

Two stands prescribed for patch clearcuts (0712060005 and 0713050009) are visible from private land and Forest Development Roads. Treatment would be designed to appear natural and would meet a moderate scenic integrity objective. Stand 0713050005, also proposed for patch clearcuts, is not visible from private lands or main roads. With proposed mitigation, this treatment would have no direct or indirect effects to the visual resource.

Cumulative Effects on Scenery

The Revised Forest Plan FEIS (page III-435) notes that:

“In general, the short-term change to the existing scenic integrity resulting from timber management is more acceptable where there are existing disturbances to the natural landscape.”

All stands prescribed for treatment under the Proposed Action and Alternative A have been previously harvested. Visual quality would be acceptable following treatment.

On the same page, the FEIS also states that:

“...thinnings, partial cuts and selection cuts are generally more acceptable to the public than are overstory removal or regeneration harvests, at least in the short term. With the large amount of advance regeneration on this Forest, these kinds of harvest cuts tend to fill in quickly and, in the long term, provide a variety of age classes.”

Proposed regeneration harvests and overstory removals would be expected to revegetate quickly and provide age class variety.

Over time, this landscape has become less diverse because of human activities, especially fire suppression. Proposed actions would offset these effects by opening meadows, restoring hardwood stands, and retaining larger-diameter trees.

3.8 Recreation

Recreational activities in the project area include driving, cross-country skiing, mountain biking, hiking, hunting, and snowmobiling. Developed recreation sites include trailheads for the Eagle Cliff trails and the Eisenhower Tree interpretive site.

Direct and Indirect Effects on Recreation – No Action Alternative

Developed recreation sites would not be affected by this alternative. Over time, trails could become overgrown as open areas are encroached on by forest, and visual variety would decrease.

Direct and Indirect Effects on Recreation – Action Alternatives

Developed recreation sites would not be affected by either action alternative. Fewer roads would be available for recreational driving, especially under the Proposed Action. Winter logging could displace skiers during harvest operations. The Eagle Cliff trail system receives limited recreational use during summer and fall. Logging operations on units adjacent to these trails would cause short-term disturbances from machinery noise, presence of loggers, logging trucks, and dust during this period.

Prescribed fire and timber harvest result in more variety in stocking levels, age classes, and plant species. Creating openings and reducing stand density may produce vistas and more extensive views into the forest.

Logging operations could result in short-term displacement of game animals and hunters. After completion of the project, increased forage would contribute to wildlife habitat improvement. Harvest would temporarily allow greater visibility into the forest. These factors may contribute to an increase in hunting success.

Road closures in management area 5.1 would not affect snowmobile trails. Though snowmobiles are prohibited in management area 4.1, illegal use occurs in the area of the Eagle Cliff cross-country ski trails; proposed road closures may help discourage illegal snowmobiling in this area.

Cumulative Effects on Recreation

There is no indication that past or ongoing vegetation management has had substantial effects on recreational opportunities in or use of the cumulative effects analysis area. Rooding has cumulatively provided extensive opportunities for recreational driving and easy access for hunting. The action alternatives would decrease this cumulative effect somewhat, though many miles of road would still be open for motorized use. Conversely, extensive rooding has infringed on remote areas for hunting and decreased opportunities for non-motorized recreation. Proposed road closures would act against this trend.

3.9 Heritage Resources

Thirty-one heritage sites are known to exist in the project area. Twenty-seven of these sites have been determined not to be eligible for nomination to the National Register of Historic Places. Six heritage sites are in locations that could be affected by the action alternatives. Two of these sites are eligible for nomination to the National Register, two are potentially eligible, and two are not eligible. All six sites would be avoided and protected during proposed activities.

Any sites discovered during implementation of the action alternatives would be protected as determined appropriate by a cultural resource specialist.

On January 23, 2003, the South Dakota State Historic Preservation Office concurred with the project archeologist's finding of no effect, subject to prescribed mitigation measures.

Past activities such as agricultural development and road construction may have disturbed heritage resource sites. None of the alternatives would have an additional effect on heritage resources.

3.10 Access and Travel Management

During public scoping, some organizations and members of the public expressed concern about the loss of access due to proposed road closures. The planning team considered the potential effects of each proposed road closure, and concluded that few adverse (and many positive) effects were likely. None of the roads proposed for closure under either alternative are necessary for timber harvest or private land access. The project area would remain extensively rooded under all alternatives. Adequate access for fire suppression would be retained under all alternatives.

Some forest users may feel frustration at finding roads closed and may be displaced to other areas that are open to motorized travel. Hunters and other forest users who prefer to walk or ride horses would experience fewer disturbances from motorized vehicles, enhancing the recreational experience.

Attempts have been made to limit motorized use of various roads in the project area in recent years with varying degrees of success. These actions have reduced opportunities for motorized recreation somewhat, but most roads remain open for motorized use. The proposed actions would decrease road mileage open in summer or all year, reducing the cumulative effect of extensive rooding.

3.11 Timber Production and Economics

The focus of the economic analysis is the relationship between the costs and revenues provided by the set of proposed projects. A full socio-economic analysis discussing market and non-market factors was conducted with the Forest Planning process and is not repeated here.

Figures generated by economic efficiency analysis of timber projects are usually used as a means to compare alternatives (rather than as an absolute measure) because timber prices tend to fluctuate widely. For example, average sawtimber stumpage price in the Black Hills was \$228.00 per thousand board feet in 1999. Between January of 2000 and March 2003, however, the average price was \$157.40 per thousand. There is no way to predict the probable price at which a future timber sale would sell, and actual economic efficiency of this project would depend on that factor.

Economic efficiency analysis of the Proposed Action and Alternative A using current stumpage rates indicates that costs would exceed revenue. The highest costs are associated with road reconstruction, prescribed burning, manual fuel treatments, and precommercial thinning. Because Alternative A would produce more timber volume than the Proposed Action, benefit/cost ratio and present net value of Alternative A are higher. Low timber prices mean these projects would cost more than the sale of commercial timber would bring in.

Various costs and benefits were not included in this analysis. Some of these, such as recreational activities, take place across the National Forest and the Black Hills region. Recreation has an economic effect on local communities, but there is insufficient information to determine this specific project's contribution to this effect. Fuel reduction projects are costly in the short term, but the cost of a wildfire that may have been prevented by the fuel reduction could be exponentially higher but difficult to fully take into account in economic analysis. Other non-market factors, such as the value of habitat for rare species, are difficult to quantify and compare directly to commodities.

The economic efficiency analysis was generated using Quick Silver, a Forest Service economic analysis program customized for the Rocky Mountain Region and the Black Hills National Forest. Present net value (the future benefit of the project discounted to the present) is -\$363,871 for the Proposed Action and -\$294,906 for Alternative A. Benefit/cost ratio is .69 for the Proposed Action and .76 for Alternative A, indicating costs would exceed benefits.

Cumulative effects on economics

The cumulative effects analysis area for economics includes the counties overlapping the National Forest (USDA 1996).

The Black Hills area economy was dominated by mining, timber harvest, and agriculture for many years. The region's economy is now well diversified (USDA 1996 p. III-473), but the future of some timber operators in the highly competitive forest products industry continues to be uncertain.

Both action alternatives would contribute to the local economy by producing forest products and employment and through procurement of services and products associated with project implementation.

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*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

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Santee Tribal Office
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Spirit Lake Sioux Tribe
Standing Rock Sioux Tribe
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7 CONTENTS OF THE ANALYSIS FILE

- I. Silviculture Files
 - a. Silviculture Report
 - b. Snag Analysis
 - c. CMAI Analysis
 - d. Stand Tables and Integrated Prescription Chart
 - e. Databases
 - f. Maps

- II. Fuels
 - a. Fuels Report
 - b. Stand Photographs and Notes

- III. Wildlife and Plants
 - a. BE
 - b. Wildlife and Plant Report
 - c. Maps

- IV. Soil and Water
 - a. Soil and Water Report

- V. Range and Noxious Weeds
 - a. Range and Noxious Weeds Report

- VI. Management Direction
 - a. Project Initiation Letter

- VII. Roads Analysis
 - a. Transportation Plan
 - b. Roads Analysis Spreadsheets
 - c. Roads Analysis Questions and Answers
 - d. Road Closure Recommendations
 - e. Maps

- VIII. Recreation, Scenery and Heritage Resources
 - a. Cultural Resource Inventory and Report
 - b. Recreation Management Report
 - c. Scenery Management Report

- IX. Economics
 - a. Economic Analysis Report
 - b. Quicksilver Runs

- X. Scoping Records

8 ACRONYM GUIDE

BA	Basal area
BMP	Best management practice
CCF	Hundred cubic feet
CFR	Code of Federal Regulations
CMAI	Culmination of mean annual increment
EA	Environmental assessment
FDR	Forest development road
FEIS	Final environmental impact statement
FH	Forest highway
FSH	Forest Service Handbook
FVS	Forest Vegetation Simulator
IDT	Interdisciplinary Team
MA	Management area
MBF	Thousand board feet
MIS	Management indicator species
MMBF	Million board feet
NFMA	National Forest Management Act
PFA	Post-fledging family area
POL	Products other than logs
R2	Region 2 (Rocky Mountain Region)
SS	(Habitat) structural stage
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
VSS	Vegetation Structural Stage

9 INDEX

A

Air quality, 44
Alternatives
 Alternative A, 25
 Comparison, 32
 No Action, 8
 Not considered in detail, 25
 Proposed Action, 8
Arnica, northern, 70

B

Bald eagle, 17, 47
Bats
 Fringe-tailed myotis, 57
 Townsend's big-eared bat, 58
Best Management Practices, 18, 72
Big game, 17, 65

C

Cover type, 36
Creeper, brown, 67
Culmination of mean annual increment, 31, 42
Cumulative effects
 Analysis area, 35
 Economics, 81
 Fire, fuels, and air quality, 46
 Noxious weeds, 76
 Past actions, 35
 Soil and water, 75
 Vegetation, 43
 Wildlife and plants (summary), 70

D

Deer
 Mule, 64
 White-tailed, 5, 64
Dipper, American, 48
Down woody material, 40

E

Eagle Cliff, 2, 6, 19, 79
Economics, 81
 Benefit to cost ratio, 7
 Present net value, 7
Elk, Rocky Mountain, 5, 64

F

Flycatcher
 Olive-sided, 60
Fuel breaks, 30
Fuels, 4, 12, 16, 44

G

Goshawk, northern, 39, 51
Grass/forb structural stage, 3, 40

H

Habitat effectiveness, 5, 25, 65
Hardwoods, 3, 10, 36
Heritage resources, 19, 80

J

Junco, dark-eyed, 69

K

Kinglet, golden-crowned, 59

L

Landbirds, 69
Late-succession forest, 39

M

MA 4.1, 2
MA 5.1, 3
Management indicator species, 7, 63
Marten, 8, 17, 39, 49
Meadows and grasslands, 10, 39
Monitoring, 21
Mountain lion, 68
Mountain pine beetle, 4, 41

N

National Forest Management Act, 10
Noxious weeds, 76
Nuthatch, pygmy, 60

O

Owl, flammulated, 53

*Power Vegetation Management Project
Final Environmental Assessment (July 2003)*

P

Plant species of concern, 70
Prescribed fire, 12, 16, 45, 74
Proposed Action, 8
Public involvement, 6
Public issues, 6

R

Range, 20, 76
Recreation, 79
Revised Forest Plan, 1
Roads
 Closures, 6, 14, 30, 73
 Reconstruction, 14

S

Salamander, tiger, 62
Scenery, 19, 77
Sensitive plants, 17, 70
Sensitive species, 7, 48,
16, 40
Snails, 17, 61
Snakes
 Black Hills red-bellied snake, 62

Pale milk snake, 63
Snowmobile trails, 19, 79
Soil and water, 17, 72
Soils
 Compaction, 74
 Erosion, 74
 Erosion hazard, 72
 Nutrients, 74
Spruce, white, 8, 39
Structural stage (habitat), 36

T

Threatened, endangered, and proposed species, 47
Timber harvest treatment descriptions, 9
Travel management, 80
Turkey, Merriam's, 17, 66

W

Water quality, 73, 75
Water yield, 30, 73
Woodpeckers
 Black-backed, 54
 Lewis's, 56
 Northern three-toed, 55