Riflepit Project

Pre-decision Environmental Assessment
Northern Hills District
Black Hills National Forest
Lawrence County, South Dakota
October 2003

Guide to acronyms used in this document

AMD	Average Maximum Density
ASQ	Allowable Sale Quantity
ATV	All Terrain Vehicle
BA	Basal Area
BA/BE	Biological Assessment/Biological Evaluation
BACM	Best Available Control Measures
BHNF	Black Hills National Forest
BMP	Best Management Practices
CCF	Hundred Cubic Feet
CDA	Connected Disturbed Areas
CE	Categorical Exclusion
CFR	Code of Federal Regulations
CMAI	Culmination of Mean Annual Increment
DBH	Diameter at Breast Height
EA	Environmental Assessment
EIS	Environmental Impact Statement
FDR	Forest Development Road
FDT	Forest Development Trail
FEIS	Final Environmental Impact Statement
FLMP	Forest Land Management Plan
FMO	Fire Management Officer
FSH	Forest Service Handbook
FVS	Forest Vegetation Simulator
HSS	Habitat Structural Stage
HUC	Hydrologic Unit Code
IDT	Interdisciplinary Team
MA	Management Area
MBF	Thousand Board Feet
MIS	Management Indicator Species
MMBF	Million Board Feet

NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFSR	National Forest System Road
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
PFA	Post-Fledgling Family Area
POL	Products Other Than Lumber
R2	Region 2 (Rocky Mountain Region)
RD	Ranger District
RIS	Resource Information System
RMRIS	Rocky Mountain Resource Information System
ROS	Recreation Opportunity Spectrum
SASEM	Simple Approach Smoke Estimation Model
SD DE&NR	South Dakota Department of Environment and Natural Resources
SD GF&P	South Dakota Game Fish and Parks
SDOU	South Dakota Ornithologist's Union
SIO	Scenic Integrity Objective
SS	Structural Stage
TEPS	Threatened, Endangered, Proposed and Sensitive Species
TMA	Timber Management Assistant
TPA	Trees per Acre
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United State Fish and Wildlife Service
VSS	Vegetation Structural Stage
WCP	Water Conservation Practice
WFU	Wildland Fire Use for Resource Benefits
WTY	Whole Tree Yarding
WUI	Wildland Urban Interface

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1 PURPOSE OF AND NEED FOR ACTION

1.1 Project Location

The Riflepit project consists of 9,020 contiguous acres in Lawrence County, South Dakota located in the northwestern Black Hills, and bordered on the west by the Wyoming state boundary (see Figure 1). The legal description of the proposed project area and adjacent access routes are listed in Table 1.

Table 1. Project Area Legal Description, Black Hills Meridian

Township	Range	Sections
3 North	1 East	5, 6, 7, 8, 9, 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32
4 North	1 East	1, 2, 3, 4, 5, 7, 8, 9, 16, 17, 18, 19, 20, 29, 30, 31, 32

While the proposed project area includes 679 acres of scattered private lands, this environmental assessment (EA) addresses only management activities proposed on National Forest lands. Travel, including log hauling, may cross private lands on which the Forest Service has acquired right-of-way.

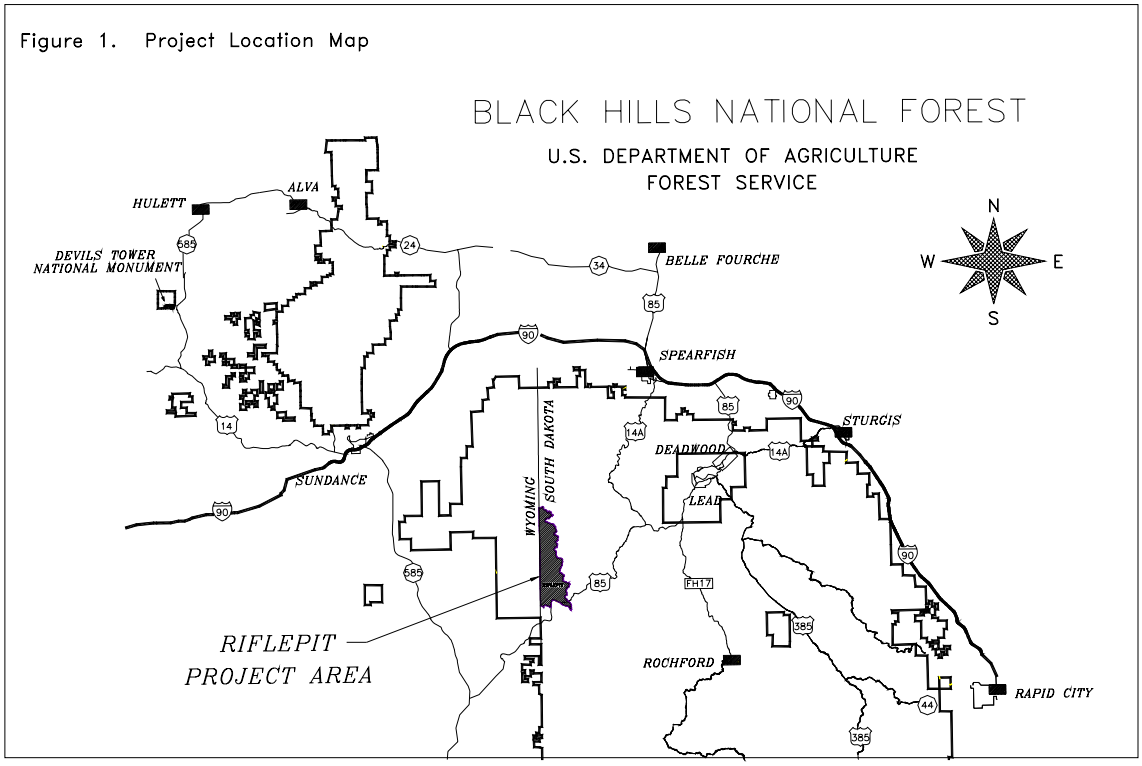

Figure 1: Project Location Map

1.2 Description of Forest

Table 2 shows the National Forest acres of each vegetative type (cover type) found within the project area.

Table 2. Vegetation Cover Types within the Riflepit Project Area

Cover Type	Acres	Percent of National Forest Lands
Ponderosa pine	6,459 acres	77 percent
Aspen	717 acres	9 percent
Paper birch	393 acres	5 percent
Grass	772 acres	9 percent
Total	**8,341 acres**	**100 percent**

1.3 Management Areas

The Revised Forest Plan assigns each portion of the forest a management emphasis to meet multiple-use objectives. Chapter 3 of the Revised Forest Plan includes a description of desired future condition; goals and objectives; and standards and guidelines for each designated Management Area (MA).

The proposed Riflepit project area is within MA 5.1 (USDA FS 1997). Agency stewardship of this MA emphasizes wood products, forage production, and water yield. Contemporary management techniques provide additional goods and services, including products other than lumber (POL), visual quality, recreation opportunities, and wildlife diversity.

The interdisciplinary (ID) planning team found the management area designation appropriate.

1.4 Purpose of and Need for Action

The ID team compared the desired future conditions, as outlined in the Revised Forest Plan, with the existing forest conditions in developing the following purpose of and need for this project:

- **Reduce the risk of insect infestation;**
- **Reduce fuel hazards contributing to catastrophic wildfires; and**
- **Offer commercial wood products on suitable and available timber lands.**

The proposed action would respond to specific Revised Forest Plan goals and objectives. The goals and objectives protect natural resources; provide for diverse ecosystems; provide for sustained commodity uses and production; and provide for scenic beauty, recreational opportunities, and heritage resource protection. The following Revised Forest Plan goals and objectives are addressed by the proposed action.

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

Objective 201: *During the planning period conserve existing hardwood communities and restore historic hardwood communities by 10 percent over 1995 conditions on sites capable of supporting these communities.*

Objective 203 - Management Area 5.1: *Maintain or enhance hardwood shrub communities where biologically feasible, and within management objectives.*

Existing Condition: There are 1,110 acres of aspen or birch (hardwood) cover types (see Table 2 cover types), and many of the ponderosa pine stands have inclusions of aspen or aspen and birch of the same age-class as the ponderosa pine. The aspen and birch inclusions are mature to over-mature and in decline. In response, these hardwood inclusions are using coppice sprouting to regenerate. However, the combination of ponderosa pine shading, pine sapling competition, insects and disease, and browsing makes successful natural hardwood regeneration unlikely.

Opportunity: Aspen and aspen/birch inclusions within ponderosa pine stands can be maintained by removing all or some of the pine. Mature and over mature aspen and aspen/birch clearcutting to stimulate coppice reproduction can regenerate inclusions. In addition, scarification of surface soils may increase the success of birch seedling establishment.

Objective 206: *Maintain or establish a minimum of 20 percent of the forested area of a planning unit (diversity unit, watershed, and/or land type association) to provide vertical diversity.*

Existing Condition: The majority of forested stands exhibit vertical diversity (at least two structural stories).

Opportunity: In single-storied stands with no regeneration, shelterwood seed cut harvest can encourage natural regeneration, creating vertical diversity.

Objective 207: *Manage at least 5 percent of the forested land base for late succession.*

Objective 208: *In addition to late succession described under Objective 207, provide smaller late-successional patches to meet specific resource elements (e.g. goshawk nesting areas, snag replacement clumps).*

Existing condition: Five percent of the project's forested land base is 380 acres. There are 464 acres of late successional stands within the project area.

Opportunity: Stands with late successional characteristics could be maintained using prescribed burning to emulate the periodic, low-intensity surface fires that were historically part of the ecosystem.

Objective 217: *Maintain habitat for game and fish populations at the state objectives in effect in 1996.*

Existing Condition: White-tailed deer, mule deer, elk, and Merriam's turkey inhabit the project area.

Opportunity: Vegetation treatments and travel management could improve game habitat.

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

Existing Conditions for sensitive species: The following species are not likely to occur within the project area due to a lack of suitable habitat, lack of reported sightings, or the species known range lying outside the project area:

Black-tailed prairie dog	Osprey
Peregrine falcon	Regal fritillary
Three-toed woodpecker	Upland sandpiper
Merlin	Yellow-billed cuckoo
Loggerhead shrike	Burrowing owl
Fox sparrow	

The following species are known or likely to occur within the project area:

American marten – Habitat for marten is marginal due to a lack of spruce. However, this species may utilize dense pine stands within the project area as travel corridors.

Black-backed woodpecker – Black-backed woodpeckers may occur in the project area based on current levels of conifer mortality (see page 69). Due to a lack of widespread or concentrated areas of such habitat, the potential for breeding pairs to occur across the landscape is low.

Black Hills red-belly snake – Suitable habitat for this species exists within the project area, but no sightings have been recorded.

Cockerell's striate disc – Suitable habitat exists within the project area. Presence/absence surveys conducted during the 1990s found no individuals.

Cooper's Rocky Mountain snail – Suitable habitat exists within the project area. Presence/absence surveys conducted during the 1990s revealed no occurrences of this species (Frest 1993, Frest 1999).

Fringe-tailed myotis – This bat is a likely resident due to the presence of suitable habitat.

Golden-crowned kinglet – Suitable summer and breeding habitat is lacking, but winter habitat is available.

Northern goshawk – Goshawks are known to occur within the project area, with one historical nest site identified. Surveys in suitable nesting habitat have been conducted for this species.

Northern leopard frog – Suitable breeding habitat exists in stock ponds and ephemeral wet areas.

Pale milk snake – Habitat is available throughout the project area. No sightings have been reported, possibly due to the nocturnal and secretive nature of this species.

Pygmy nuthatch – Open to moderately dense ponderosa pine stands within the project area provide suitable habitat for the pygmy nuthatch. Some previously harvested areas are devoid of larger snags and may not support this species**.**

Tawny crescent butterfly – Habitat is available in moist valley bottoms where conifer and deciduous stands meet. No known population centers occur within the project area.

Tiger salamander - Suitable breeding habitat exists in stock ponds and ephemeral wet areas.

Townsend's big-eared bat – This species is likely to occur within the project area due to existing suitable foraging habitat and roost sites.

Opportunity: Applying measures described in Revised Forest Plan Standards 3108 and 3109 could maintain goshawk habitat. Measures consist of protecting known current and historic raptor nests and considering potential effects of disturbance, nesting phenology, human activities existing at onset of nest initiation, species, topography, forest cover, nest protection standards and recommendations used by state or federal agencies, and other appropriate factors.

New roads would be assessed in relation to effects on red-belly snake habitat.

Existing Conditions for Management Indicator Species (MIS):

Mule Deer, White-tailed Deer, and Elk – Populations of all three species exist within and adjacent to the project area, with white-tailed deer the most numerous. The Riflepit

project area, with its mix of conifer, hardwood, and meadow habitat, is most suited to elk and white-tailed deer. Summer forage values for deer are low, with higher cover values. Deer winter cover values are low, with higher forage values. For elk, summer forage and cover values are similar, while winter values are low for cover and higher for forage. Within the project area, high road densities cause a 31 percent loss in habitat effectiveness.

Merriam's turkey- This species is present throughout the project area. Turkeys require a variety of habitat conditions, all of which are available in the project area. Roosting habitat is absent in some portions of the project area, probably limiting turkey presence in these areas.

Brown creeper – This species is described as utilizing dense conifer, mixed woodland, and hardwood stands, especially in areas containing trees with a minimum diameter of 10 inches and loose bark (DeGraaf 1991). Although a large number of acres within the project area meet the density and diameter requirements, adequate snags and trees with loose bark may be limited in portions of the project area.

Opportunity: Deer and elk forage value and habitat effectiveness could be improved by creation of foraging areas and closing roads.

Objective 222: *Complete 1,000 acres of nonstructural wildlife habitat projects and 100 wildlife habitat improvement structures each year.*

Existing Condition: Nonstructural natural forest characteristics benefit many wildlife species. Structural features may benefit wildlife, but were typically constructed to benefit other values such as livestock.

Opportunity: There is potential to implement the following nonstructural and structural wildlife habitat projects:

Nonstructural

- Underburning to gain characteristics of fire-maintained late successional ponderosa pine.
- Rejuvenation of aspen stands by introducing disturbance.
- Removal of encroaching conifers from hardwood stands.
- Removal of encroaching conifers from meadows.
- Prescribed burning to rejuvenate grass/forb vegetation.

Structural

- Fence existing water sources to prevent livestock damage.
- Create water catchments in areas devoid of a water source.
- Close select roads to increase wildlife security and reduce disturbance.

Objective 223: *Use management ignited fires and prescribed natural fires to achieve desirable vegetative diversity and fuel profiles on 8,000 acres per year for the next decade.*

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.*

Existing Condition: An undesirably high fuel hazard exists in the project area. Prescribed natural fires are prohibited in Management Area 5.1. Prescribed burning can be used as a tool to manage fuels.

Opportunity: Underburns could be used to reduce fuel hazard, reducing risk of crown fire. Underburning can be implemented in areas where effects on existing regeneration and smaller trees are not an issue.

Forage production would be increased through the use of prescribed burning, generally benefiting livestock production. Some areas may need to be rested or deferred from grazing prior to the proposed burns to allow accumulation of sufficient fine fuels to carry the fire and to allow the burn to remain within prescription and achieve objectives. Grazing may also need to be temporarily deferred following a burn.

Objective 226: *Develop fuel management and protection strategies for intermixed land ownerships in partnership with private, state and other federal agencies.*

Existing Condition: Five private residences, Trailshead Lodge, and Hardy Work Center exist within the project area. Fuels on private lands and adjacent National Forest may put those structures at risk. The Lawrence County Fire Advisory Board has identified wildland-urban interface (WUI) zones and developed objectives for defensible space.

Opportunity: Treatments on National Forest lands adjacent to private property could reduce fuel hazard and help protect private lands. The Forest Service would use county WUI zones to identify the interface and develop an interface treatment plan.

Objective 227: *Manage 28,900 acres of activity fuels and 4,000 acres of natural fuels each year during the next decade, consistent with the need to protect life, property and natural resources from the threat of wildfire. This acreage includes acres specified in Objective 223.*

Existing Condition: Within the project area there are 1,606 acres of dense pine stands with a high potential for crown fire. Without follow-up fuel treatments, proposed management activities would create undesirably high fuel loading.

Opportunity: Mechanical methods and prescribed burning treatments could lower fuel hazards for natural and activity-generated fuels.

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

Objective 229: *Using analyses of insect and disease populations, determine where suppression strategies are needed to meet management objectives and minimize value loss of tree vegetation affected by outbreaks of insect and disease pests.*

Existing Condition: Mountain pine beetle populations have been increasing in the Black Hills in recent years (Allen and Long 2001). Beetle-caused mortality is occurring on the Riflepit project area, especially in the southern portions of the area. Thirty-four percent

of the project area ponderosa pine stands are at moderate risk of mountain pine beetle caused losses, and 39 percent are at high risk.

Opportunity: Thinning ponderosa pine stands with moderate and high mountain pine beetle risk can reduce stand susceptibility to mountain pine beetle-caused losses. Green infested trees can be cut and removed, or cut and the bark peeled to kill the beetle larvae or immature beetles before they can emerge the next season. This is called sanitation treatment.

Goal 3: Provide for sustained commodity uses in an environmentally acceptable manner.

Objective 303: *Offer 181 mmcf of sawtimber and 21 mmcf of roundwood timber on suitable and available timberlands in the next decade.*

Objective 304: *On lands not identified as suitable and available for timber harvest, timber volume may be offered as a by-product of other vegetation management objectives. This volume would be offered in addition to the ASQ.*

Existing Condition: Stocking: Thirteen percent of the project areas ponderosa pine stands are overstocked and 45 percent are fully stocked. Within the next decade many of the fully stocked stands will reach overstocked conditions outside the desired management zone (Revised Forest Plan Appendix G).

Opportunity: Overstocked or nearly overstocked ponderosa pine stands can be thinned. Thinning provides POL and sawtimber products and improves stand growth. Dense, mature ponderosa pine stands and those that are approaching maturity can be thinned from below with a shelterwood preparatory cut. This treatment allows trees to develop full crowns for good seed production and increase wind-firmness prior to a shelterwood seedcut.

Overmature, even-aged ponderosa pine stands can be treated with a shelterwood seedcut to regenerate a new stand of ponderosa pine. The harvest treatment provides sawtimber and POL products.

Some or all of the overmature trees can be removed from fully stocked stands of ponderosa pine saplings and seedlings so that the regeneration can grow in full sunlight with minimal competition for water and nutrients. The harvest treatment provides sawtimber and POL products.

Objective 309: *Provide road construction, reconstruction, and obliteration in support of long-term sustainable production of commodities.*

Existing Condition: There are 54 miles of National Forest System and non-system roads in the project area.

Opportunity: The proposed vegetation management would require reconstruction and maintenance of some roads. Some new road construction may be required. Existing roads could be closed or decommissioned to meet forest road management and wildlife objectives.

1.5 Issues

1.5.1 Public Involvement

Scoping letters were sent to citizens, organization representatives, and agency representatives in November 2002. Response letters were received by the ID team in November and December 2002. The proposed project was also announced in local and regional newspapers in November 2002. The record of scoping comments is in the project file, available for review at the Northern Hills District office of the Black Hills National Forest in Spearfish, South Dakota.

1.5.2 Identification of Issues

The ID team 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. The ID team considered the following key issues in developing the alternatives.

1. Effects of timber harvest and vegetative management on wildlife habitat

Proposed timber harvest and other vegetation management can reduce habitat for some wildlife and plant species and improve it for other species. Stands of large, old trees are in relatively short supply. Species dependent on these types of stands may be negatively affected by certain types of harvesting, while other species could benefit. Concern was expressed that timber harvesting and vegetative management could negatively influence the habitat of many species. Because Riflepit is an area of historic harvesting, some are concerned that the proposed harvesting would have negative cumulative effects.

2. Effects of not treating stands with high and moderate bark beetle risk and high fuel hazard risk

The proposed timber harvest and vegetation management may not achieve fully effective bark beetle and fuel hazard risk reduction because some moderate and high risk stands would remain untreated in order to satisfy Revised Forest Plan wildlife habitat standards. Dense stands are both attractive to bark beetles and a high fuel hazard risk. Commentators are concerned that if vulnerable dense stands in the project area are left untreated, bark beetles, which are already active in the area, could build up epidemic populations. They are also concerned that wildfire can be difficult to control in dense stands.

3. Effects of transportation system management

Some believe there are too many roads now. They recommend no new road construction and road decommissioning or closure. Others recommend all roads remain accessible to the public.

4. Effects of prescribed burning

Prescribed burning can lower fuel hazards and protect people, property, and resources. However, there is always a risk that a prescribed burn can escape control and cause damage. Some commentators are concerned that burning in high-density stands would

kill timber and damage private property, especially where burning would not be preceded by mechanical thinning treatments.

1.6 Proposed Activities

The following list describes the type and estimated extent of proposed activities. Definitions of treatments listed below can be found in section 2.1.

- Harvest 9.1 million board feet (MMBF) of sawtimber and POL wood products from 2,370 acres, including:
  - Intermediate timber management using shelterwood preparation, shelterwood removal, thinning, and thinning and pine encroachment control (1,585 acres). These treatments would accomplish stand improvement, bark beetle risk reduction, fuel hazard reduction, and late successional enhancement (objectives 206, 207, 208, 221, 223, 224, 228, 303).
  - Ponderosa pine regeneration establishment through shelterwood seedcut harvest on 130 acres (objectives 206, 224, 228, 303).
  - Hardwood maintenance and restoration on 655 acres by coppice, coppice with standards, pine encroachment control, and underburning (objectives 201, 223, 303).
- Fuel reduction on 3,356 acres by one or a combination of treatments, including 1,384 acres of underburning (including meadow burning) (objectives 210, 223, 224, 227).

These treatments would reduce risk of beetle-caused mortality on 1,715 acres of pine (objectives 228, 229); improve wildlife habitat on 1,582 acres (objectives 217, 221, 222); and maintain and restore hardwoods on 198 acres via mechanical means rather than prescribed fire.

- Management of 54 miles of road, including (objective 309):
  - Up to 1.6 miles of new construction
  - 14.2 miles of reconstruction
  - 23.0 miles of maintenance
  - 13.0 miles of road decommissioning
  - 3.7 miles of road closures.

1.7 Decisions to be made

This EA does not document a decision. This document discloses the effects and consequences of proposed actions and alternatives. The responsible official will make decisions based on consideration of this analysis.

Decisions to be made for this project are:

- Should resource management activities such as fuel treatment, forest density reduction and diversification, forest pest prevention, timber harvest, and road system management be carried out in the Riflepit Project area?
- If so, where in the project area should such activities occur?
- What operating standards and mitigation measures should be used?
- How should such measures be applied?

2 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the alternatives considered in detail, including the No Action alternative; and alternatives considered but eliminated from detailed study. This chapter also includes a comparative summary of the environmental effects of alternatives and mitigation measures. All proposed action alternatives are designed to meet the purpose of and need for action. They would:

- **reduce the risk of insect infestation;**
- **reduce fuel hazards contributing to catastrophic wildfires; and**
- **offer commercial wood products on suitable and available timber lands**.

All action alternatives are consistent with the Black Hills National Forest Land and Resource Management Plan (Revised Forest Plan) direction as amended by Phase I (USDA FS 2001).

2.1 Definitions

This section defines terminology used throughout the document.

Rotation: The number of years required to establish and grow trees to a specified size, product, or condition of maturity.

Shelterwood system: The preferred silvicultural system for regenerating ponderosa pine on suitable lands is shelterwood (USDA FS 1997). The shelterwood system uses a series of cuts or harvest treatments to regenerate a stand.

> Preparation cut: This harvest method removes trees near the end of a rotation to open the canopy (USDA FS 1997). This will enlarge the crowns of seed bearers, improving conditions for seed production and natural regeneration. This harvest is usually accomplished by thinning from below, and may look the same as a commercial thin. Thinning from below removes smaller, inferior trees and retains larger trees with the best crowns. In most stands the stocking of trees would be 60-80 square feet of basal area per acre, or the equivalent of 43 to 57, 16-inch diameter trees per acre.
>
> Seed cut: The seed cut is the regeneration cut of the shelterwood system. All mature trees on the site are removed except for selected seed-bearing trees retained to provide a seed source for stand regeneration (USDA FS 1997). In most stands the stocking of seed trees would be 30 square feet of basal area per acre. That would be the equivalent of 21, 16-inch diameter trees per acre.
>
> Removal cut: This harvest removes the last seed-bearing trees after regeneration is established (USDA FS 1997). Some over mature trees are often retained for future snags, and can be clumped. The Riflepit project would retain at least five mature trees per acre for future snags, and more where needed.

Commercial thin: This method removes some of the trees in a stand to meet desired conditions (USDA FS 1997). Commercial thinning harvests sawtimber and POL products to achieve stand stocking for growth of sawtimber, reduce risk of mountain pine beetle-caused losses, and/or decrease wildland fuel. The proposed action would usually thin stands to 60 or 80 square feet of basal area per acre, or the equivalent of 110 to 147 trees 10 inches in diameter per acre. Poorer quality trees would be removed. The tallest, best-formed trees with greater-than-average diameter would be retained.

Coppice system: This regeneration method produces a hardwood (aspen and/or birch) stand originating primarily from vegetative reproduction, or root sprouts (USDA FS 1997). All standing trees are cut at the end of the rotation, and an even-aged stand sprouts from existing roots. Aspen and birch stands can be regenerated using the coppice system. Because there is no commercial demand for aspen or birch, this treatment would be accomplished after the timber sale through a service contract, district crews, or firewood cutting.

Coppice with standards: This regeneration method retains selected hardwood trees and produces a two-storied stand (USDA FS 1997). Paper birch regenerates from seed where a mineral soil seedbed is provided. This treatment retains selected birch trees to serve as a seed source in mixed aspen/birch stands. Scarification during harvest operations or underburning increases the success of birch regeneration (USDA FS 2002). This treatment would be accomplished after the timber sale through a service contract, district crews, or firewood cutting.

Pine encroachment control: This treatment removes conifers within hardwood stands through commercial harvest. Reducing the stocking of pine slows the natural succession from aspen or aspen/birch to pine, and decreases competition for light and nutrients. This improves the health of the existing aspen or aspen/birch and the health and growth of aspen and birch sprouts. Encroachment control may also be part of an aspen regeneration clearcut. Some of the large, mature or overmature ponderosa pine would be retained to maintain stand diversity.

This treatment may also occur with thinning, shelterwood preparation, shelterwood seedcut, and shelterwood removal. Individual ponderosa pine stands in the Riflepit project area often have a mix of cover types. Removing conifers from aspen or aspen/birch inclusions within the pine stands maintains the inclusions and stand diversity.

Hardwood restoration: 'Restoration', as described in Revised Forest Plan guideline 2205, consists of treating mixed conifer/hardwood stands to meet hardwood restoration objective 201, leaving no more than 10 overstory conifers per acre and treating the conifer understory and hardwood component to shift the dominance of basal area from conifer to hardwood.

Hardwood maintenance: 'Maintenance' results when hardwood treatments do not meet guideline 2205.

Culmination of mean annual increment (CMAI): Mean Annual Increment (MAI) is a relative measure of annual tree or stand volume growth. Culmination of Mean Annual Increment (CMAI) is the year in the life of a tree or stand when the potential growth rate is the greatest.

The law generally prohibits the harvest of stands before they reach their maximum growth rate (National Forest Management Act (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).

The proposed action and action alternatives would harvest some trees before the maximum potential growth rate of some stands in the project area has been reached. These harvest treatments are consistent with the exceptions provided in part m2 of the law, and include the following: precommercial thinning, shelterwood preparation, shelterwood removal, commercial thinning, pine encroachment control, coppice, and coppice with standards.

These treatments are proposed to meet the Revised Forest Plan multiple-use objectives stated earlier in this analysis. All even-aged stands proposed for shelterwood seedcut have reached CMAI.

Old-growth/mature stand enhancement: Stands with old-growth characteristics would be maintained or managed for those characteristics. Underburning is proposed in ponderosa pine stands selected for their old-growth characteristics to maintain or gain the characteristics of fire-maintained ponderosa pine old-growth. Where periodic, low-intensity fires have been part of the ecosystem, old-growth stands consist of clumps or groups of trees with grasses in the openings between the clumps. The clumps or groups of trees contain little down, dead material and few small trees (Mehl 1992). Use of low-intensity surface fires may eliminate or thin ponderosa pine regeneration and regenerate aspen inclusions. Cutting regeneration and small nonmerchantable conifers may occur before underburning.

Sanitation: Sanitation cutting removes or treats insect-infested or diseased trees to reduce pest populations and spread of disease (USDA FS 1997). Commercial operations (timber sale) or non-commercial methods such as felling and peeling the bark of infested trees accomplishes sanitation. Stands proposed for timber harvest would also receive sanitation cutting where necessary. The removal of insect-infested trees would reduce the spread of insects to other trees, decrease mortality, and maintain stand stocking at planned, desired levels.

Meadow enhancement: Young pine trees encroaching on meadows are cut and slashed to maintain the forage base and landscape diversity. In some cases a prescribed burn follows this treatment.

Whole-tree-yarding (WTY): Cut trees are brought to a landing with limbs and tops attached to the tree. Here the limbs and tops are removed from the bole of the tree, piled, and later burned. This technique would be used in Riflepit where harvesting is proposed adjacent to private land.

Prescribed burning: This process is defined as the controlled burning of fuels by confining a fire to a predetermined area, yet burning hot enough to attain desired objectives. Detailed, written plans are always prepared prior to a prescribed burn.

Underburning (prescribed burn): This is a type of prescribed fire broadcast across the forest floor to consume litter, duff, and smaller (no more than three inches in diameter) forest debris, and generate enough heat to kill smaller trees.

Piling and burning: This process accumulates slash into piles, which are left to dry for a time and then burned. Generally, yarding whole trees to a landing area where limbs and tops are removed generates large slash piles. Moderate-sized piles are created when natural debris and logging slash are mechanically pushed together. Hand-piling creates smaller piles.

2.2 Alternatives Considered and Analyzed in Detail

This section describes the alternatives considered in detail. Table 10 and 11 summarize proposed management activities and transportation plans by alternative.

2.2.1 Alternative A

The Forest Service Handbook (FSH) requires the Forest Service study the No Action alternative in detail, and use it as a baseline against which impacts of action alternatives can be measured (FSH 1909.15, 14.1) (USDA FS 1992). Under this alternative, none of the management activities proposed in this document would occur. Ongoing activities such as hunting, snowmobiling and other recreation, fire suppression, and road maintenance would continue. Management activities analyzed under other environmental documents may still occur.

Under alternative A, no vegetation treatments would be implemented. Ponderosa pine would further encroach on hardwood stands and meadows. Competition among trees for light, moisture, and soil nutrients would continue to stress trees and decrease resistance to pathogens. Fuel loadings would continue to increase. For the next 10 years and possibly longer, disturbances would be associated with past sales, ongoing management activities, and wildfire. This alternative does not address the purpose of and need for managing this area to reduce the risk of bark beetle infestation in ponderosa pine stands, reduce fuel hazards contributing to severe wildfire damage, or offer commercial wood products for sale.

2.2.2 Alternative B

The interdisciplinary team developed alternative B (the proposed action) to fully meet the purpose of and need for the project by reducing beetle and fuels risk and offering wood products for sale. Alternative B would implement Revised Forest Plan Management Area 5.1 direction by improving timber and forage production while maintaining wildlife habitat and recreation.

Under alternative B, ongoing activities would continue as described for alternative A. In addition, vegetation management and associated activities would focus on reducing bark beetle risk in ponderosa pine stands, reducing fuels, and offering commercial wood

products for sale. Management activities would also maintain or restore hardwood plant communities, enhance late successional forest stands, and enhance wildlife habitat.

This alternative emphasizes fuel treatment adjacent to developed land, reducing the vulnerability of these areas to crown fire. Treatments to accomplish this objective would include thinning and both slash and natural fuels treatment consistent with the Revised Forest Plan.

Silvicultural Treatments

Timber and POL wood products would be harvested from 2,370 acres, producing a net yield of approximately 9.1 MMBF. Table 3 displays the acres of commercial and non-commercial harvest activities by treatment type.

Table 3. Alternative B Harvest Treatment Descriptions

Commercial Harvest Treatments	Acres Treated	Totals
Shelterwood preparation	477	
Shelterwood seedcut	130	
Shelterwood removal	319	
Thinning	729	
Thinning and pine encroachment control	60	
Hardwood maintenance and restoration		
• Pine encroachment control	408	
• Hardwood maintenance (removes conifer trees out of hardwood stands to maintain the hardwoods)*	185	
• Hardwood restoration (restores stands taken over by pine back to a hardwood type)*	62	
Subtotal		**2,370**

Non-commercial Harvest Treatments	Acres Treated	Totals
Hardwood maintenance		
• Coppice or coppice with standards	9	
Old growth/mature stand enhancement	201	
Meadow enhancement	15	
Non-commercial thinning (chip slash)	13	
Subtotal		**238**
Commercial and Non-commercial Treatment TOTAL:		**2,608**

*see explanation of restoration and maintenance in 'Hardwood Management' section below.

These proposed treatments would satisfy the purpose of and need for action, reducing beetle risk and fuel hazard on these acres by reducing stand density and/or removing surface fuels, and offering merchantable timber for sale. These treatments would also accomplish the Revised Forest Plan objectives of improving stand growth, maintaining hardwoods, and enhancing late-successional forest stands.

Where logging slash exceeds fuel guidelines (Revised Forest Plan guideline 4110) or visual standards; slash piling, chipping, burning, fuel breaks, or other reduction methods would be achieved through standard timber sale contract provisions. For additional information see 'Fire Hazard and Fuels' (Section 3.3.3).

All harvest would be conducted using conventional ground-based equipment consisting of chainsaw felling and rubber-tired skidder yarding, cut-to-length systems, or mechanical felling using equipment such as Timbco tracked feller-bunchers.

Hardwood Management

See Section 2.1 "Definitions" for explanations of hardwood maintenance and hardwood restoration. Hardwood restoration or maintenance is a result of a management treatment or treatments listed in Table 3, including thinning, pine encroachment control, coppice, and coppice with standards. Under alternative B, four stands totaling 62 acres would meet restoration guideline 2205.

In all, treatments of hardwood stands or stands with a hardwood component (inclusions) would total 724 acres. In addition to maintaining hardwoods, these treatments would maintain vegetative diversity and offer merchantable timber.

Fuel Treatment

All of the 2,608 acres identified in Table 3 for harvest treatment would also receive fuel treatment. An additional 748 acres not identified for harvest treatment would receive fuel treatment. Prescribed burning, mechanical slash management techniques, or both, would reduce fuels as shown in Table 4.

Table 4. Alternative B Fuel Treatments

Fuel Treatments in Harvest Units	Acres Treated	Totals
WTY, piling, and burning without follow-up underburning	407	
WTY, piling, and burning with follow-up underburning	191	
Lop and scatter without further treatment	1,552	
Lop and scatter (L&S) followed by underburning (includes L&S of small trees in mature pine stands)	445	
Chipping	13	
Subtotal		**2,608**

Fuel Treatments Outside of Harvest Units	Acres Treated	Totals
Prescribed underburning only	540	
Meadow burning only	208	
Subtotal		**748**
Fuel Treatment Inside and Outside Units TOTAL:		**3,356**

These prescriptions would use prescribed burning to meet Revised Forest Plan direction regarding fuel risks and fuel reduction goals.

Standard slash treatment on the Black Hills National Forest is lop and scatter to 18 inches, with some treatments prescribing subsequent burning (USDA FS 2001). Underburning reduces logging slash and naturally occurring fuels and thins out smaller trees. Whole-tree yarding is prescribed in the WUI, with the resulting slash piles burned to reduce fuels near private land.

Insect Risk Reduction

Harvesting in ponderosa pine stands reduces forest density, which in turn reduces the risk of mountain pine beetle infestation. Shelterwood and thinning harvests on approximately 1,715 acres of ponderosa pine stands would reduce bark beetle risk (see Section 3.2.1, 'Forest Insects' for more information). Sanitation treatments to remove insect-infested ponderosa pine reduce mountain pine beetle populations. Sanitation would be accomplished on infested trees within the entire 2,370 acres identified for commercial harvest treatment in Table 3. Forest Plan snag retention requirements would be met. All action alternatives would select and time slash treatments to minimize build-up of pine engraver beetle populations.

Wildlife Habitat Improvement

Underburning and meadow burning typically improve big game habitat by improving grasses, forbs, and shrubs for forage. Songbirds and raptors also benefit from meadow burning, which rejuvenates foliage for ground-nesters and improves prey species habitat. Such burns are proposed on 1,384 acres. Additional habitat improvements through hardwood maintenance and restoration and meadow maintenance (mainly through burning) would benefit a variety of wildlife species. Wildlife habitat improvements would total 1,582 acres.

Transportation Management

Currently there are 54 miles of Forest Service roads (system and non-system roads) within the proposed project area. Management of these roads under alternative B would include approximately:

- 1.6 miles of new road construction,
- 14.2 miles of reconstruction,

- 23.0 miles of maintenance,
- 13.0 miles of decommissioning, and
- 3.7 miles of yearlong closures.

This road management proposal was developed from a project-level Roads Analysis and meets Revised Forest Plan direction regarding changes to the forest development road system in support of long-term sustainable commodity production.

2.2.3 Alternative C

This alternative is discussed in Section 2.3, 'Alternatives Considered but Eliminated from Detailed Study'.

2.2.4 Alternative D

Alternative D emphasizes thinning as many high and moderate risk stands as possible (within Revised Forest Plan standards) to maximize reduction of bark beetle risk. By closing more roads than proposed under alternative B to offset the effects on big game of harvesting additional acres, this alternative would maximize reduction of beetle risk while still meeting Revised Forest Plan habitat standards.

This alternative would also emphasize reducing stand vulnerability to crown fire, particularly around developed private lands. Treatments proposed to accomplish this objective include thinning and treatment of both logging slash and natural fuels consistent with the Revised Forest Plan.

Shelterwood preparation and thinning would take place on 163 more acres than proposed under alternative B.

Silvicultural Treatment

Timber and POL wood products would be harvested from a total of 2,613 acres, producing a net yield of approximately 9.8 MMBF. Table 5 displays the acres of harvesting activities by treatment.

Table 5. Alternative D Harvest Treatments

Commercial Harvest Treatments	Acres Treated	Totals
Shelterwood preparation	540	
Shelterwood seedcut	202	
Shelterwood removal	319	
Thinning	829	
Thinning and pine encroachment control	60	

Commercial Harvest Treatments	Acres Treated	Totals
Hardwood maintenance and restoration		
• Pine encroachment control	416	
• Hardwood maintenance (removes conifer trees out of hardwood stands to maintain the hardwoods)	185	
• Hardwood restoration (restores stands back to a hardwood type that had been taken over by pine)	62	
Subtotal		**2,613**

Non-commercial Harvest Treatments	Acres Treated	Totals
Hardwood maintenance		
• Coppice or coppice with standards	9	
Old growth/mature stand enhancement	266	
Meadow enhancement	15	
Non-commercial thinning (chip slash)	13	
Subtotal		**303**
Commercial and Non-commercial Treatment TOTAL:		**2,916**

All timber harvesting would be conducted with conventional ground-based logging equipment.

Hardwood Management

See Section 2.1 "Definitions" for explanations of hardwood maintenance and hardwood restoration. Under alternative D, four stands totaling 62 acres would meet restoration guideline 2205 through conifer removal and coppice regeneration treatments.

In all, treatments of hardwood stands or stands with a hardwood component (inclusion) would total 732 acres. In addition to maintaining hardwoods, these treatments would maintain vegetative diversity and offer merchantable timber.

Fuel Reduction

All of the 2,916 acres identified in Table 5 for harvest treatment would also receive fuel treatment. An additional 758 acres not identified for harvest treatment would also receive fuel treatment. Through one or a combination of the techniques listed in Table 6, a total of 3,674 acres would receive fuel treatment.

Table 6. Alternative D Fuel Treatments

Fuel Treatments in Harvest Units	Acres Treated	Totals
WTY, piling, and burning without follow-up underburning	407	
WTY, piling, and burning with follow-up underburning	191	
L&S without further treatment	1,739	
L&S followed by underburning (includes L&S of small trees in mature pine stands)	566	
Chipping	13	
Subtotal		**2,916**

Fuel Treatments Outside of Harvest Units	Acres Treated	Totals
Prescribed underburning only	550	
Meadow burning only	208	
Subtotal		**758**
Fuel Treatment Inside and Outside Units TOTAL:		**3,674**

These prescriptions would use prescribed burning to meet Revised Forest Plan direction regarding fuel risks and fuel reduction goals.

Insect and Disease Risk Reduction

Harvesting in ponderosa pine stands reduces forest density, which reduces the risk of mountain pine beetle infestation. Shelterwood and thinning harvests on approximately 1,950 acres of ponderosa pine stands would reduce bark beetle risk (see section 3.2.1, 'Forest Insects,' for more information). Sanitation would be accomplished on infested trees on the entire 2,613 acres proposed for commercial harvest treatment (Table 5). Forest Plan snag retention requirements would be met. All action alternatives would select and time slash treatments to minimize buildup of pine engraver beetle populations. This alternative would reduce insect risk and conduct sanitation in more stands than any of the other alternatives.

Wildlife Habitat Improvement

Effects of underburning and meadow burning on wildlife habitat would be similar to those of alternative B. Such burns are proposed for 1,515 acres. Habitat improvements include hardwood maintenance, restoration, conifer underburns and meadow maintenance burns.

Transportation Management

Transportation system and travel management of 54 miles of road would include approximately:

- 1.6 miles of new road construction,
- 14.2 miles of reconstruction,
- 23.0 miles of maintenance,
- 13.0 miles of decommissioning, and
- 9.2 miles of yearlong road closures.

2.2.5 Alternative E

This alternative is discussed in Section 2.3, 'Alternatives Considered but Eliminated from Detailed Study'.

2.2.6 Alternative F

This alternative emphasizes commercial thinning, overstory retention, large tree development, limiting stand fragmentation, and maintaining non-conifer stands. Bark beetle risk reduction and fuel treatment would still be achieved, though on fewer acres than under alternative B or D. Wildlife enhancement would be accomplished by lumping treatment areas together to create larger treatment areas (and thus larger untreated areas) than under the other alternatives.

This alternative proposes to commercially thin more acres than alternative B or D while minimizing shelterwood seedcut and shelterwood removal treatments. Overall commercial treatment would take place on 400 fewer acres than under alternative B and 643 fewer acres than under alternative D. Total commercial and non-commercial hardwood treatments would take place on 160 fewer acres than under alternative B and on 168 fewer acres than under alternative D.

Alternative F also emphasizes low-intensity fire, emulating historic habitat and disturbance conditions. This alternative includes 2,736 acres of prescribed burning, more than any other alternative. This includes pile burning, underburning, and meadow burning. Alternative F would burn 945 more acres than alternative B and 814 more acres than alternative D.

Silvicultural Treatment

Timber and POL wood products would be harvested from a total of 1,970 acres, producing a net yield of approximately 6.9 MMBF. Table 7 displays the acres of harvesting activities by treatment.

Table 7. Alternative F Harvest Treatments

Commercial Harvest Treatments	Acres Treated	Totals
Shelterwood preparation	468	
Shelterwood seedcut	33	
Shelterwood removal (chip slash)	15	
Thinning	843	
Thinning and pine encroachment control	107	
Hardwood maintenance and restoration		
• Pine encroachment control	283	
• Hardwood maintenance (removes conifer trees out of hardwood stands to maintain the hardwoods)	186	
• Hardwood restoration (restores stands back to a hardwood type that had been taken over by pine)	35	
Subtotal		**1,970**

Non-commercial Harvest Treatments	Acres Treated	Totals
Old growth/mature stand enhancement	156	
Meadow enhancement	412	
Subtotal		**568**
Commercial and Non-commercial Treatment TOTAL:		**2,538**

All timber harvesting would be conducted with conventional ground-based logging equipment.

Hardwood Management

See Section 2.1 "Definitions" for explanations of hardwood maintenance and hardwood restoration. Alternative F would restore 35 acres of hardwoods through conifer removal and coppice regeneration treatments.

In all, treatments of hardwood stands or conifer stands with a hardwood component would total 611 acres. In addition to perpetuating hardwoods, these treatments would maintain vegetative diversity and offer merchantable timber.

Fuel Treatment

All of the 2,538 acres identified in Table 7 for harvest treatment would also receive fuel treatment. An additional 960 acres not identified for harvest treatment would also receive fuel treatment. Fuel treatment would be accomplished on 3,498 acres through one or a combination of the techniques listed in Table 8.

Table 8. Alternative F Fuel Treatments

Fuel Treatments in Harvest Units	Acres Treated	Totals
WTY, piling, and burning without follow-up underburning	211	
WTY, piling, and burning with follow-up underburning.	197	
L&S without further treatment.	762	
L&S followed by underburning (includes L&S of small trees in mature pine stands)	1,368	
Subtotal		**2,538**

Fuel Treatments Outside of Harvest Units	Acres Treated	Totals
Prescribed underburning only	765	
Meadow burning only	195	
Subtotal		**960**
Fuel Treatment Inside and Outside Units TOTAL:		**3,498**

These prescriptions would use slash treatments and prescribed burning to meet Revised Forest Plan direction regarding fuel risks and fuel reduction goals and to improve wildlife habitat.

Insect Risk Reduction

All shelterwood cuts and thinning in pine stands would reduce bark beetle risk. Thinning and pine encroachment control would take place on approximately 1,466 acres where hardwood inclusions are found in ponderosa pine stands. Sanitation would be accomplished on infested trees on all 1,970 acres identified for commercial harvest treatment in Table 7. Revised Forest Plan snag retention requirements would be met. All action alternatives would select and time slash treatments to minimize buildup of pine engraver beetle populations.

Wildlife Habitat Improvement

Habitat improvements include hardwood maintenance, restoration, conifer underburns, and meadow maintenance burns. These treatments would be similar to those described under alternatives B and D. Burning would take place on 2,525 acres, considerably more acres of treatment than under alternative B or D.

Transportation Management

Transportation system and travel management would address 54 miles of road, including approximately:

- 0 miles of new road construction,

- 6.2 miles of reconstruction,
- 18.4 miles of maintenance,
- 13.0 miles of decommissioning, and
- 7.9 miles of yearlong road closures.

2.2.7 Alternative G

This alternative is discussed in Section 2.3, 'Alternatives Considered but Eliminated from Detailed Study'.

2.3 Alternatives Considered but Eliminated from Detailed Study

The ID team considered a number of alternatives to the proposed action. This section briefly describes alternatives not considered in detail and the reasons for eliminating them from further consideration.

2.3.1 Alternative C

In addition to the treatments prescribed in alternative B, alternative C would have increased ponderosa pine thinning in order to accomplish additional mountain pine beetle risk reduction. This alternative would have compromised Revised Forest Plan wildlife habitat standards, and was therefore dropped from further consideration.

Beetle-caused mortality is occurring in the Riflepit project area, especially in the southern portions of the area. Ponderosa pine stands have been classified for mountain pine beetle risk, with 34 percent of ponderosa pine stands at moderate risk and 39 percent at high risk.

Thinning ponderosa pine stands decreases susceptibility to mountain pine beetle-caused losses. The proposed action would treat some of the moderate and high risk stands. A substantial portion of the project area would, however, remain untreated to provide wildlife habitat, with 43 percent of the pine stands remaining at moderate or high risk. More thinning would decrease the risk of loss. Untreated, mountain pine beetle risk would continue to increase over time increasing the likelihood of a bark beetle epidemic. Such an epidemic could cause extensive pine mortality, resulting in potentially greater loss of wildlife habitat than loss due to timber harvest.

Thinning all stands of ponderosa pine with moderate and high mountain pine beetle risk ratings, except for critical habitat such as goshawk nest stands or cultural sites that could be damaged by logging, would address the issue of insect caused mortality. This alternative would have produced an estimated 14 MMBF.

2.3.2 Alternative E

Alternative E would have focused silvicultural treatments on ponderosa pine stands with the highest bark beetle risk. This alternative was considered and developed but was not carried through full analysis. Dense ponderosa pine sawtimber stands have the highest beetle risk (Schmid et al. 1994, Schmid and Mata 1992), and are also valued for wildlife habitat. Concentrating harvest on these stands while maintaining Forest-wide standards for wildlife habitat would have reduced the overall area of timber harvest to 1,280 acres, leaving 2,262 acres of pine at moderate risk of beetle infestation and 1,597 acres at high risk. Untreated pine stands with moderate risk will normally grow into high-risk stands within a decade. While this alternative would reduce risk on 1,104 acres of high-risk ponderosa pine stands, 76 percent of the pine stands would remain at moderate or high risk. Alternatives B and D would more effectively reduce overall stand susceptibility to mountain pine beetle-caused losses across the project area. Therefore alternative E was dropped from further consideration.

2.3.3 Alternative G

The Forest Service considered an alternative raised by the public proposing treatments to reduce fuels and susceptibility of pine stands to mountain pine beetle attack without commercial timber harvest.

Goal 3 of the Revised Forest Plan is to provide for sustained commodity uses in an environmentally acceptable manner (Revised Forest Plan, p. I-17). Management Area 5.1 (5.1-201, Chap. 3, 5.1 p. 4), which fully encompasses the Riflepit project area, directs area management to emphasize sustained production of wood products. MA 5.1 direction also describes the desired future condition as: "Evidence of insect and disease outbreaks is infrequent"; "Insect and disease populations are at endemic levels"; and "Fuel treatment emphasis is on maintaining forest health and protection of management investments in the interest of sustained productivity". This alternative was eliminated from detailed study because it does not meet MA 5.1 management direction. A non-commercial treatment, such as alternative G, would not meaningfully contribute to the purpose of and need for this project, nor would it meet Revised Forest Plan goals and objectives for the project area. Therefore, this alternative was eliminated from detailed study.

2.4 Comparison of Alternatives Considered in Detail

Table 9 summarizes the volumes and acreages of treatments by alternative as they satisfy the purpose and need for this proposed action. The purpose of and need for this project include reducing risk of bark beetle infestation, reducing fuel hazards, and offering commercial wood products. There are two bases of comparison for reducing the risk of beetle infestation. The first is acres of treatment that would reduce bark beetle risk. All of the proposed shelterwood and commercial thinning treatments would accomplish bark beetle risk reduction by reducing ponderosa pine stand density. The second is acres of sanitation harvest that would remove bark beetle-infested trees. For the "reducing fuel

hazard risk" aspect of the purpose of and need for this project, Table 9 compares acres of fuels treated. For the purpose and need of **offering commercial wood products**, Table 9 compares the volume of commercial wood products harvested in millions of board feet (MMBF).

Table 9. Satisfaction of the Project Purpose and Need by Alternative

Treatment	Alternative A	Alternative B	Alternative D	Alternative F
Bark Beetle Risk Reduction (acres)	0 acres	1,715 acres	1,950 acres	1,466 acres
Bark Beetle Sanitation (acres)*	0 acres	2,730 acres	2,613 acres	1,970 acres
Fuel Hazard Reduction (acres)	0 acres	3,356 acres	3,674 acres	3,498 acres
Commercial Wood Products Harvested (MMBF)	0 MMBF	9.1 MMBF	9.8 MMBF	6.9 MMBF

*Sanitation would occur where needed on the acreages displayed.

Table 10 displays a detailed comparative summary of the extent of the proposed treatments.

Table 10. Comparative Summary of Proposed Actions by Alternative (acres)

HARVEST TREATMENTS - COMMERCIAL				
Commercial Harvest Treatments	**Alternative A**	**Alternative B**	**Alternative D**	**Alternative F**
Shelterwood preparation harvest	0 acres	477	540	468
Shelterwood seed cut harvest	0	130	202	33
Shelterwood removal harvest	0	319	319	15
Thinning	0	729	829	843
Thinning and pine encroachment control harvest	0	60	60	107

HARVEST TREATMENTS - COMMERCIAL				
Commercial Harvest Treatments	**Alternative A**	**Alternative B**	**Alternative D**	**Alternative F**
Hardwood maintenance and restoration harvest				
• Pine encroachment control	0	408	416	283
• Hardwood maintenance	0	185	185	186
• Hardwood restoration	0	62	62	35
Commercial Harvest Treatments – Subtotal	**0**	**2,370**	**2,613**	**1,970**

HARVEST TREATMENTS – NON-COMMERCIAL				
Non-commercial Harvest Treatments	**Alternative A**	**Alternative B**	**Alternative D**	**Alternative F**
Hardwood maintenance: Coppice or coppice with standards cutting	0	9	9	0
Old growth/mature stand enhancement	0	201	266	156
Meadow enhancement	0	15	15	412
Ladder fuel reduction thinning (chip slash)	0	13	13	0
Non-commercial Harvest Treatments – Subtotal	**0**	**238**	**303**	**568**
HARVEST TREATMENTS - TOTALS				
Commercial and Non-commercial Treatments TOTAL:	**0**	**2,608**	**2,916**	**2,538**

FUEL TREATMENTS – WITHIN HARVEST UNITS				
Fuel Treatments in Harvest Units	**Alternative A**	**Alternative B**	**Alternative D**	**Alternative F**
WTY, piling, and burning without follow-up underburning	0	407	407	211
WTY, piling, and burning with follow-up underburning	0	191	191	197
L&S without further treatment	0	1,552	1,739	762

FUEL TREATMENTS – WITHIN HARVEST UNITS				
Fuel Treatments in Harvest Units	**Alternative A**	**Alternative B**	**Alternative D**	**Alternative F**
L&S followed by underburning (includes L&S of small trees in mature pine stands)	0	445	566	1,368
Chip slash	0	13	13	0
Fuel Treatment in Harvest Units – Subtotal	**0**	**2,608**	**2,916**	**2,538**
FUEL TREATMENTS – OUTSIDE HARVEST UNITS				
Fuel Treatments Outside of Harvest Units				
Prescribed underburning only	0	540	550	765
Meadow burning only	0	208	208	195
Fuel Treatment Outside of Harvest Units – Subtotal	**0**	**748**	**758**	**960**
FUEL TREATMENTS - TOTALS				
Fuel Treatment Inside and Outside Units TOTAL:	**0**	**3,356**	**3,674**	**3,498**

Table 11. Summary of Proposed Transportation Management Activities by Alternative

Activity	Miles (approximate)			
	Alt A	**Alt B**	**Alt D**	**Alt F**
Roads constructed	0.0	1.6	1.6	0
Roads reconstructed	0.0	14.2	14.2	6.2
Pre-use road maintenance	0.0	23.0	23.0	18.4
System roads decommissioned	0.0	0.5	0.5	0.5
Non-system roads decommissioned	0.0	12.5	12.5	12.5
Roads open summer only	0.2	8.6	6.3	6.1
Roads open all year	48.3	24.2	20.9	20.9
Roads closed all year	5.2	3.7	9.2	7.9
Total Forest Service roads	**53.7**	**36.5**	**36.4**	**34.9**
Total road density (miles of roads per square mile of land)	4.1	2.8	2.8	2.7

2.5 Mitigation Measures

Mitigation measures prevent adverse impacts or maintain acceptable limits of change during implementation of a chosen action alternative. These measures avoid, minimize, or reduce negative impacts. Mitigation measures can also rectify, repair, replace, compensate for, or substitute resources impacted.

Chapter 2 of the Revised Forest Plan includes mitigating measures (standards and guidelines) that apply to all areas of the Forest when implementing activities. Chapter 3 of the Revised Forest Plan includes measures that apply to specific management areas. Not all of these measures are repeated in this document. Some have been included for emphasis. Revised Forest Plan references are italicized below.

The following mandatory management requirements will be applied to any action alternative for the protection of soil and water: State of South Dakota Best Management Practices (BMPs); Revised Forest Plan standards and guidelines; those contained in the Black Hills National Forest Weed Management Plan; and requirements in the Watershed Conservation Practices Handbook (Forest Service Handbook 2509.25 & 26) (USDA FS 1996).

2.5.1 Timber Harvest

- To protect hardwood regeneration, harvest operations in coppice treatment stands will retain hardwood slash on-site. Post-treatment survey and monitoring will determine if additional protection measures, such as fencing, are necessary**.** Conifer regeneration will be protected during harvest activities in stands planned for shelterwood removal. The timber sale contract will prohibit whole-tree yarding and will require the use of designated skid trails in these units unless the purchaser can adequately protect regeneration through other methods.
- Harvest will occur in shelterwood seedcut units when there is no snow cover to ensure adequate disturbance to expose mineral soil for seedling establishment. This restriction may be waived if the purchaser agrees to scarify the stand the following summer or fall.
- Timber sale layout personnel will retain sufficient live trees (in clumps, where possible) to provide future snags in shelterwood seedcut and overstory removal stands. Residual will consist of at least five trees per acre (TPA) of the largest diameter class available. *Reference Guidelines 2303, 2306 (to be treated as standards)*

2.5.2 Riparian Areas

- The timber sale contract and/or timber sale administrators will prohibit log landings, decking areas, and mechanical slash piling in riparian areas unless the integrity of the riparian area can be protected (e.g., frozen, snow-covered ground conditions). *Reference Standard 1306*

2.5.3 Snag Habitat

- Proposed activities will not result in a loss of individual snags unless a snag is determined to be a safety hazards. Where possible, workers will leave snags cut as safety hazards on site rather than salvaging the logs or skidding them to landings. *Reference Guideline 2305 (to be treated as a standard)*
- Where hard snag densities are deficient, the Forest Service will create snags to move towards levels specified in standard 2301. Timber sale layout will retain an average of 1.75 trees per acre on south aspects and three on north aspects for snag creation in designated shelterwood seedcut and shelterwood removal stands, in addition to trees retained for other purposes. These trees should be representative of the largest trees on the site and can be clumped. Where possible, layout will group existing snags away from roads to prevent cutting as firewood. Prior to creation of snags, the Forest Service will conduct snag surveys within harvest units or, where feasible and funded, across the 7th-order watershed. If standard 2301 is found to be met, trees will not be converted to snags. *Reference Standard 2302, 2306*

2.5.4 Down Woody Material

- Harvest activities will leave sufficient down woody debris, where available, in all treated conifer units to meet or exceed the Revised Forest Plan standard of 50 linear feet per acre of coarse woody debris with a minimum diameter of 10 inches. *Reference Standard 2308* (Note: If this mitigation measure conflicts with fuel loading or visual quality, standard 2308 takes precedence.)
- Harvest operations will leave cull logs or felled cull trees on site except where whole-tree yarding takes place. Except in the WUI, contractors will return and scatter cull logs (where whole) as needed to meet Revised Forest Plan standards.
- Prescriptions formulated for underburning will meet Revised Forest Plan standard 2308 for retention of large woody material. *Reference Standard 2308*

2.5.5 Threatened, Endangered, and Sensitive Species

- From March 1 through August 31, project administrators will minimize additional human-caused noise and disruption within ¼ mile of active goshawk nests. The project file lists the specific restricted activities. The project file identifies known goshawk nest stands, protected acreage, and post-fledging family areas. *Reference Standard 3111*
- From March 1 through September 30, timber harvest administrators will avoid timber harvest schedules causing simultaneous, widespread disturbance across active goshawk fledgling habitat. Fledging habitat will include areas without constant human disturbance. *Reference Standard 3113*
- Project layout and administration personnel will report any newly discovered raptor nests to the district biologist for further assessment and protection. Project layout personnel and administrators will protect known current and historic nests. *Reference Guideline 3204 (to be treated as a standard)*

- Project layout and administration personnel will report any bald eagle sightings to the district biologist for further assessment and protection. *Reference Standard 3101d*
- All activities will avoid known sites of populations of plant species of interest. Locations are in the "Plant Report for the Riflepit Project" found in the project file. This EA does not disclose site-specific information in order to protect plant populations. Timber sale layout personnel will consult this information and/or the district botanist prior to layout of units. *Reference Guideline 3107 (to be treated as a standard)*
- Project administrators will manage sensitive species located after contract or permit formation through active coordination with permittees, contractors, purchasers, Forest Service line officers, and biologists. *Reference Standard 3115*
- Timber sale preparation personnel will set aside one or more harvest sites during harvest unit preparation and marking. If 1) a sensitive species site or population or heritage site is discovered during implementation of the project, and 2) it is necessary to leave unharvested a portion of the timber sale in order to protect the site or population, harvest may occur in all or part of the set-aside unit/s to offset the lost timber volume. If the above conditions do not occur, the set-aside unit/s will be harvested as a small sale or through other means. The Decision Notice for this project will identify the site/s to be set aside.
- All activities will conserve live aspen with signs of cavity nesting where this will not conflict with clone regeneration. *Reference Standard 2204*
- Project layout personnel will provide a no-treatment buffer of 100 feet around known land snail sites in stands 0705040082 and 0713010002 The following measures will apply: a) project layout and administration personnel will report any new snail colonies to a district biologist; b) project layout and administration personnel will review district files prior to implementation to determine locations of any newly discovered sites; c) if new snail sites are found within treatment areas, harvest administrators will move skid trails to either side of the colony; d) project layout and administration personnel will preserve existing microclimate at snail sites by providing small no-cut areas around populations. In some locations, it may be possible to accomplish this with mid- and understory trees.
- Project layout and administration personnel will review raptor nest records prior to implementation to determine if nests exist within a treatment unit. Administrators of all activities will avoid disturbance of nests.
- Timber harvest prescriptions will retain a minimum of 15 trees per acre in the largest size classes in stand 0705040040, alternative F, to avoid removal of the overstory component.

2.5.6 Other Wildlife and Fish

- Timber harvest prescriptions will provide at least two to six turkey-roost sites will be provided per section, consisting of mature trees with an average diameter of 10-14", widely spaced horizontal branches, and basal areas at least 90 ft^2/acre. Sites will be at least ¼ acre in size and not isolated from adjacent forested stands. The upper third of

east-facing slopes will be emphasized if available. Stands 0705040003, 0705040004, and 0705020077 will each have three roost sites of ¼ acre each. Stand 0705040045 will have four roost sites of ¼ acre each. *Reference Guideline 3205 (to be treated as a standard)*

- Prescriptions for treatment of mixed conifer/hardwood stands (Objective 201) will leave no more than 10 overstory conifers per acre and will treat the conifer understory and hardwood component to shift the dominance of basal area from conifer to hardwood. *Reference Guideline 2205*
- Prescriptions for all activities will provide big game screening along at least 20 percent of the edges of arterial and collector roads, and will consider vegetation, slopes, landform, etc. *Reference Guideline 3203 (to be treated as a standard)*

2.5.7 Improvements

- Timber sale maps will show all Forest Service-authorized improvements, such as property line monuments, section corners, Hardy Work Center, fences, trails, mining claim corners, and utility lines, as protected improvements. Project administrators will protect these improvements during management activities.

2.5.8 Rangeland

- Project layout and administration personnel will locate roads, landings, and slash piles out of meadows and draw bottoms whenever possible to reduce forage loss and protect key grazing areas.
- Project administrators will ensure that all pasture gates are kept closed during the grazing season (June through October) and that fences are protected during logging operations to maintain proper grazing and prevent unauthorized livestock use.
- Project administrators will ensure protection of range improvements such as cattle guards, fences, spring developments, and water storage tanks during proposed activities. As appropriate, contractors will repair any damage they cause to range improvements during management activities. Contractors will maintain cattle guards put in place to facilitate timber sales for the duration of the timber sale contract period.

2.5.9 Noxious Weeds

- The Black Hills National Forest Weed Management Plan (approved January 18, 2003) identifies measures to prevent the spread of noxious weeds during prescribed burning, road maintenance/rehabilitation, and timber harvest activities. These measures apply to this project. Where the risk of spreading noxious weeds is high, contractors will wash off-road equipment before leaving the site to prevent spread of weeds to adjacent National Forest and private lands. District staff will identify known high-risk areas prior to project implementation. *Reference Objective 231*
- Before, during, and after the timber sale, district personnel will inventory and monitor noxious weed infestations along access routes. If infestations are found, the

appropriate parties will control or prevent the spread of noxious weeds according to the Forest Weed Management Plan. *Reference Objective 230*

- District personnel responsible for noxious weed control will, in coordination with the project engineer, inspect gravel pits for noxious weed infestation and ensure that the materials are weed-free or treated prior to transport and use. The Forest Service will inspect treated gravel sources annually for at least three years after project completion to ensure that any weeds transported to the site are promptly detected and controlled, and will inspect stockpiled gravel materials annually for weeds. *Reference Objective 230*
- Disturbed soil will be revegetated to optimize plant establishment for that specific site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulch as necessary. *Reference Standard 4306*
- Project administrators will locate project staging areas, including landings, in areas free of noxious weeds where possible. Workers will avoid travelling through areas infested with noxious weeds where possible, or will restrict travel to those periods when spread of seed is least likely. Timber sale administrators and District personnel responsible for noxious weed control will coordinate to enforce this provision.

See also Soil and Water Quality mitigation, below.

2.5.10 Soil and Water Quality

- Revegetation will begin within six months after termination of ground-disturbing activities. Project administrators will ensure revegetation of all disturbed soils with native species when available. Seed mixtures will be free of noxious weeds. On areas needing the immediate establishment of vegetation, non-native, non-aggressive annuals, non-aggressive perennials, or sterile perennial species may be used while native perennials are becoming established. These species can be used to prevent the spread of noxious weeds and prevent erosion. Only weed-free mulches will be used. *Reference Guideline 1110 (to be treated as a standard)*
- Road designers will ensure that roads meet minimum standards and include road surface drainage features to disperse runoff and minimize erosion. *Reference Standard 1105*
- When ground-disturbing activities occur, project design and administration personnel will ensure use of vegetative buffer strips or barriers to reduce sediment delivery to drainages. Buffer width between streams and roads or trails will be determined using the equation in Appendix J of the Revised Forest Plan. *Reference Guideline 1115*
- To prevent detrimental compaction of soils, project administrators will limit the use of heavy equipment to periods when soils are sufficiently dry or frozen so equipment does not cause ruts.
- Where possible, road designers will locate newly constructed classified roads with adequate vegetative buffer zones. In cases where an adequate buffer zone does not exist, or existing roads do not meet the vegetative buffer zone guideline, one or more mitigation measures will be implemented:

- Silt fence
- Slash windrows
- Lead-off ditches or corrugated metal pipe to disperse water
- Surface stabilization to reduce the vegetative buffer to an acceptable distance
- Hay bales or sediment basins to trap silt
- Pit run or crushed aggregate placed on road
- Abandon the location or road

Reference Guideline 1108 (to be treated as a standard)

- Contractors or project administrators will seed timber sale roads after construction but prior to timber harvest if any part of the gap between construction and harvest would occur during or between April and October. This may be accomplished under the road contract. If necessary, roads will be seeded again after log hauling is complete. *Reference Standard 1106*
- The Forest Service will close newly constructed roads and skid trails after construction until needed for timber harvest and again after timber harvest to reduce negative resource effects.

2.5.11 Roads/Transportation Management

- Road designers will minimize the impact of new road construction on wildlife. Generally, new roads will not be located in meadows. When topography allows, roads will not be within 400 feet of the meadow edge. *Reference Guideline 9204 (to be treated as a standard)*

See also mitigations under Soil and Water Quality and Timber Harvest.

2.5.12 Prescribed Burning/Fuel Treatment

- Visual effects of prescribed burning will comply with the approved Scenic Integrity Objectives of the area. *Reference Standard 4104*
- When feasible and appropriate, fuel managers will use broadcast burning to dispose of slash. *Reference Guideline 4105*
- The Forest Service would defer prescribed burn areas from livestock grazing for a portion or all of the following growing season to ensure re-growth of forage species. *Reference Guideline 4107*
- Prior to implementation of prescribed burn projects, fire managers will develop and the line officer will approve prescribed burn plans. The plans will describe the objectives for each burn, identify acceptable levels of tree mortality, incorporate Revised Forest Plan standards and guidelines, and establish burn organizations and weather/fuels parameters in order to safely and successfully accomplish the project. *Reference Guideline 4108*
- Where possible, slash piles will not be located in meadows.

- Contractors or project administrators will treat slash according to direction in the Revised Forest Plan. *Reference Standard 4113, Guidelines 4110, 4112.* In addition to standard 4113, WTY may take place in the WUI and within 200 feet of undeveloped private lands. The fuels specialist's report in the project file lists stands requiring WTY.
- Fuel breaks will be hand-piled where mechanized piling could cause soil damage (such as on thin soils or rocky terrain).
- Fire managers will ensure that underburns meet the following mortality standards.

Tree diameter	Upper limit of mortality
0-3"	75-90 percent
3-5"	50-75 percent
5-9"	20-50 percent
9-16"	Less than 10 percent
Greater than 16"	Less than 5 percent

- Underburning will not take place in stands proposed for shelterwood removal to protect existing pine regeneration.
- Prescribed burns will meet air quality standards.
- Revegetation will occur in prescribed burn areas that have less than 60 percent ground coverage or more than 30 percent slope. *Reference Standard 4106*

2.5.13 Air Quality

- Prescribed burn projects will follow South Dakota Open Burning statute guidelines.
- Burn plans will contain a smoke management prescription that predicts emissions and daytime and nighttime smoke paths from the burn site, determines lift heights and acceptable smoke dispersal directions, and identifies a smoke contingency plan.
- Fire managers will use avoidance, dilution, and emission-reduction strategies:
    - Avoidance – do not burn when smoke would not disperse well or would carry into a smoke sensitive area.
    - Dilution – reduce smoke concentration by staggering ignitions and/or burning when there is good smoke lift and dispersion.
    - Emission-reduction – as stated in the Best Available Control Measures (BACMs).
- Fire managers will minimize smoke emissions by following BACMs:
    - Reduce acres burned
    - Reduce pre-burn fuel loading
    - Reduce fuel consumption
    - Lower the applicable emission factor (PM_{10})

- Timber sale design and administration personnel will coordinate to ensure that fewer than 60 large (landing) piles will need to be burned in each watershed.
- Fire managers will coordinate prescribed burning with other ranger districts and agencies to prevent undesirable smoke loads in any particular area.
- Fire managers will identify and notify receptors such as subdivisions, roads, towns and other air quality sensitive areas or individual during the prescribed burning planning process.
- Prescribed burn plans will identify burning prescriptions to ensure that the air quality standards are maintained in receptor areas.
- Prior to implementation of an approved prescribed burn project, fire managers will assess weather conditions (predicted and current), including smoke dispersal predictions, to ensure smoke management criteria can be met.
- Fire managers will monitor air quality on site and at receptor areas during burn implementation to ensure that air quality remains within identified parameters.
- Fire managers will use safety signing, lights, or other devices along traffic routes that may be impacted by smoke.

2.5.14 Recreation and Trails

- Timber sale maps will show snowmobile trails as improvements. Project administrators will ensure protection of trails during project implementation.
- Timber sale design personnel will evaluate the potential for conflicts between logging and snowmobile trail use at the time of timber sale appraisal and contract preparation. If conflicts appear likely between trail use and specific logging units or haul routes, logging may be restricted between December 1 and March 31. Restrictions will apply only to those units and/or roads in conflict so that logging operations may proceed in the remainder of the sale area.
- Project managers will use appropriate signing or other cautionary measures during management activities for public safety. Implementation of these measures is the responsibility of the person initiating the action (e.g., logging contractor, prescribed fire manager).

2.5.15 Visual Resources

- Timber sale design and layout personnel will shape harvest units to mimic natural patterns found in the landscape, where possible (edges should be uneven/feathered). Design will avoid straight lines and geometric shapes except where necessary.
- Where possible, timber sale administrators will not locate log landings where highly visible from main haul roads.
- Timber sale design and layout personnel will use natural topography to minimize the visual effects of timber harvest activities when possible.

- Timber sale design and layout personnel will randomly space residual trees in shelterwood seedcut units to benefit wildlife, break up the monotony of even spacing, and blend concentrations into adjacent stands. Emphasis will be on aspen, birch, and large yellowbark pine.
- Where it would not conflict with other objectives, timber sale design and layout personnel will vary density and diameters of residual trees in commercial thin units to maintain visual diversity.
- Contractors will lop and scatter logging slash over the harvested area to a depth of no more than 18".
- Timber sale administrators will identify buffer trees along skid trails to decrease potential damage to remaining trees. Contractors will remove damaged buffer trees when skidding is complete. Contractors will return skid trails to near natural condition as soon as possible.

Project managers will construct firelines and slash piles by hand along NFSRs 105.1, 106.1 (southern portion), 107.1, 108.1, and 175.1 to minimize impacts along Sensitivity Level 2 Corridors with a Moderate Scenic Integrity Objective (SIO) rating.

- The following mitigation measures apply to areas in the immediate foreground (300 feet or sight distance, whichever is less) of US Highway 85 to meet Moderate or High SIOs as mapped in the project file. Stands affected include: 0705040038, 0705040039, 0705040084, 0705040095, 0705050041, 0705050043, 0705050044, 0705050045, 0713010001, 0713010002, 0713010043, and 0713010101.
    - Tree marking will be visually sensitive. Markers will paint cut trees on the side away from roads and trails to reduce marking paint visibility to the casual observer.
    - Stumps will be no more than 8 inches high. Contractors will bury, scatter, or remove stumps that are pulled up as a part of roadwork unless needed for other purposes.
    - Project activities will leave light slash on the ground to provide soil nutrients.
    - Activities will result in a park-like setting characterized by larger ponderosa pines, random tree spacing, understory grasses, and shrubs.
- The following mitigation measures apply to areas within 300 feet or sight distance, whichever is less, of areas adjacent to residential developments on private land to reduce negative visual effects of logging slash and other harvest-related disturbances.
    - Project managers will minimize slash piles, skid trails, and landing areas where possible.
    - Contractors will reshape, rehabilitate, and/or revegetate skid trails as needed to approximate natural conditions.
- A landscape architect will be involved in design of cutting units on relatively steep terrain to reduce visual impact.

- A landscape architect will be involved in designing fuel breaks adjacent to US Highway 85 and private land with houses to reduce visual impact.

2.5.16 Heritage Resources

- All activities will avoid heritage sites eligible or potentially eligible to the National Register of Historic Places or effects will be mitigated.
- Timber sale managers will review heritage maps and implement mitigation measures for sites listed in the Riflepit project file. Heritage site locations are listed in the project file rather than this EA to protect site integrity.
- If heritage resources or caves are discovered during project activities, the contractor and/or timber sale administrator will stop ground-disturbing activities and notify the District archeologist.

2.6 Comparison of Environmental Effects of Alternatives by Major Issues.

Table 12. Comparison of Effects of Alternatives by Key Issue

Issue: Proposed timber harvest and vegetation management may have adverse effects on wildlife habitat.				
Concern	**Alternative A No Action**	**Alternative B**	**Alternative D**	**Alternative F**
Logging could adversely affect goshawk species habitat.	No management alteration of habitat by the proposed action.	180 acres of potential nest habitat and 448 acres of PFA would be set aside. Harvest and under-burning would enhance forag-ing habitat.	Same as alternative B.	Same as alternative B.
Logging could adversely affect other sensitive species.	No manage-ment alteration of habitat for other 14 species.	Individuals may be impacted, but no negative impacts to populations are expected.	Same as alternative B.	Same As alternative B.

Issue: Proposed timber harvest and vegetation management may have adverse effects on wildlife habitat.				
Concern	**Alternative A No Action**	**Alternative B**	**Alternative D**	**Alternative F**
Logging roads may adversely impact wildlife.	No change of road status. 53.7 total miles of FS system and non-system roads. Road density 4.1 mi./mi.^{2}. Habitat effectiveness would remain as is.	Habitat effectiveness would improve due to reduction in total road mileage to 36.5 (open and closed) miles or 2.8 mi./mi.^{2}. Road density reductions would increase security habitat and reduce disturbance of wildlife.	Same as alternative B, except total road mileage reduced to 36.4 miles.	Habitat effectiveness would increase more than under alt. B or D because road mileage would be reduced to 34.9 miles (2.7 mi./mi.^{2}.
Proposed harvesting may adversely affect snag habitat.	No immediate change in the number of snags. Future snag recruitment expected to increase due to mortality caused by bark beetles and high stand density.	Existing snags would decrease slightly during harvest due to hazard tree removal. Lower rate of snag recruitment in harvested stands due to improved stand health reducing mortality. Density of existing snags and large green trees for future snags would meet Revised Forest Plan direction. Snags likely to increase in unharvested areas.	Similar to alternative B, but more acres harvest, reducing snag recruitment across a larger area.	Similar to alternative B, but fewer acres of harvest, allowing snag recruitment to continue at current or elevated rate across a larger area.

Issue: Undesirably high rates of tree mortality could occur in untreated pine stands that currently include hazardous fuels or are at moderate or high risk of bark beetle infestation.				
Concern	**Alternative A No Action**	**Alternative B**	**Alternative D**	**Alternative F**
Bark beetle risk would remain high in much of the project area.	Bark beetle risk would continue to increase as stand densities naturally in-crease. Cur-rently 2,701 acres are at high risk and 2,262 acres are at moderate risk.	Activities would decrease high hazard acres to 1,642 and increase moderate hazard acres to 2,507.	Activities would decrease high hazard acres to 1,407 and increase moderate hazard acres to 2,670.	Activities would decrease high hazard acres to 1,507 and increase moderate hazard acres to 3,113.
Buildup of natural fuels could contribute to catastrophic damage from future wildfires.	Build up of natural fuels would continue.	Treatments would reduce fuels on 3,356 acres. Treat-ments include underburn, pile and burn, lop and scatter, and fuel breaks, or a combination of these techniques.	Treatments would reduce fuels on 3,674 acres using techniques listed for alternative B.	Treatments would reduce fuels on 3,498 acres using techniques listed for alternative B.

Issue: Constructing new roads would add to an already high road density, while closing or decommissioning roads may limit access.				
Concern	**Alternative A No Action**	**Alternative B**	**Alternative D**	**Alternative F**
Road closure would limit access for recreation and other public uses.	Road status would remain as is, with road density of 4.1 mi./mi.^{2}.	Road density would decrease to 2.8 mi./mi.^{2}. Adequate access for public and management uses would remain.	Same as alternative B.	Similar to alternative B; road density would be 2.7 mi./mi.^{2}.
New road construction would add to disruption of wildlife habitat.	No new roads proposed.	Would construct and close after use (not obliterate) 1.6 miles of classified roads	Same as alternative B.	No new road construction.
Current road density is high.	No change in road density. Current road density = 4.1 mi./mi.^{2}.	Road density would decrease to 2.8 mi./mi.^{2} by road closures and decommis-sioning. Road density ade-quate for public access.	Same as alternative B.	Similar to alternative B; road density would decrease to 2.7 mi./mi.^{2}.
Road construction and reconstruction could cause resource damage.	No road construction or reconstruction.	1.6 miles of road construc-tion and 14.2 miles of recon-struction. BMPs would minimize effects of construction /reconstruction.	Same as alternative B	No new road construction. 6.2 miles of reconstruction; BMPs would minimize effects of reconstruction.

Issue: The extent and location of proposed prescribed burning could result in undesirable mortality and threaten private property.				
Concern	**Alternative A No Action**	**Alternative B**	**Alternative D**	**Alternative F**
Prescribed burns could cause damage on private property.	No burning proposed.	Would require whole-tree yarding and piling and burning near private property to minimize threat of prescribed burn escape. Under–burning near some private property, but fuel loading would be light due to whole-tree yarding, minimizing the chance that the burn could escape control.	Same as alternative B.	Same as alternative B.
Prescribed burning could cause excessive stand damage from crowning, torching, and escaped fire, especially in unharvested stands.	No burning proposed.	Each burn would be planned and carried out according forest plan standards and District fire plan. Proposed burning consists of 1,176 acres, including 191 acres following WTY, 445 acres following L&S, and 540 acres without prior harvest treatment.	Similar to as alternative B, except 1,307 acres of underburning including 191 acres following WTY, 566 acres following L&S, and 550 acres without prior harvest treatment.	Similar to alternative B, except 2,330 acres of underburning including 197 acres following WTY, 1,368 acres following L&S, and 765 acres without prior harvest treatment.

2.7 Monitoring Common to All Action Alternatives

District staff will monitor implementation of the selected alternative. At least one staff meeting and/or field review will occur prior to the bid offering for any commercial timber sale to ensure that the objectives in this EA are carried through the layout phase of the timber sale. District staff will again monitor the project area following project implementation to ensure that objectives were met and mitigation measures followed and effective. The final monitoring review will take place two years after the timber sale closes. The ID team will document all field reviews and complete a final monitoring report. The timber sale administrator or other contract administrators will conduct monitoring of some phases of project implementation, and other resource specialists will be involved in monitoring of specific mitigation measures relating to their particular resource area. The monitoring plan (Appendix B) includes details on what will be monitored, monitoring methods, timing and frequency, purpose, and responsible party.

2.8 Consistency with Revised Forest Plan and Phase 1 Amendment

The Revised Forest Plan and Phase 1 Amendment contain direction in forest-wide and management area goals, objectives, standards, and guidelines. Standards are limitations on management activities. Deviation from a standard requires a forest plan amendment. Guidelines are preferred courses of action, and deviation is permissible if the responsible official documents the reasons for the deviation. The Phase 1 Amendment prescribes treating certain guidelines as standards (USDA FS 2001 b). Goals are broad, general statements of desired end results of management, and objectives describe measurable desired results to work towards achieving goals.

This project is within the scope of the Revised Forest Plan analysis, and contains no unusual or extraordinary features or circumstances. Alternatives considered in detail meet Revised Forest Plan and Phase 1 Amendment direction.

3 ENVIRONMENTAL CONSEQUENCES

This section describes the scientific and analytical basis for the comparison of potential environmental effects of the alternatives. In determining potential environmental consequences of each alternative, the interdisciplinary team considered the following:

- The probable consequences of each alternative or environmental resources
- Achievement of project objectives
- Adherence to Revised Forest Plan standards, guidelines, and objectives
- Compliance with federal and state laws and regulations

Chapter 3 (Affected Environment and Consequences) of the Revised Forest Plan Final Environmental Impact Statement (FEIS) discusses the short and long term effects, irreversible and irretrievable commitment of resources, and adverse environmental effects that cannot be avoided when implementing management practices in the Black Hills forest environment. The projects and effects described in this EA are the same as those anticipated by the Revised Forest Plan FEIS. Because the effects are discussed in the FEIS, they are not repeated in this document. This EA is tiered to Chapter 3 of the FEIS to avoid repetition and allow this description to focus on the site-specific effects that would result from implementation of the proposed alternatives.

The Revised Forest Plan Biological Assessment/Biological Evaluation (BA/BE) identifies objectives, standards and guidelines for all federally listed and Region 2 Sensitive Species found in the Black Hills. This project will follow the objectives, standards, and guidelines applicable to species and habitats found within the Riflepit analysis area. Mitigation measures are found in the Riflepit wildlife specialist report, the 1996 Revised Forest Plan, and 2001 Phase 1 Amendment Decision Notice. This document incorporates mitigation measures by reference, forming the basis for the determinations.

Any determinations of "May Affect" will result in consultation with the USFWS, and decision documents will be signed only when concurrence is received. There are no additional changes to the Revised Forest Plan operating criteria and no additional information has become available that would change Revised Forest Plan analysis of threatened, endangered, or sensitive species.

This section describes the biological, physical, and social environmental consequences of implementing each alternative.

3.1 Past, Present and Reasonably Foreseeable Future Activities

Landscape use patterns throughout this area include developed/transitional, natural appearing, historic mining, and rural uses. This area includes evidence of timber harvest,

recreational uses, and grazing. Although these activities are occurring and have occurred in the past, they are subtle and not visually dominant. The interdisciplinary team considered past, present and scheduled land use activities on federal and non-federal lands within and surrounding the project area The following activities are confined to the project area unless otherwise stated.

- **Past logging:** District databases identify seven timber sales within or partially within the Riflepit project area since 1984. They are:
  - Crowley 1993-1999
  - Hardy 1984-1991
  - Moonshine 1993-2002
  - Timex 1989
  - Geranium Park 1986-1988
  - Lone 1990-1999
  - Rifle 1987-1998

The following table lists the acres of vegetation treatments on National Forest lands occurring since 1984.

Table 13. Forest Vegetation Treatments 1984-1999 (RMRIS data)

Treatment Code	Treatment Description	Acres Treated
4511-4521	Precommercial thinning	2,438
4121	Shelterwood preparation	527
4131	Shelterwood seedcut	5,488
4141-4143	Shelterwood removal and overstory removal	412
4151	Individual tree selection	120
4210-4220	Thin	7,245
4240	Special cut (aspen, aspen/birch maintenance and enhancement	1,025
6104	Habitat improvement – tree encroachment control	290
6108	Regenerate aspen – clearcut or coppice	224
6109	Tree encroachment control	183

- **On-going recreation:** The most popular recreation activities in the project area are fall hunting and winter snowmobiling. Some dispersed camping occurs. The project area has a high density of roads per square mile, providing access to most parts of the project area. These roads are associated with past timber sales, transmission lines, and access to private lands and mining claims.
- **On-going cattle grazing:** The Riflepit project area lies within the Willow Springs/Stearns Park and Grand Canyon grazing allotments (administered by the

Bearlodge Ranger District) and the Little Spearfish grazing allotment (administered by the Northern Hills Ranger District).

- **Private land development**: Two private land parcels are being considered for a land exchange. They are located in T3N, R1E, Section 8; T3N, R1E, Section 6 and T4N, R1E, Section 31. Both parcels would convert to National Forest lands if the land exchanges are completed.

  The Riflepit area is beginning to experience the effects of urban sprawl. Currently there are five residences and one business within the project area. A private land parcel in T3N, R1E, Section 17 was recently subdivided for future sale. It is likely that by the time the Riflepit project is implemented, more residences will have been built.

- **Proposed projects:** The *Power Vegetation Management Project* is scheduled to occur adjacent to the southeast border of the Riflepit project area in 2004. The *Geranium Vegetation Management Project* is scheduled to occur in 2005 to the east and the *Moskee Vegetation Management Project* is scheduled to occur in 2006 to the west of Riflepit project area. The proposed *Cement Vegetation Management Project* would take place adjacent to the northwest in 2004.

- **National Guard training:** Training exercises are occasionally conducted in the project area.

3.2 Biological Consequences

3.2.1 Vegetation Management

Affected Environment:

Forest Stand Diversity: Table 14 (below) displays existing forest vegetation cover types and those from the 1995 Forest Rocky Mountain Resource Information System (RMRIS) database. These data characterize existing forest diversity. Project area cover types have been updated from the 2001 RMRIS data through field reconnaissance and survey to reflect current stand conditions.

Table 14. Forest Vegetation Cover Types (acres)

Cover Type	1995 RIS Database (1997 Forest Plan)	Existing – Project Database
Ponderosa pine	6,698	6,459
Aspen	680	717

Cover Type	1995 RIS Database (1997 Forest Plan)	Existing – Project Database
Paper birch	295	393
Grass	606	772
Non-forest	144	0

Snags: Existing snag information was calculated from RMRIS tree data. That information is summarized in Table 24, found in Section 3.2.2 (Wildlife Habitat).

Forest Insects: The 2002 aerial pest survey of the Black Hills indicates recent mortality of approximately 600 trees across the central and southern portions of the project area. While mortality on a per-acre basis is relatively low, mountain pine beetle populations in the area are increasing.

Harvest Volume: Approximately 50 MMBF of timber exists in the project area. Nearly all merchantable timber is ponderosa pine.

Stand Structure and Stocking: Average Maximum Density (AMD) is a percentage measure of stand stocking density. The higher the AMD percentage, the denser the stand. Stands stocked at 0-39 percent AMD are considered understocked, stands stocked at 40-59 percent AMD fully occupy the site, and stands above 59 percent AMD are considered overstocked. Understocked stands do not fully occupy the site. In overstocked stands, trees compete with one another, resulting in tree mortality. Present AMD stocking levels are:

- 2,513 acres of 0-39 percent AMD;
- 3,023 acres of 40-59 percent AMD; and
- 922 acres of at least 60 percent AMD.

Direct and Indirect Effects: Alternatives A, B, D, and F

This discussion addresses **issue 1** (effects of timber harvest and vegetative management on wildlife habitat) and **issue 2** (effects of not treating stands with hazardous fuels and high or moderate bark beetle risk) (see section 1.5.2).

Forest Stand Diversity: Under alternative A, natural succession and events such as wildfire, weather, and insects would determine stand diversity. Without disturbance, age-class distribution of ponderosa pine stands would continue to move away from younger stages towards maturity. Hardwood stands and inclusions would continue to decrease as natural succession favored ponderosa pine. Pine trees would continue to encroach on grasslands, reducing diversity.

Table 15. Post Treatment Acres by Forest Cover Type (acres)

Cover Type	Alternative A	Alternative B	Alternative D	Alternative F
Grass	772	772	772	772
Aspen	717	783	783	752
Paper birch	393	393	393	393
Ponderosa pine	6,459	6,393	6,393	6,424

Alternative B would improve tree age-class diversity of ponderosa pine stands by initiating the regeneration of 130 acres through shelterwood seedcut and releasing 319 acres of pine regeneration through shelterwood removal. Alternative D would initiate the regeneration of 202 acres of ponderosa pine and release 319 acres of pine regeneration. Alternative F would initiate regeneration of 33 acres and release 15 acres of pine regeneration. Aspen and birch would increase in treated, mixed pine/hardwood stands.

Pine encroachment control and coppice regeneration of hardwoods would maintain or increase stand diversity. In addition to pine encroachment control, proposed treatments would completely remove pine from some mixed stands. Alternatives B and D would restore or maintain 247 acres of hardwoods through pine removal followed by treatment for coppice hardwood regeneration. Sixty-two of the 247 acres of treatment would apply towards Revised Forest Plan hardwood restoration objective 201. Alternative F would restore or maintain 221 acres of hardwoods through pine removal followed by treatment for coppice regeneration. Thirty-five of the 221 acres of proposed treatment would apply towards objective 201.

Ponderosa pines have seeded into meadows in the project area. Cutting the encroaching young pine, or cutting the pine and then burning the meadow, would maintain the meadow. Alternatives B and D would cut invading pine trees out of 15 acres of meadow. Alternative F would cut or cut-and-burn 412 acres of grasslands or mixed forest-grasslands. Under alternatives B and D, 208 acres of meadow would be treated through burning. Alternative F would treat 195 acres of meadow by burning alone. Overall, alternative F would most effectively reduce pine encroachment on grasslands.

Snags: Thinning stands to reduce bark beetle risk and sanitation harvest to remove trees harboring bark beetles would remove potential snags and reduce the rate of snag recruitment, eventually reducing density of snags available for snag-dependent species. Potential snags harvested are also lost for future down woody material useful to small mammals and other prey species.

Alternative A would have no effect on existing snags and would leave all existing live trees as potential future snags. Mountain pine beetles, other insects, disease-caused mortality, weather events, and tree-to-tree competition would continue to create snags.

Alternatives B, D, and F would slightly decrease existing snag populations as hazardous snags may be cut during harvest operations. Most snags would remain standing. Mountain pine beetles, other insects, disease-caused mortality, weather events, and tree-to-tree competition would create snags. Because of thinning and decreased tree-to-tree competition, future mortality in the lower diameter classes in treated stands should be less

than under alternative A, but growth of the remaining trees should provide green trees of larger diameter for future snag recruitment.

The Revised Forest Plan requires retention of sufficient large green trees to provide future large-diameter snags (standard 2302, guideline 2306). Alternatives B, D and F are designed to move hard snag densities toward Revised Forest Plan standards. At least three live pine trees per acre over 20" in diameter (averaged across the watershed) should exist on north and east aspects, and 1.75 per acre on other slopes. This density of large, live trees would allow for large snag recruitment while maintaining minimum densities for large green trees (USDA 2001). Other diameter classes are represented across the watershed to provide other sizes of snags and to provide trees that will grow to over 20" in the future.

Forest Insects: The probability of tree mortality due to pine engraver beetle (genus *Ips*) would increase during timber harvest and post-sale operations proposed under alternatives B, D, and F. The probability of pine engraver beetle-caused mortality would remain unchanged under alternative A.

Pine engraver beetle's primary host is fresh slash or wind-thrown trees (Sheppard and Battaglia 2002). Depending on weather conditions and the continuity of harvest and post-treatment operations, a large population of beetles can build up in slash and successfully attack stressed trees. Proper slash treatment and timing of post-sale treatments can minimize losses. Slash treatments that minimize the build-up of beetle populations include whole-tree yarding and limbing and lopping slash to a depth of less than 18". Alternative D would leave more slash than the other alternatives and provide the best habitat for the pine engraver beetle. As a result, alternative D would most likely have the highest potential increase in pine engraver beetle-caused mortality, followed by alternatives B then F.

Treatments proposed under alternatives B, D, and F would decrease the risk of mountain pine beetle-caused losses in ponderosa pine stands. Risk of mountain pine beetle-caused losses would continue to increase under alternative A as stand stocking increased.

Stands are considered most susceptible to mountain pine beetle-caused losses when 75 percent of the stand is in the 7-13 inch diameter range and stand density is over 120 square feet of basal area per acre (Stevens et al. 1980, Schmid and Mata 1992). Stand risk ratings are based on stand structure, average stand diameter, and stand density. High-risk stands are single storied and have large average diameter and high density. Stand hazard ratings provide an indication of those stands most susceptible to initial beetle infestations. Once an outbreak has started, any stand containing suitable host material is likely to incur damage. The reduction of risk in stands is temporary, because risk increases with stand growth. Thinned stands generally reach the high-risk category within 13-50 years after thinning (Obedzinski et al. 1999) depending on the residual stocking and site quality. Table 16 displays the post-treatment risk rating of ponderosa pine stands.

Table 16. Post-Treatment Mountain Pine Beetle Risk

Risk Rating	Post-treatment Risk – Acres (percent of Ponderosa Pine Cover Type)			
	Alt. A	Alt B.	Alt. D	Alt. F
Low	1,496 (23 %)	2,244 (35 %)	2,316 (36 %)	1,803 (28 %)
Moderate	2,262 (35 %)	2,507 (39 %)	2,670 (42 %)	3,113 (48 %)
High	2,701 (42 %)	1,642 (26 %)	1,407 (22 %)	1,508 (23 %)

Alternative D would most effectively reduce risk of mountain pine beetle-caused losses in ponderosa pine stands across the project area, followed by alternatives B and F.

Sanitation of beetle-infested trees would occur as necessary in stands planned for commercial timber harvest. Beetle-infested trees would be cut, removed, and debarked at a sawmill, killing the beetle population within the tree. This treatment can reduce mountain pine beetle populations in localized areas and individual stands, and provide some protection to surrounding trees and stands by removing a large source of attacking beetles (Allen and Long 2001). Sanitation would increase the likelihood of post-treatment stand stocking remaining at desired levels. Alternative D would treat the largest area with sanitation and would be the most effective at reducing beetle populations in the project area, followed by alternatives B and F. Alternative A would do nothing to reduce beetle populations in the project area.

Harvest Volume: Harvest volume for the alternatives is displayed in the following table. The volumes are estimates based on stand exam data. Alternative D would harvest the most sawtimber and POL, followed by alternatives B and F.

Table 17. Harvest Volume by Alternative

Product	Alt. A	Alt. B	Alt. D	Alt. F
Net Sawtimber – CCF*	0	15,320	16,506	11,244
Net POL – CCF	0	2,806	3,124	2,690
Total Net Volume – CCF	0	18,126	19,630	13,934
MMBF		9.1	9.8	6.9

*CCF = 100 cubic feet

Stand Structure and Stocking: Stand structure would continue to develop and increase in stocking under alternative A. Mortality would occur in overstocked stands from tree-to-tree competition, insect- and disease-caused mortality, and weather events such as windy, wet spring snowstorms. Hardwood stands and inclusions would continue to decline as ponderosa pine trees seed into hardwood stands. The treatments proposed under alternatives B, D, and F would change stand structures, dependent on the treatment. All proposed treatments would reduce the stocking of ponderosa pine, increase hardwoods, and increase the diversity of ponderosa pine and hardwood age-classes.

All commercial treatments would reduce the stocking of ponderosa pine stands as reflected in Table 18.

Table 18. Post Treatment Ponderosa Pine Stocking (acres)

Stocking	Alt. A	Alt. B	Alt. D	Alt. F
0-39 % AMD	2,513	3,748	3,936	3,755
40-59 % AMD	3,023	2,248	2,076	2,196
60+ % AMD	922	397	381	473

Silvicultural Requirements:

CMAI: All even-aged stands proposed for shelterwood seedcut have generally reached culmination of mean annual increment (CMAI).

Stands proposed for shelterwood removal, shelterwood preparation, thinning, sanitation, pine encroachment control, and coppice regeneration harvests were not evaluated for culmination of growth. These treatments are not subject to the CMAI finding because the treatments are exceptions permitted as sound silvicultural practices or meeting multiple use objectives (36 CFR 219.16(2)(iii)) (also see CMAI in Section 2.1).

Timber Suitability and Sale Contribution to Allowable Sale Quantity (ASQ): No timber harvest would occur on lands classified as unsuitable for timber harvest (36 CFR 219.14 (a)). All lands proposed for timber harvest are suitable or tentatively suitable. The following table displays each alternative's harvest volume contribution to the forest ASQ and non-ASQ volume from lands classified as tentatively suitable.

Table 19. ASQ and non-ASQ Volume by Alternative

	Product	Net CCF Volume		
		Alt. B	Alt. D	Alt. F
ASQ	Sawtimber	13,926	14,465	9,701
	POL	2,057	2,367	1,950
Non-ASQ	Sawtimber	2,024	2,041	1,543
	POL	749	757	740

Cumulative Effects on Forest Vegetation:

The cumulative effects being analyzed include the past actions and reasonably foreseeable actions in the four 7th order watersheds described in Section 3.1.

Historically, wildfire was a keystone ecological process, shaping the composition and structure of plant communities in the Black Hills. Over the past 100 years fire has been suppressed. In the past, periodic surface fire consumed small seedlings, pruned lower branches, and consumed concentrations of woody fuels on the forest floor. If or when large crown fires did occur, they probably did not completely consume all trees within a landscape, but left sources of seed for the eventual reforestation of the burned area. The result was a mosaic of conditions ranging from openings to groups of young seedlings to clumps and groups of older trees, including large, orange-barked patriarchs (Sheppard and Battaglia 2002).

Forest vegetation has been altered since settlement in the 1870s through timber harvest, fire suppression, wildfire, mining, and grazing by livestock. The age-classes of ponderosa pine stands in the project area show that approximately 76 % of the stands originated between 1880 and 1919. Stands within the cumulative effects area are of similar age-class, likely as the result of a combination of wildfire, mountain pine beetle, and logging. In general, more of the area is forested with ponderosa pine and less with aspen and birch, there are fewer grasslands, and the ponderosa pine are smaller than prior to 1870. Browsing of hardwood sprouts by cattle and big game has likely decreased the presence of hardwoods, although information on the long-term effects of cattle grazing on regenerating aspen is lacking (Rumble, et al. 1996).

Firewood cutting in this area is limited due to the distance cutters would need to travel when an ample supply of firewood exists nearer to home. Therefore, firewood cutting has had minimal effect on forest vegetation and snags within the cumulative effects analysis area and no changes in demand for firewood are foreseen within the next 5-10 years.

Mining for gravel removed forest vegetation from several sites totaling approximately 5-7 acres. The gravel pits have been abandoned and trees are gradually taking over the sites. There should be no long-term effects on forest vegetation due to mining.

The construction and maintenance of roads, recreation trails, and utility lines across the area has decreased the forested area. As long as roads and trails are maintained for vehicle use and utility corridors are maintained, these sites will not produce large trees or harvest volume. Maintenance crews routinely cut down trees growing in utility and along road corridors. The forest area in these corridors is very small; utility lines and roads quickly seed in and become forested when abandoned, so there should be no long-term effects on forest vegetation due to road, trail, and utility corridors.

Development of private lands adjacent to National Forest stands has no direct effects on forest vegetation, but these lands would likely be managed to minimize wildfire risk. Stands with low wildfire risk would be more characteristic of stands prior to settlement, when periodic low-intensity surface fire consumed wildland fuels. There should be no effects on forest vegetation that are outside of historic conditions.

Alternative A:

In the absence of treatment or wildfire, stands throughout the area would follow the successional trend toward increased composition of ponderosa pine. The area in hardwood cover type and hardwood inclusions would decrease as succession to ponderosa pine occurs. Browsing would contribute to the decline of hardwoods in the area. Openings in the pine forest caused by weather events, wildfires, and insect-caused mortality would maintain some hardwoods.

Mortality due to mountain pine beetle is difficult to predict, although it is generally true that as stand density increases, risk of mountain pine beetle-caused losses also increases.

The amount of forest land within road, recreation trail, and utility line corridors would remain unchanged with alternative A.

Alternatives B, D, and F:

The actions proposed under alternatives B, D, and F would cover only a minor percentage of the cumulative effects area, remove only a portion of the trees within the treated areas, and leave stands well stocked. The treatments or lack of treatments (alternative A) would have no effect on the overall long-term productivity of forest stands. Hardwood treatments would maintain hardwoods in the treated areas, but natural succession to conifers would continue across much of the area in the absence of a major disturbance, decreasing stand diversity. Mature hardwood stands regenerating naturally through coppice sprouts would continue to decline due to big game and livestock browsing and competition from pine on most sites.

Suitable habitat for mountain pine beetles would continue to exist under all alternatives. While sanitation efforts decrease local beetle populations and stands with reduced stocking would be at reduced risk of infestation, suitable habitat for mountain pine beetles exists across the cumulative effects area and susceptibility to mountain pine beetle-caused losses would increase with growth and associated stand stocking. Future levels of mountain pine beetle populations and corresponding tree mortality are unknown and difficult to predict.

3.2.2 Wildlife habitat

Summary of Effects on Wildlife and Habitat:

This wildlife effects analysis discussion addresses effects related to **issue 2** (effects of timber harvest and vegetative management on wildlife habitat) and **issue 3 (**effects of transportation system management) as they affect wildlife (see Section 1.5.2).

Habitat diversity would continue to decline under alternative A as non-conifer types are encroached, but overall tree densities would remain higher. The action alternatives would restore habitat diversity in treated hardwood stands and meadows. Mature spruce habitat would not be affected by any alternative.

None of the alternatives would affect threatened or endangered species. The action alternatives could impact individuals of 16 sensitive wildlife species, but would not affect populations. Alternative A would retain the most habitat for species relying on dense forest conditions while providing the least open forest habitat. The action alternatives would increase habitat for species associated with non-conifer communities and more open pine habitat and decrease habitat for species associated with dense forest conditions.

Density of existing snags currently meets Revised Forest Plan direction in all but one watershed. None of the alternatives would change this situation. All alternatives would move density and distribution of large green trees toward compliance with Revised Forest Plan direction. The action alternatives are expected to increase large trees on the landscape in the long term as compared to alternative A.

Affected Environment:

Approximately 77% of the National Forest System land is forested with ponderosa pine, with 14% in hardwoods, 9% in meadows, and 0% in white spruce[1]. Dominance of ponderosa pine is a natural condition in the Black Hills, but pine is probably more dominant now than it was historically. Although other plant communities are in limited supply, they provide vital habitat components for many wildlife species.

Stands of mature pine at moderate density generally dominate existing forest structure. Dense stands of large, mature trees are uncommon. Pure stands of young trees are unusual, but most of the open stands have an understory of pine seedlings and saplings. Conifer stands with hardwood inclusions and mixed pine/hardwood stands are common.

Environmental Consequences on Habitat:

Direct and Indirect Effects on Wildlife Habitat:

The following tables display predicted habitat structure acres after treatment by cover type.

Forest structural stages (SS) are described as follows:

SS 1: Grasses and forbs
SS 2: Seedlings and saplings
SS 3A: Young, open forest
SS 3B: Young, moderately dense forest
SS 3C: Young, dense forest
SS 4A: Mature, open forest
SS 4B: Mature, moderately dense forest
SS 4C: Mature, dense forest
SS 5: Late succession ("old growth")

Table 20. Existing (Alternative A) Structural Stage Distribution by Cover Type

Habitat	SS 1	SS 2	SS 3A	SS 3B	SS 3C	SS 4A	SS 4B	SS 4C	SS 5	Total
Meadow	772	0	0	0	0	0	0	0	0	772
Aspen	37	170	183	61	117	66	83	0	0	717
Birch	9	0	128	64	30	0	162	0	0	393
Pine	46	336	29	126	5	1,862	3,145	910	0	6,459
Spruce	0	0	0	0	0	0	0	0	0	0
Totals	864	506	340	251	152	1,928	3,390	910	0	8,341

[1] No spruce stands are present in the project area, due evidently to a lack of natural site suitability to this species. In other areas of the northern Black Hills, spruce has increased with fire suppression, but this has not occurred in the Riflepit project area or the adjacent vicinity.

Table 21. Alternative B Structural Stage Distribution by Cover Type

Habitat	SS 1	SS 2	SS 3A	SS 3B	SS 3C	SS 4A	SS 4B	SS 4C	SS 5	Total
Meadow	772	0	0	0	0	0	0	0	0	772
Aspen	37	306	139	61	69	92	79	0	0	783
Birch	9	0	128	64	30	0	162	0	0	393
Pine	46	430	71	86	5	3015	2351	389	0	6,393
Spruce	0	0	0	0	0	0	0	0	0	0
Totals	864	736	338	211	104	3107	2592	389	0	8,341

Table 22. Alternative D Structural Stage Distribution by Cover Type

Habitat	SS 1	SS 2	SS 3A	SS 3B	SS 3C	SS 4A	SS 4B	SS 4C	SS 5	Total
Meadow	772	0	0	0	0	0	0	0	0	772
Aspen	37	306	139	61	69	92	79	0	0	783
Birch	9	0	128	64	30	0	162	0	0	393
Pine	46	430	71	86	5	3250	2132	373	0	6,393
Spruce	0	0	0	0	0	0	0	0	0	0
Totals	864	736	338	211	104	3342	2373	373	0	8,341

Table 23. Alternative F Structural Stage Distribution by Cover Type

Habitat	SS 1	SS 2	SS 3A	SS 3B	SS 3C	SS 4A	SS 4B	SS 4C	SS 5	Total
Meadow	772	0	0	0	0	0	0	0	0	772
Aspen	37	309	139	47	69	68	83	0	0	752
Birch	9	0	128	64	30	0	162	0	0	393
Pine	46	434	105	212	0	3162	2000	465	0	6424
Spruce	0	0	0	0	0	0	0	0	0	0
Totals	864	743	372	323	99	3230	2245	465	0	8341

Effects on Meadows and Open Habitat: Structural stage 1 consists of grasses and forbs. Meadows are shown in Table 14 as separate from SS 1 in the above tables because the two designations are not synonymous. Meadows are natural openings and usually exist on soils formed under grass. SS 1 is the first step in forest succession and occurs in relatively small forest openings such as clearcuts or patches of timber killed by mountain pine beetles. Meadows generally produce more forage than the grass/forb stage and often contain different plant composition.

Effects on Hardwood Habitat: Aspen and birch are important hardwood components of Black Hills habitat diversity. Deer and elk browse both species, while ruffed grouse, red-naped sapsuckers, and various songbirds use hardwood habitat for feeding and nesting. Young aspen stands are also very important deer fawning habitat (Kennedy 1992).

Conifers are encroaching many of the hardwood sites. Left untreated, these conifers will eventually overtake the hardwoods. Alternative A would result in an eventual decrease of hardwood acres.

Alternatives B and D would restore 62 acres of aspen or birch cover types by removing the pine and regenerating the hardwoods. Likewise, alternative F would restore 35 acres of aspen or birch. Prescribed burning would be applied to several hardwood stands to stimulate understory sprouting of aspen. Some mortality of overstory trees would occur, creating snags and diversity within stands.

Effects on Open, Mature Conifer Habitat: Open, mature conifer stands (structural stage 4A) currently comprise 29% of the ponderosa pine cover type. While the average diameters are relatively small (9-13 inches), these stands still represent potential suitable habitat for many species, including pygmy nuthatch, Lewis' woodpecker, deer, elk, and several raptors.

All action alternatives would increase acreage of open, mature ponderosa pine. As stands are thinned, tree diameter, height, and crown growth would accelerate, thereby moving these stands toward conditions more suitable for species requiring large-diameter, open-grown ponderosa pine.

Underburning would be applied primarily in this habitat type, and would be of low intensity to consume finer fuels and emulate historic fire behavior in open pine stands. The grass/forb understory component is expected to respond positively to burn treatments.

Effects on Dense Conifer Habitat and Late Succession: The 2002 Black Hills aerial pest survey indicates recent mortality of approximately 600 trees across the central and southern portions of the project area. While mortality on a per acre basis is relatively low, mountain pine beetle populations in the area are increasing.

Dense to moderately dense, mature conifer stands (structural stages 4B and 4C) currently comprise 49% of the project area. Alternative A would retain all dense stands. However, many of these stands would likely be less dense after the current mountain pine beetle activity has run its course. Alternative B would decrease dense stand acreage to 33% of the project area, while alternatives D and F would decrease dense stands to 30% of project area acreage.

Thinning treatments proposed under the action alternatives would accelerate development of large-diameter trees in treated stands. Development of large trees under alternative A would be expected to be considerably slower.

Several mature, dense stands have been identified for application of underburning. Although fire would consume finer fuels in the understory as well as some ladder fuels, little to no change in stand structural stage would be expected.

Effects on White Spruce Habitat: There is no white spruce habitat located in the project area.

Effects on Snag Habitat: Snags are an important habitat component for many species. Primary cavity nesters such as the black-backed woodpecker excavate their own cavities

in dead trees that have rotting heartwood. Secondary cavity nesters such as the white-breasted nuthatch use natural cavities or abandoned woodpecker cavities.

The following table displays the average density of ponderosa pine snags (10" in diameter or greater) by aspect in stands of ponderosa pine cover type throughout the four 7th-order watersheds associated with the project area. Snag densities were calculated from RMRIS tree data. Ponderosa pine snags with a diameter greater than 9.9 inches were calculated for each watershed and aspect. Information regarding snag height is not available, and live trees with snag characteristics (such as dead tops) are not included.

Table 24. Existing Pine Snags, 10" DBH and Larger

Aspect	7th Order Watershed			
	10120203020204	10120203020203	10120203020201	10120203020104
North	5.8 snags/acre	11.9 snags/acre	4.6 snags/acre	2.6 snags/acre
South	6.8 snags/acre	7.5 snags/acre	3.7 snags/acre	2.3 snags/acre

(RMRIS Tree Data)

Watersheds 10120203020204, 10120203020203, and 10120203020201 meet forest-wide standard 2301 for the number of snags 10" and greater, although snag height information specified by the standard is not known. Watershed 10120203020104 meets the standard on south aspects but not on north aspects. Ongoing mountain pine beetle activity within the project area is expected to create numerous additional snags across the landscape in 4B and 4C stands under all alternatives.

Alternative A:

Alternative A would have no effect on existing snags and would leave all existing live trees in place as potential future snag habitat. It would have no immediate effect on dense stands, which are potential habitat for sensitive species such as black-backed woodpecker. Alternative A would result in short-term snag habitat increases as retention and continued development or stagnation of dense stands would increase risk of insect infestation. In the long term, stands could become open depending on the extent and duration of bark beetle mortality. Wildfires could also dramatically open up portions of the project area.

Snags in open-canopy stands are habitat for species such as Lewis' woodpecker and northern flicker. This habitat could diminish over time as open stands regenerate and become denser.

Short-term snag recruitment rates are likely to be greatest under alternative A since beetle-induced mortality of larger diameter trees is more likely in dense stands. Large trees, which may be killed by mountain pine beetle in the near term, may be fewer in the long-term under this alternative.

Alternatives B, D, and F:

Under the action alternatives, snags posing a safety hazard during logging operations would be cut and retained on site, where they would add to the down woody component.

All other existing snags would be left standing (see mitigations, Section 2.5.3). Prescribed burning has the potential to reduce existing snag densities as well as to create new snags. Loss of snags to prescribed fire would be minimized, as would mortality in the overstory.

All action alternatives would thin a portion of the project area's dense stands. Thinning would decrease short-term snag recruitment within treated stands since the residual trees would be less likely to succumb to insects, diseases, or natural competition-related mortality. Conversely, trees in thinned stands are expected to live longer and under better growing conditions, resulting in larger-diameter snags for the future. Thinning under this project is designed to retain the largest trees and remove smaller trees competing for resources. Some of the large trees retained may still be killed by mountain pine beetle.

Using mountain pine beetle risk rating as an indicator of potential snag development from insect attack, the action alternatives would reduce the percentage of high-risk ponderosa pine stands from an existing 42% to a range of 22-26%. Stands at moderate risk would actually increase under the action alternatives, as proposed thinning treatments move existing high risk stands to the moderate category. After treatment, moderate and high risk stands would still comprise from 64% (alternative D) to 71% (alternative F) of pine acreage, making some level of mortality and snag creation reasonably certain.

The Revised Forest Plan requires retention of sufficient large green trees to provide future large-diameter snags (standard 2302, guideline 2306). This direction is interpreted to mean at least three live pine trees per acre over 20" in diameter (averaged across the watershed) should exist on north and east aspects, and 1.75 per acre on other slopes. Other diameter classes must also be represented across the watershed to provide other sizes of snags and to provide 20" snags in the future. Table 25 shows that each alternative would meet Revised Forest Plan requirements for green-tree retention across the project area projected out 20 years in the future.

Table 25. Post-Treatment Green Tree Retention on Pine Sites

7th Order Watershed	Alt. & Year	Aspect	Live Pine per Acre by 2" Diameter Class					
			10-12"	12-14"	14-16"	16-18"	18-20"	>20"
10120203020204	2003	North	12	14	8	8	4	8
		South	18	14	8	6	3	5
	Alt. A: 2023	North	13	12	11	7	7	9
		South	20	17	11	6	6	6
	Alt. B: 2023	North	13	12	11	7	7	9
		South	20	17	11	6	6	6
	Alt. D: 2023	North	13	12	11	7	7	9
		South	20	17	11	6	6	6
	Alt. F: 2023	North	13	12	11	7	7	9
		South	20	16	11	9	6	7
10120203020203	2003	North	14	13	14	7	3	1
		South	18	20	18	8	2	0
	Alt. A: 2023	North	14	12	15	10	6	3

7th Order Watershed	Alt. & Year	Aspect	Live Pine per Acre by 2" Diameter Class					
			10-12"	12-14"	14-16"	16-18"	18-20"	>20"
		South	16	16	18	25	7	3
	Alt. B: 2023	North	12	11	14	9	6	3
		South	14	13	16	13	6	3
	Alt. D: 2023	North	12	11	14	10	6	3
		South	14	13	16	13	6	3
	Alt. F: 2023	North	12	11	14	9	6	3
		South	13	14	17	15	7	3
10120203020201	2003	North	16	12	11	5	4	2
		South	18	21	13	7	2	2
	Alt. A: 2023	North	16	14	10	9	5	5
		South	20	17	17	11	6	4
	Alt. B: 2023	North	15	13	10	9	5	5
		South	16	13	15	11	7	4
	Alt. D: 2023	North	15	13	10	9	5	5
		South	16	13	15	11	7	4
	Alt. F: 2023	North	15	13	10	9	5	5
		South	16	14	15	11	7	4
10120203020104	2003	North	24	17	12	7	3	2
		South	24	17	12	8	5	3
	Alt. A: 2023	North	25	19	16	11	6	4
		South	21	21	16	11	7	7
	Alt. B: 2023	North	24	18	12	8	5	3
		South	21	21	16	11	7	7
	Alt. D: 2023	North	24	18	12	8	5	3
		South	21	21	16	11	7	7
	Alt. F: 2023	North	24	19	15	10	6	4
		South	20	21	15	11	7	7

Harvest treatments in pine stands could affect the number and distribution of large green trees. Treatments that leave very low or no overstory basal area or focus on removal of the largest trees would be most likely to have an effect. This would include shelterwood removal cuts. In order to meet Revised Forest Plan standard 2302, shelterwood removal treatments have been designed to retain a minimum of 5 overstory trees per acre in the largest size classes.

Effects on Down Woody Material: Availability of large down wood varies across the project area. Although large landing piles may be used for firewood, smaller piles and scattered logs remain to provide habitat for small mammals. Alternative A would have the greatest recruitment potential since all available trees could contribute to future recruitment. To ensure that proposed treatment areas are not lacking large, down woody material in the future, cull logs greater than 10" in diameter would be left on site or returned to the site in all stands not requiring whole-tree yarding. This mitigation would meet Revised Forest Plan standard 2308. There is potential for loss of down logs through

prescribed burning. Consumption of larger down logs by prescribed fire would be minimized (see mitigations, Section 2.5.4).

Affected Environment: Threatened, Endangered, Proposed and Sensitive Species

Species listed as threatened, endangered, proposed for listing, or sensitive (TEPS) with potential to occur in Lawrence County, South Dakota are considered in Table 26. Species being considered for listing are also displayed. Bald eagle is the only federally listed (threatened) species occurring in the project area. No habitat exists for the whooping crane in the project area. All sensitive species known to occur or potentially occurring in the Black Hills National Forest and nearby vicinity are considered (USDA 1994). Species marked as "present" or "habitat present" are considered further in the effects analysis.

Table 26. Threatened, Endangered, Proposed, Candidate, and Sensitive Species Considered.

Species	Status*	Species Present	Habitat Present
Bald Eagle	T	X	X
Whooping Crane	E		
Black-tailed Prairie Dog	C, S		
Fringed-tailed Myotis	S		X
Townsend's Big-eared Bat	S		X
American Marten	S		X
Northern Goshawk	S	X	X
Osprey	S		
Merlin	S		
Peregrine Falcon	S		
Upland Sandpiper	S		
Western Yellow-billed Cuckoo	S		
Western Burrowing Owl	S		
Flammulated Owl	S		X
Lewis' Woodpecker	S		X
Black-backed Woodpecker	S		X
Northern Three-toed Woodpecker	S		
Pygmy Nuthatch	S		X
Golden-crowned Kinglet	S		X
Loggerhead Shrike	S		
Fox Sparrow	S		

Species	Status*	Species Present	Habitat Present
Tiger Salamander	S		X
Northern Leopard Frog	S		X
Black Hills Redbelly Snake	S		X
Milk Snake	S		X
Cockerell's Striate Disc	S		X
Cooper's Rocky Mountain Snail	S		X
Regal Fritillary Butterfly	S		
Tawny Crescent Butterfly	S		X

*E=Endangered, T=Threatened, C=Candidate, S=Included in R2 Regional Forester's Sensitive Species List

Environmental Consequences; Direct and Indirect and Cumulative Effects, TEPS Species:

Bald Eagle (*Haliaeetus leucocephalus*)

Habitat summary: Bald eagles are frequent winter migrants within the planning unit, but are not known to nest within the Black Hills National Forest. This species utilizes winter habitat where carrion is available (along highways and in big game winter range) and where there are open lakes and streams. It uses large-diameter trees for hunting perches and roost trees.

Distribution/abundance: Bald eagles are documented as a winter resident only (SDOU 1991) in all counties in the Black Hills (District files).

Threats: Threats are minimal. No critical habitat has been designated in the Black Hills and no winter concentration areas are known. Use of chlorinated hydrocarbons is prohibited on the Black Hills National Forest (Revised Forest Plan standard 3101).

Direct/indirect effects: Bald eagles are not known to nest in the Black Hills either historically or in recent years. Quality nesting habitat is lacking within the project area due to the absence of large, fish-supporting streams. Small streams may support localized foraging, but not breeding populations of eagles. Eagles observed during the winter have been feeding on carrion, including gut piles from harvested deer, road kills, and winterkills. Winter use of the project area is apparently random. Open stands with large trees occur within the analysis area away from water. Some winter roost trees could be removed under any of the action alternatives, but Phase I Amendment standard 2306 will ensure large diameter trees are maintained across the landscape.

Cumulative effects: Carrion supply is expected to remain relatively unchanged. Additional large trees could be removed by private land logging, but overall effects would be negligible. With chlorinated hydrocarbons prohibited on the Forest, chemical contamination risk is low.

Determination: Risk levels are low. There would be no effect on bald eagles under any alternative.

Whooping Crane *(Grus americana)*

Direct/Indirect/Cumulative Effects: No suitable habitat exists within the project area.

Determination: Project activities would have no impact on this species.

Northern Goshawk (*Accipiter gentilis*)

Habitat summary: Nesting habitat is most often dense mature ponderosa pine (SS 4C/5) in the Black Hills, although denser 4B is also used in some cases (Erickson 1987). Fledging habitat consists of pine in structural stages 3B, 3C, 4B, 4C, and 5 (Reynolds et al. 1992). Foraging habitat is more dependent upon prey species and includes a variety of habitat types and structural stages.

Distribution/abundance: Goshawks were considered winter residents in South Dakota in the early 1900s, with only suspected breeding occurring within the state (Over and Thoms 1920, 1946). They are known from all Black Hills counties and are considered a rare to uncommon resident in the Black Hills (SDOU 1991, Peterson 1990).

Threats: Loss of dense habitat for nesting and fledging due to logging or wildfire. Also is susceptible to human disturbance during nesting period. Low reproductive rate makes recovery slow.

Direct/indirect effects: District personnel surveyed suitable **nesting habitat** within the project area in 2001. One historic territory (last active in 1993) is known to occur within the project. The project biologist identified at least 180 acres of potential nest habitat in this territory. Stands were designated using the following priority system: active nests, known alternate nests, historical nest areas, and suitable habitat. No treatment would occur in the historic, alternate, or suitable nest stands under any alternative. No timing restrictions are required, since no treatment is proposed within ¼ mile of the historic nest stand.

One **post-fledging area** (PFA), 448 acres in size, is designated around the historic nest site. Since none of the alternatives propose treatments in the PFA, the current structural stages will continue to move toward later successional structural stages. This territory is estimated to extend throughout existing suitable habitat in the project area.

Alternative A would maintain all existing **foraging habitat**. All action alternatives would essentially maintain this habitat, since some treatments were dropped or amended to meet habitat effectiveness standards for big game. Application of underburning would enhance foraging habitat for goshawks.

Cumulative effects: The District database tracks nest stands and their associated PFAs for future planning efforts. There would be similar future trends for nesting, PFA, and foraging habitat under all alternatives, since treatments would not alter existing habitat.

Logging or development could occur on private land adjacent to PFA. While this could impact habitat in the immediate area, private land was not included in PFA designation or calculations. The greatest potential threat from private land logging or development would be disturbance during nesting season. The Forest Service has no jurisdiction over private land or authority to impose timing restrictions on private land activities.

Determination: Alternative A would have no impact. Alternatives B, D, and F may adversely impact individuals through disturbance or changes in forage habitat, but no negative impacts to populations are expected. This determination is made based on designation of the PFA and protection of the existing nest stand. Actual use of these areas may vary.

Black-backed woodpecker (*Picoides arcticus*)

Habitat summary: Suitable habitat includes bug-killed or fire-killed conifers and structural stages 4C and 5 in undisturbed spruce and pine stands (Mohren 2002, Anderson 2003). The 2002 aerial pest survey of the Black Hills indicates recent mortality of approximately 600 trees across the central and southern portions of the project area. While mortality on a per acre basis is relatively low, mountain pine beetle populations in the area are increasing.

Distribution/abundance: In the Black Hills, this species is considered a rare permanent resident in higher elevations (SDOU 1991). The species' preference for burned forests in a time of fire suppression, its eruptive populations, and lack of population information have identified it as a species of concern (Finch 1992). No known nest sites occur within the project area.

Threats: This species requires dense habitat with large-diameter snags. Salvage logging is detrimental to the species.

Direct/indirect effects: Alternative A would maintain the current 14% of suitable pine habitat acreage. The current estimate of pine acres at high risk to mountain pine beetle attack is 2,701 acres (Table 27). Alternatives B and D would reduce habitat to 6% of pine acres, while alternative F would reduce suitable habitat to 7% of pine stands. Estimated residual amounts of pine acres at high risk to beetle mortality total ranges from 1,407 to 1,642 acres for the action alternatives (Table 27). Acres at moderate risk to mountain pine beetle attack would increase under the action alternatives as some treated stands shift from high risk into this category.

Table 27. Post-Treatment Mountain Pine Beetle Risk

Risk Rating	Post-treatment Risk – Acres (% of Ponderosa Pine Cover Type)			
	Alt. A	Alt B.	Alt. D	Alt. F
Low	1,496 (23%)	2,244 (35%)	2,316 (36%)	1,803 (28%)
Moderate	2,262 (35%)	2,507 (39%)	2,670 (42%)	3,113 (48%)
High	2,701 (42%)	1,642 (26%)	1,407 (22%)	1,508 (23%)

Application of underburning in dense stands would not be expected to negatively impact this species, since structural stages would not change.

Cumulative effects: A total of 50,683 acres of ponderosa pine cover type exists in the four 7th level watersheds associated with the Riflepit project area. Existing SS 4C ponderosa pine stands total approximately 16% of pine acres within that area. Treatments proposed under alternative B, D, and F would reduce suitable habitat at the landscape level to 15% of pine acres.

With an emphasis in the Black Hills toward thinning stands to reduce insect, disease, and wildfire risk, the trend of habitat availability for this species is likely to be downward. Recent wildfires across the Forest have, however, created a substantial amount of suitable habitat. Recently modified Revised Forest Plan standards that require habitat retention for big game, marten, and goshawk, as well as minimum retention levels of snags and green tree replacements, are expected to favor habitat retention for black-backs in the long term.

Determination: Because it would maintain suitable habitat and stands at high risk of disturbance, alternative A would have no impact. Alternatives B, D, and F may adversely impact individuals as potential nest trees and suitable habitat are reduced in number. No negative impacts to populations are expected due to the relatively minor amount of suitable habitat loss across the landscape.

Lewis' Woodpecker *(Melanerpes lewis)*

Habitat summary: Habitat occurs within burns, also in large, open pine (structural stages 4A, 5), and deciduous riparian with snags at least 19" in diameter.

Distribution/abundance: The Black Hills represent the most northeasternmost extent of the range of this species. In the Black Hills, this species is considered a locally uncommon summer resident (locally common in large burns). This species has been documented in all counties in the Black Hills of South Dakota and Wyoming. Panjabi (2003) describes Lewis' woodpecker as "quite rare" in the Black Hills. Historic accounts of this species stated the species was common in the southwestern Black Hills, and was partial to burned timber on the sides of canyons (Haldeman 1980). Haldeman (1980) also describes Lewis' woodpecker as uncommon to locally rare, preferring deciduous trees in riparian situations as well as park-like ponderosa with understory of various shrubs, such as logged or burned forest in the early brush stage. Other accounts described this species as never common in the Black Hills.

Threats: This species is vulnerable to loss of large snags and large diameter trees through timber harvest.

Direct/indirect effects: None of the alternatives would impact optimal habitat for this species, which consists of old burns with numerous large snags. Under alternative A, current structural stage 4A stands are probably marginal habitat due to small tree and snag size as well as a lack of shrubby understory. Ponderosa pine regeneration normally out-competes brush species, especially without regular low-intensity fires. In addition, conifer encroachment into deciduous stands would continue and hardwood stands would decline in the long-term. Alternative A would maintain the current 1,862 acres of structural stage 4A habitat (28% of the ponderosa pine cover type) that is currently marginally suitable. This habitat may become more suitable in the future as tree growth

occurs. Without prescribed fire to set back pine regeneration, however, these stands may never achieve suitability.

Alternatives B, D, and F would increase 4A stands to 42%, 48%, and 49% of ponderosa pine, respectively. All action alternatives would increase potential future habitat for this species by thinning and applying prescribed fire. Alternative F would apply the most prescribed fire, and has the potential to provide the most acres with park-like conditions (thinning down to 60 $ft.^2$ of basal area) and shrub understory. Alternative F would also maintain the overstory component in all conifer stands.

Cumulative effects: Potential suitable habitat within 7^{th}-order watersheds associated with the project area currently totals 24% of ponderosa pine acres. Treatments proposed under this project would increase potential future habitat to approximately 26% of pine acres. The Forest-wide trend toward increased commercial thinning and seed tree retention cuts presents long-term habitat benefits at the landscape level. Due to current lack of large trees on the landscape, treatments that remove large trees, such as overstory removal, are likely to create habitat gaps. Snag standard 2306 would ensure maintenance/creation of large-diameter trees and snags over time and will eventually benefit the species. As suitable large-diameter trees/snags develop over time in the open habitat, downward population trends should be reversed. Recent large fires in the Black Hills (e.g., Grizzly Gulch, Jasper) have also created large areas of potential habitat for this species.

Determination: Alternative A would have no impact, but would fail to develop a shrub understory in 4A stands. Since individual trees used by this species may be impacted, the action alternatives may impact individuals, but not are likely to result in a loss of species viability in the planning area, nor cause a trend to federal listing.

Pygmy Nuthatch (*Sitta pygmaea*)

Habitat summary: Open pine structural stage 4A; needs snags greater than 17" in diameter.

Distribution/abundance: In the Black Hills, this species is an uncommon permanent resident and nest regularly in the southern and lower elevations of the hills (SDOU 1991). Sightings of this species within the Black Hills have been very rare (Panjabi 2003).

Threats: This species is vulnerable to loss of large snags and large diameter trees through timber harvest.

Direct/indirect effects: Under alternative A, natural mortality of trees would increase snag numbers. Due to the small size of existing trees, however, the likelihood of suitable snags as habitat is low. Existing ponderosa pine SS 4A totals 1,862 acres within the project area. No SS 5 exists within the project area. Diameters of existing live trees in structural stage 4 stands are small, averaging 9-13 inches. Snag availability, especially large-diameter snags (greater than16 inches in diameter), is currently low and may limit population distribution. Large tree and large snag development is expected to occur most quickly within existing 4A stands.

Thinning treatments prescribed under the action alternatives are expected to increase future available habitat by accelerating development of larger trees and larger snags.

Treatments within existing 4A stands (shelterwood removal) have the potential to create habitat gaps, and could impact individuals due to nesting disturbance or displacement.

All action alternatives have the potential to remove existing snags that pose a safety problem in treatment units, and therefore could reduce suitable nesting habitat. Snag removal is, however, expected to be rare.

Cumulative effects: Structural stage 4A stands, where mature tree growth is expected to be fastest, currently total 24% of ponderosa pine acres within the 7th-order watersheds associated with the project area. Treatments proposed under this project would increase potential suitable habitat to approximately 26% of pine acres. The Forest-wide trend toward increased commercial thinning and seed tree retention cuts presents long-term habitat benefits at the landscape level, as long as these trees are allowed to persist on the landscape. Due to current lack of large trees on the landscape, treatments that remove large trees, such as overstory removal, are likely to create habitat gaps. Snag standard 2306 will ensure maintenance/creation of large-diameter trees and snags over time and will eventually benefit the species. As suitable large-diameter trees/snags develop over time in the open habitat, downward population trends may be reversed.

Determination: Alternative A would have no impact. All action alternatives have the potential to increase large trees on the landscape, and may provide long-term benefits for this species. Since individual trees used by this species may be harvested, the action alternatives may adversely impact individuals, but not are likely to result in a loss of viability in the planning area nor cause a trend to federal listing.

Flammulated Owl (*Otus flammeolus*)

Habitat summary: Larger diameter, 18-29 inches (McCallum 1994), mature and old growth open-grown ponderosa pine for nesting and foraging; dense pine or mixed conifer stands for roosting.

Distribution/abundance: This species was unknown in the Black Hills until several recent sightings. Surveys for this species have not occurred in the Black Hills. Current distribution and density are unknown.

Threats: Removal of large-diameter snags; removal of large-diameter ponderosa pine.

Direct/indirect effects: Alternative A would maintain existing conditions, which consist of 1,862 acres of relatively small-diameter (9-13 inches) trees in open pine stands that are likely marginal due to the small tree size. An abundance of roosting habitat (4,055 acres in habitat structural stages 4B and 4C) would be maintained across the landscape.

The action alternatives would create and maintain more acres in pine structural stage 4A, ranging from a total of 3,015 acres under alternative B to 3,250 acres under alternative D. While existing diameters may be small and therefore marginally suitable, lower basal area will allow these growth in these stands to accelerate, producing a large-diameter condition in the future. All action alternatives would provide more acres of future suitable nesting habitat than alternative A. The action alternatives would maintain between 2,465 and 2,740 acres of potential roosting habitat. Underburning in 4A stands

may impact individuals due to smoke, but the effect will be minor due to the short duration of smoke presence in the stand.

All action alternatives have the potential to remove existing snags that pose a safety problem in treatment units, and therefore could reduce suitable nesting habitat. Because snag removal is expected to occur rarely and existing habitat in treatment units is marginally suitable for nesting, this action may impact individual owls but is not expected to negatively impact populations.

Shelterwood removal treatments under alternatives B and D total 319 acres each. Removal of overstory trees may negatively impact individual owls, but no negative impacts to populations are expected on the planning area. Alternative F proposes 15 acres of shelterwood removal, but would retain a minimum of 15 trees/acre in the largest diameter class to retain large trees as an overstory component (see Table 10).

Cumulative effects: Current planning efforts for vegetation management projects on the Northern Hills Ranger District emphasize thinning of dense stands. Thinning treatments applied across the landscape are expected to increase future suitable habitat for this species by accelerating tree growth and reducing the potential loss of overstory trees to insects, disease, and wildfire.

Determination: Alternative A would have no impact. Since there is a low potential that individual trees used by this species may be harvested, the action alternatives may adversely impact individuals, but are not likely to result in a loss of species viability in the planning area nor cause a trend to federal listing. The action alternatives may benefit this species in the long-term by accelerating development of large trees.

Golden-crowned Kinglet *(Regulus satrapa)*

Habitat summary: Mature spruce for nesting and summer foraging; conifer and deciduous woodland thickets in winter (Marshall et al. 2003).

Distribution: Panjabi (2003) describes this species as occurring locally in the Black Hills, exclusively within white spruce stands in the summer.

Threats: Loss of mature spruce to wildfire, logging.

Direct/indirect effects: No suitable nesting habitat (white spruce stands) occurs within the project area. Continued displacement of hardwoods by conifers under alternative A is likely to reduce winter habitat for this species in the long term. Under the action alternatives, hardwood stand maintenance and enhancement treatments may cause temporary displacement in the short term, but long-term winter habitat is expected to persist or increase in comparison to the No Action alternative.

Cumulative effects: Fire suppression during the past century has likely increased spruce on the landscape, although spruce appears to be naturally absent from the project area. Fire suppression has also allowed encroachment of hardwood stands by conifers on the landscape, which can impact availability of winter habitat. The trend within the last decade, however, has been one of large, stand-replacing fires. This situation can reduce suitable nesting habitat while increasing winter habitat availability. Phase 1 Amendment direction currently protects spruce stands from harvest, but the duration of these

standards as they apply to spruce is unknown. This project is not expected to contribute to habitat loss or degradation.

Determination: No impacts to suitable nesting and summer forage habitat would occur under any alternative. Alternative A would have no impact on short-term winter habitat availability, but may lead to long-term reductions in available habitat due to conifer encroachment. Since no displacement or habitat removal would occur, alternative A would have no impact on this species. The action alternatives may cause temporary displacement of individuals in treated hardwood stands, but are expected to maintain or increase available winter habitat in the long term. Due to the potential for temporary displacement in winter habitat, the action alternatives may adversely impact individuals, but are not likely to result in a loss of species viability in the planning area nor cause a trend to federal listing.

American Marten (*Martes americana*)

Habitat summary: Spruce, predominantly structural stages 3B, 3C, 4B, 4C, and 5, and pine 3B, 3C, 4B, 4C, and 5 with greater than 30% basal area in spruce and greater than 40% crown closure.

Distribution/abundance: Pine marten historically occurred within the Black Hills, but are thought to have been trapped out by 1930. Forty-two marten were re-introduced on the Spearfish District near Cheyenne Crossing during 1980 and 1981 (Fredrickson 1989). Marten are frequently sighted near the re-introduction sites and by 1988 had spread to as far away as Cement Ridge, Galena, Bridal Veil Falls, and Higgins Gulch. Known and predicted pine marten distribution patterns show similar trends, indicating that the distribution of pine marten is contained within a region that extends from the northern Black Hills southeast to the Norbeck Wildlife Preserve and Black Elk Wilderness Area in the central Black Hills.

Threats: Trapping is regulated; susceptible to habitat loss and degradation from forest management activities.

Direct/indirect effects: Alternative A would maintain existing dense pine stands that may serve as potential movement corridors. The action alternatives would treat some dense pine, and may influence marten movement across the landscape. Untreated areas would remain, however, to facilitate marten movements. Due to the lack of spruce stands in the project are, it is unlikely that marten would be traveling in or through the project area. Remaining, untreated dense pine stands would be sufficient to accommodate possible incidental travel.

Cumulative effects: Due to a lack of spruce within the project area, no negative cumulative impact to suitable habitat for this species is expected to occur as a result of management actions. Marten movement on the landscape may be influenced by treatments in dense stands, but retention of untreated areas is expected to facilitate marten movement on the landscape.

Determination: There would be no impact on marten under alternative A. Since marten movement on the landscape could be influenced, the action alternatives may adversely

impact individuals, but are not likely to result in a loss of species viability in the project area, nor cause a trend to federal listing.

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

Habitat summary: Suitable caves, mineshafts.

Distribution/abundance: Known from Fall River, Custer, Pennington, Lawrence, Meade counties in South Dakota and Crook County in Wyoming. The eastern subspecies is listed as endangered. Classified as G4 (apparently secure, but cause for long-term concern globally) and S2/S3 (imperiled because of rarity or vulnerability factors/rare or local in a restricted range) by South Dakota Natural Heritage Program (SDNHP 2002).

Threats: Winter habitat is declining due to mine closure/collapse and recreational use of caves. Hibernacula and maternity roosts are highly sensitive to disturbance.

Direct/indirect effects: There are no known caves or abandoned mines within the project area.

Cumulative effects: Cave and mine habitat does not occur within or adjacent to the project area. Management activities are not expected to contribute to negative impacts at the landscape level.

Determination: There would be no impact on Townsend's big-eared bat populations under any alternative.

Fringed-tailed Myotis *(Myotis thysanodes)*

Habitat summary: This species feeds mainly on small moths high in the forest canopy and on or near the ground near thick or thorny vegetation. They may occasionally glean insects from leaves (Barbour and Davis 1969). Suitable caves and mine shafts are used as roosting and maternity sites and for hibernating. Cryan (2001) found fringed-tailed bats in the Black Hills roosting in rock crevices as well as in cavities of ponderosa pine snags (rather than under exfoliating bark).

Distribution/abundance: Known locations are found in Lawrence, Meade, Pennington and Custer Counties of South Dakota and possibly Crook and Weston Counties in Wyoming (Schmidt 2003a). Factors that affect this species are human disturbance of roosting and hibernation sites, low reproductive rate, and habitat loss. Disturbance by humans, especially in hibernacula and maternity roosts, can be a threat to survival of these animals (Barbour and Davis 1969).

Threats: Disturbance to hibernacula and maternity roosts, loss of habitat due to mine closure/collapse.

Direct/Indirect effects: No known caves or abandoned mines occur within the project area. Proposed treatments may remove snags that pose a hazard during harvest operations, but snag removal is expected to be rare.

Cumulative effects: Cumulative impacts to maternity, hibernating, and roosting habitat has probably been minimal due to a lack of caves and mines within the project area. Past

practices of snag removal during timber harvest and woodcutting activities have occurred and, along with fire suppression, have probably altered snag distribution on the landscape. Snag removal under the action alternatives is expected to be rare. Snag retention standards, as well as road closures proposed under the action alternatives, would reduce the potential for landscape-level impacts to this species.

Determination: There is a possibility that snags posing an operational hazard may be removed. However, due to the estimated rarity of this occurrence, in addition to the species use of habitats other than snags, the action alternatives may impact individuals, but are not to result in a loss of viability in the planning area, nor cause a trend to federal listing.

Northern Leopard Frog *(Rana pretiosa)*

Habitat summary: Cattail marshes, beaver ponds, small stock ponds, permanent water sources. Adults may disperse into upland sites during the summer (Smith 2003).

Distribution/abundance: Known from all Black Hills counties, this species is abundant throughout the Black Hills up to 6,900 feet elevation. Habitat appears stable, but can be affected by management activities such as grazing, timber, and roads.

Threats: Vulnerable to habitat loss/alteration from overgrazing, predation, and reduced water quality/quantity.

Direct/indirect effects: Breeding and over-wintering habitat is limited to ephemeral wet areas and stock ponds. Upland habitat use may occur outside the breeding season. All alternatives would maintain the current breeding and over-wintering habitat. The action alternatives could temporarily disrupt upland habitat as downed logs are potentially shifted during logging operations. Grazing impacts, both positive and negative, would be dealt with in Allotment Management Plans and associated environmental analyses. Prescribed burning and underburning would not occur in suitable breeding and over-wintering habitat, but could affect individuals utilizing upland habitat.

Cumulative Effects: Backlund (USDA FS 2000) identifies uncontrolled grazing as having detrimental impacts on populations of leopard frogs. Grazing distribution and intensity would remain constant under all alternatives. No cumulative impacts to this species are expected since water sources that may influence habitat suitable for this species would be buffered from treatments.

Determination: Risk levels are low. Alternative A would have no impact. Alternatives B, D, and F may impact individuals, but are not likely result in loss of species viability in the planning area, nor cause a trend toward federal listing.

Black Hills Redbelly Snake *(Storeria occipitomaculata pahasapae)*

Habitat summary: Found beneath downed logs, slash, debris, and rocks.

Distribution/abundance: This species is found throughout the higher elevations of the Black Hills (Smith and Stephens 2003) and has been documented in all counties (Thompson and Backlund, no date). No local population trend data is available. Little is

known about distribution, abundance, or dispersal due to secretive behaviors. No hibernacula are known to exist in the project area.

Threats: May be susceptible to predation where ground cover is lacking. This species is vulnerable to vehicle-caused mortality.

Direct/indirect effects: Open roads allow potential mortality via vehicle traffic. Open road density under alternative A would remain unchanged. Road densities under the action alternatives would decline, thereby reducing the potential for vehicle-caused mortality. Prescribed burning has the potential to kill individual snakes and temporarily impact snake distribution by affecting ground vegetation characteristics. Prescribed fire would be applied in suitable habitat. Individuals may be impacted due to reductions in forest floor litter and structure, but overall distribution of this species would not be compromised.

Cumulative effects: Due to a lack of treatment, alternative A would not contribute to negative impacts. By maintaining the current road density in the project area, however, this alternative would continue to pose an elevated potential for vehicle-caused mortality. Alternative A would also maintain an elevated risk of stand-replacement fire, which could negatively impact large blocks of habitat in the short-term by removing ground-level vegetation and woody material. The action alternatives would reduce overall open road densities and the potential for vehicle-caused mortality. In addition, the action alternatives would be expected to reduce the potential for stand-replacement fire in the project area and resulting large-scale changes in habitat.

Determination: Risk levels are low. Alternative A would have no impact. Alternatives B, D, and F may impact individuals, but are not likely to result in a loss of species viability in the planning area, nor cause a trend toward federal listing.

Pale Milk Snake *(Lampropeltis triangulum)*

Habitat summary: Occupies very diverse habitat types from semiarid to damp coastal bottomlands to Rocky Mountain and tropical hardwood forests, pine forests, open deciduous woodlands, rocky hillsides, sand dunes, meadows, prairies, high plains, farmlands, and suburban areas to 8,000 feet elevation. This species is secretive and nocturnal, generally found under rotting logs, stumps, or decaying trash (Behler and King 1979).

Distribution/abundance: In the Black Hills, this species is rare (survey data limited) but has been documented in all counties at lower elevations (Thompson and Backlund, no date). Little is known about distribution, abundance, and dispersal due to secretive and nocturnal behaviors.

Threats: May be susceptible to predation where ground cover is lacking. This species is also vulnerable to vehicle-caused mortality.

Direct/indirect effects: The entire project area is considered suitable habitat for the milk snake. Displacement of individuals may occur under the action alternatives as downed logs are potentially moved during skidding operations and prescribed burn treatments are implemented. Open road density under alternative A would remain unchanged. Road

densities under the action alternatives would decline, thereby reducing the potential for vehicle-caused mortality. Prescribed burning has the potential to kill individual snakes and temporarily impact snake distribution by affecting ground vegetation characteristics. Revised Forest Plan standard 2308 provides direction for maintaining down woody debris in logging units.

Cumulative effects: Due to a lack of treatment, alternative A would not contribute to negative impacts. By maintaining the current road density in the project area, however, this alternative would continue to pose an elevated potential for vehicle-caused mortality. Alternative A would also maintain an elevated risk of stand-replacement fire, which could negatively impact large blocks of habitat in the short-term by removing ground-level vegetation and woody material. The action alternatives would reduce overall open road densities and the potential for vehicle-caused mortality. In addition, the action alternatives would be expected to reduce the potential for stand-replacement fire in the project area and resulting large-scale changes in habitat.

Determination: Risk levels are low. Alternative A would have no impact. Alternatives B, D, and F may impact individuals, but are not likely to result in loss of species viability in the planning area, nor cause a trend toward federal listing.

Tiger Salamander (*Ambystoma tigrinum*)

Habitat summary: Temporary pools, damp meadows, under debris.

Distribution/abundance: No local population trend data is available, but habitat appears stable.

Threats: Loss of riparian and other breeding habitat and reduced water quality.

Direct/indirect effects: Suitable habitat occurs on much of the project area. Breeding habitat is, however, limited to riparian areas, old beaver ponds, dugouts, and springs. All alternatives would maintain current habitat. Prescribed burning could impact distribution of individuals in upland habitat, but is not expected to affect breeding habitat.

Cumulative effects: Water quality can be affected by livestock and mining. Corn (USDA FS 2000) states that livestock degradation of wet areas during the spring can have detrimental effects to salamanders from egg trampling and siltation. Grazing distribution and intensity would remain constant under all alternatives. No cumulative impacts to this species are expected since water sources that may influence habitat suitable for this species are required to be buffered from treatments.

Determination: Risk levels are low. Alternative A would have no impact. The action alternatives are unlikely to negatively impact habitat or populations. Therefore, the action alternatives could impact individuals, but are not likely to result in a loss of viability in the planning area, nor a trend toward federal listing.

Cooper's Rocky Mountain Snail *(Oreohelix strigosa cooperi)*

Habitat summary: Habitat includes lowland wooded areas, talus slopes, and moist woodlands adjacent to riparian areas.

Distribution/abundance: This species is common in Spearfish Canyon drainages and occurs elsewhere in scattered populations (Frest and Johannes 1993, Frest and Johannes 2002).

Threats: Drying of sites through extensive logging and overgrazing of riparian areas, especially around seeps and springs.

Direct/indirect effects: Frest and Johannes surveyed high-probability sites within the project area but found no positive sites for this species. High-probability sites would not be disturbed under any alternative. Application of mitigation measures would minimize potential impacts to this species (see mitigation in Section 2.5.5).

Cumulative effects: Past actions across the landscape, including cattle grazing and timber harvest, have been identified by Frest and Johannes (2002) as factors in restricting habitat available to this and several other land mollusk species. Actions proposed under this project would have no impact on available habitat. No negative cumulative effects are expected for this species.

Determination: Risk levels are low. While the species may occur within or adjacent to treatment units, the potential for occurrence is low. In addition, potential for impacts to hydrology that influences suitable habitat are low due to prescribed buffers. Therefore, the action alternatives may impact individuals, but are not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing.

Cockerell's Striate Disc Snail *(Discus shimeki cockerellii)*

Habitat summary: Moist woodlands, north-facing slope bases adjacent to spruce with a deciduous association, on north aspects with limestone derived soils (Frest and Johannes 2002).

Distribution/abundance: In the Black Hills, this species is locally abundant in a limited number of colonies (Frest and Johannes 2002).

Threats: Drying of site through extensive logging, overgrazing of riparian areas.

Direct/indirect effects: No spruce exists within the project area. Frest surveyed two north-facing sites in the project area 1993 and 1999, but no members of this species were found.

Cumulative effects: Frest and Johannes (2002) identify grazing as an activity that may be limiting distribution of this and other snail species of concern. Grazing distribution and intensity would remain constant under all alternatives. No cumulative impacts to this species are expected since water sources that may influence suitable habitat are required to be buffered from treatments. Forest Plan standard 3215 ensures existing spruce stands will be retained Forest-wide, at least in the short term. Negative cumulative impacts are not expected.

Determination: None of the alternatives would impact snail populations due to a lack of suitable habitat.

Tawny Crescent Butterfly *(Phyciodes batesi)*

Habitat summary: This species is restricted to moist forest borders, particularly riparian areas, and moist valley bottoms in the transition between deciduous and coniferous forests (Royer and Marrone 1992). Specimens have been collected on the Northern Hills Ranger District.

Distribution/abundance: In the Black Hills, this species is known in Lawrence, Pennington, Meade, and Custer counties in South Dakota and Crook and Weston counties in Wyoming, and is considered rare to uncommon at known sites. There is no local population trend data available, but this species has been disappearing from its range in the eastern United States.

Threats: Habitat loss (e.g., riparian areas), pesticide/herbicide application, and loss of host species (Royer and Marrone 1992).

Direct/indirect effects: Riparian areas within the project area are ephemeral, seasonal, and associated with meadows or aspen. No alteration of existing hydrologic functions is expected under any alternative.

Cumulative effects: Pesticides are not currently used on the Northern Hills Ranger District. Herbicides are applied locally, targeting patches of noxious weeds, but riparian areas are generally avoided. No negative cumulative impacts for this species are expected.

Determination: Risk levels are low under all alternatives. No impacts are expected.

American Dipper (*Cinclus mexicanus*)

The US Fish and Wildlife Service was petitioned in March 2003 to list the American dipper in the Black Hills as a "Distinct Population Segment". The petitioners also requested that the species be listed under emergency provisions. This species is not currently listed as threatened, endangered, sensitive, or proposed for listing.

Direct/indirect effects: The American dipper is a bird associated with mountain streams. Due to a lack of perennial streams, no suitable or potential habitat for this species exists within the project area. No direct or indirect effects are expected as a result of any alternative.

Species Under Review for Sensitive Classification

The Regional Forester is considering revision of the Rocky Mountain Region Sensitive Species list. The following section discusses species that are being considered for addition to the list and have been documented as existing on the Black Hills National Forest, or for which suitable habitat exists on the National Forest.

River Otter (*Lontra canadensis*)

Habitat summary: The river otter is a semi-aquatic carnivore found in a variety of freshwater habitats. The State of South Dakota lists the river otter as threatened. The Wyoming Natural Diversity Database (WYNDD) tracks the river otter as a "species of special concern". Otters prefer valley streams, but can also be found in lakes, ponds (including beaver ponds), and marshes (USDA, Forest Service 2003a). Important habitat features include unpolluted water, limited human use, and areas rich in food (Higgins et al. 2000). The otter's primary food is usually fish, but frogs, crayfish, insects, birds, and small mammals are also eaten (Higgins et al. 2000).

Distribution/abundance: Grinnell (1875) reported the river otter as abundant on the Heart and Cannon-Ball rivers in North Dakota, "and probably in the Black Hills". The South Dakota Natural Heritage Database documents one river otter observation on the Hell Canyon District in September 1992. The location was T2S, R5E, section 36 in the Norbeck Wildlife Preserve west of Camp Remington. Iron Creek, a perennial stream, flows through that section. An incidental observation of a river otter is recorded for the Northern Hills District from January 1995 at T3N, R3E, section 15, which is northwest of Rochford (USDA, Forest Service, unpublished data). The confluence of the north and south forks of Rapid Creek is in that section and both forks are perennial streams. No records of river otter observations in the Wyoming portion of the Black Hills National Forest were found (WYNDD 2001).

Kiesow (2003a) evaluated the feasibility of reintroducing the river otter in South Dakota. No reintroduction sites were identified because most of the streams in the Black Hills are too small (according to stream order) and lack adequate water flow to support river otter (Kiesow, 2003b pers. comm.).

Streams in the Black Hills may be used as travel routes for transient river otter trying to locate to new areas from established populations in Montana, Wyoming, or Nebraska, but a remnant river otter population does not exist in the Black Hills of South Dakota (Kiesow 2003b, pers. comm.).

Direct/indirect/cumulative effects: There are no known otter sightings within the project area. No suitable habitat occurs within the project area due to a lack of permanent bodies of water other than isolated stock ponds.

Determination: Project activities are expected to have no impact on river otter populations and habitat.

Mountain Plover (*Charadrius montanus*)

Habitat summary: The mountain plover prefers large, flat grassland expanses with sparse, short vegetation and bare ground, often associated with blue grama *(Bouteloua gracilis)* or buffalo grass *(Buchloe dactyloides)*. The proposal to list this species under the Endangered Species Act was recently withdrawn (68 FR 53083).

Areas affected by prairie dogs, bison, heavy grazing, fire, drought, and cultivation can provide suitable habitat (USDA, Forest Service 2003b). Vegetation at short-grass prairie sites is less than 4 inches tall, while shrubs visually predominate nest sites within the shrub-steppe landscape. Approximately 220 acres of prairie dog towns exist in five

separate locations on the Forest, all on the Hell Canyon District in the extreme southern Black Hills (USDA, Forest Service 2003c).

Distribution/abundance: Mountain plovers were formerly rare breeders in southwestern South Dakota (SDOU 2002). Mountain plovers have not been documented on the Black Hills National Forest (WYNDD 2001, SDNHP 2002) and are extirpated from South Dakota (NRCS 2001). Surveys in the Powder River Basin of Wyoming, which includes parts of Crook and Weston counties, and on the Thunder Basin Grassland found mountain plovers.

Direct/indirect/cumulative effects: There are no known active or historic mountain plover nest sites within the project area. No suitable nesting or foraging habitat occurs within the project area.

Determination: Project activities are expected to have no impact on mountain plover populations or habitat.

Northern Harrier (*Circus cyaneus)*

Habitat summary: The SDOU (2002) reported the northern harrier as an uncommon migrant and summer resident in South Dakota, being more common in the west. This species inhabits prairies, open fields, and marshes.

Harriers are not known to breed or winter on the Black Hills National Forest (Luce et al. 1999, Peterson 1995). The species' preferred habitat of open landscapes with tall, dense vegetation and abundant residual vegetation is uncommon on NFS lands (USDA Forest Service 2002b) and this may account for the absence of breeding in the Black Hills.

Distribution/abundance: RMBO detected one northern harrier in burned habitat during the first year of bird monitoring on the Black Hills (USDA. Forest Service, unpublished data). This species is not tracked by the SDNHP or WYNDD.

Harriers are an essentially open-country species. Key habitat components include open habitats with tall, dense vegetation and abundant residual vegetation for nesting and foraging (USDA Forest Service 2002b). They are commonly found in medium- to tall-grass prairies and associated wetlands, marshes, swamps, bogs, wet meadows, hay meadows, logged-over or burned woodlands, and tundra (Johnsgard 1990). Most nests are found on the ground in undisturbed wetlands or grasslands with thick vegetation (Ehrlich 1988, USDA Forest Service 2002b). This is a broadly adapted hawk, with an ability to diversify its diet according to time and place (Johnsgard 1990). It is, however, largely specialized for feeding on small to medium-sized mammals captured in rather low vegetation while flying at low levels over open vegetation (Johnsgard 1990). The species' diet includes small mammals, especially voles, birds, snakes, frogs, insects and carrion (Ehrlich 1988). By reducing thick residual vegetation, agricultural and grazing practices have contributed to declines in breeding harriers (USDA Forest Service 2002b). Quality of breeding habitat is directly affected by range management on NFS lands (USDA Forest Service 2002b).

Direct/indirect/cumulative effects: There are no known active or historic harrier nest sites within the project area. No suitable nesting or foraging habitat occurs within the project area.

Determination: Project activities are expected to have no impact on northern harrier populations or habitat.

Grasshopper Sparrow (*Ammodramus savannarum*)

Habitat summary: The grasshopper sparrow prefers grasslands with intermediate grass height and is often associated with clumped vegetation interspersed with patches of bare ground (WYNDD 2001). Other habitat requirements include moderately deep litter and sparse coverage of woody vegetation. This species is migratory and occurs locally in the Black Hills, almost exclusively in native mixed-grass prairies (RMBO 2003). The grasshopper sparrow feeds on insects, other small invertebrates, grain and seeds. Nesting occurs primarily in June and July but may extend into August (SDOU 2002).

Distribution/abundance: The grasshopper sparrow is not tracked by the SDNHP, but the WYNDD (2002) reports an observation of this species from July 1988 of a male singing in the Bear Lodge Mountains (T54N R63W, section 28) in a hay meadow approximately 5 miles south of Alva. In South Dakota, there are breeding records throughout the state, including the Black Hills (Peterson 1995), and the species is considered an uncommon to common summer resident (SDOU 1991). Bird monitoring being conducted by the RMBO through an Agreement with the Black Hills National Forest documented grasshopper sparrows in 2001 and 2002 (RMBO 2001 and 2003), primarily in mixed-grass prairie habitat. RMBO reported this species appeared more abundant in 2002, possibly due to drought conditions that reduced suitable nesting sites off of the Forest, but comparison between years was subjective due to fewer sites being sampled in 2001.

Habitat decline for this species is attributed to cultivation, urban sprawl and reforestation, compounded by losses incurred as a result of mowing of habitat and subsequent predation (USDA, Forest Service 2003d).

Direct/indirect/cumulative effects: There are no known sightings of this species within the project area. Although small meadows exist in the project area, no suitable habitat in the form of mixed grass prairie is found.

Determination: Project activities are expected to have no effect on grasshopper sparrows.

Mountain sucker (*Catostomus platyrhynchus*)

Lake chub (*Couesius plumbeus*)

Finescale dace (*Phoxinus neogaeus*)

A lack of permanent water sources precludes the potential for occurrence of these fish species within the project area.

Direct/indirect/cumulative effects: No suitable habitat exists within the project area.

Determination: Project activities would have no impact on these fish species.

Mitigation for All TEPS Species

The Revised Forest Plan BA/BE identifies objectives, standards, and guidelines that provide mitigation for all federally listed and Region 2 sensitive species found in the Black Hills. This project will follow the objectives, standards, and guidelines applicable to species and habitats found within the Riflepit analysis area. Mitigation measures are found in the Riflepit wildlife specialist report, the Revised Forest Plan (USDA FS 1997) and 2001 Phase 1 Amendment Decision Notice (USDA FS 2001). Mitigations are incorporated into this document by reference and form the basis for the determinations. Mitigation measures for TEPS species are also listed in Section 2.5.5 of this EA.

Summary of Effects Determinations for TEPS Species

The determination of effects on federally listed species and Region 2 sensitive species in this document was made as a result of the information gathered in the pre-field review, field reconnaissance, and effects analysis. The basis for these determinations was potential habitat, distribution, effects from forest activities and proposed mitigation. The determination language is set forth in Forest Service Manual 2670 (USDA 1994) and by the US Fish and Wildlife Service.

With implementation of identified mitigation measures, a determination of "no effect" would apply to all federally listed species that may be found in the Riflepit project area (bald eagle). With implementation of identified mitigation measures, the Revised Forest Plan BA/BE determinations of "no impact", "beneficial impact" or "may adversely impact individuals, but not likely to result in a loss of viability in the planning area nor cause a trend to federal listing" would apply to Region 2 sensitive species found in the project area. Any non-compliance with mitigation measures identified in Section 2.5.5 could alter the determination and lead toward trends to federal listing. Table 28 below summarizes individual determinations.

Table 28. Summary of Determinations for TEPS Wildlife Species Known or Suspected to Occur in the Riflepit Project Area

Species	No Impact	Beneficial Impact	May Impact Individuals*	May Impact Population
Bald Eagle	All			
Northern Goshawk	Alt A		Alt B, D, F	
Black-backed Woodpecker	Alt A		Alt B, D, F	
Lewis' Woodpecker	Alt A		Alt B, D, F	
Pygmy Nuthatch	Alt A		Alt B, D, F	
Flammulated Owl	Alt A		Alt B, D, F	
American Marten	Alt A		Alt B, D, F	
Townsend's Big-eared Bat	All			
Fringed-tailed Myotis	Alt A		Alt B, D, F	
Northern Leopard Frog	Alt A		Alt B, D, F	
Black Hills Redbelly Snake	Alt A		Alt B, D, F	

Species	No Impact	Beneficial Impact	May Impact Individuals*	May Impact Population
Pale Milk Snake	Alt A		Alt B, D, F	
Tiger Salamander	Alt A		Alt B, D, F	
Cooper's Rocky Mtn. Snail	Alt A		Alt B, D, F	
Cockerell's Striate Disc Snail	All			
Tawny Crescent	All			

* "May adversely impact individuals, but not likely to result in a loss of viability in the planning area nor cause a trend to federal listing"

Affected Environment and Direct and Indirect Effects: Management Indicator Species (MIS)

Management indicator species applicable to the Black Hills National Forest are listed in the Phase I Amendment (USDA FS 2001). Species with potential occurrence or habitat within the project area are discussed below.

White-tailed Deer, Mule Deer, and Elk:

The project area currently supports herds of white-tailed deer and elk and limited numbers of mule deer. White-tailed deer numbers have declined in the Black Hills since the middle 1970s (Griffin et al. 1994). Diminished habitat quality has been implicated as a primary cause of deer reductions since fawn production and recruitment remain low (Anderson 1998, Deperno et al. 2000). Deperno et al. (2002) implicated the general lack of shrubs on the landscape as a factor contributing to deteriorated deer habitat and recommended that aspen regeneration and underburning be applied to improve habitat quality. Sieg and Severson (1996) stated that the value of stands with 80 to 120 square feet of basal area is minimal as deer summer range habitat and recommended aspen regeneration and thinning pine to low densities, followed by underburning, as techniques for improving forage quality and quantity.

The project area lies within deer and elk summer range. Current habitat conditions in the project area include 63% of the ponderosa pine cover type in dense to moderately dense mature stands (4B and 4C) with little or no viable forage in the understory. Open understory pine stands (4A) currently total 29% of the same cover type. Hardwood stands are slowly transitioning to conifer as more pine becomes established. Ponderosa pine are also encroaching into meadows not treated for pine removal in past vegetation management projects. Optimal hiding cover in the form of 3C stands is limited, and open road densities average just below 3.8 miles per square mile. Existing habitat suitability would remain unchanged under alternative A.

Treatments proposed under the action alternatives would remove encroaching pine from hardwood stands and meadows, regenerate some aspen stands, reduce ponderosa pine stand densities, and reduce mileage of open roads. Open-understory ponderosa pine would increase to 47%, 51%, and 49% of ponderosa pine acres under alternatives B, D, and F, respectively. Ponderosa pine underburning would occur on 1,384 acres under alternative B, 1,515 acres under alternative D, and 2,525 acres under alternative F. The combination of commercial and non-commercial treatments to maintain hardwood

inclusions in pine stands (thinning and pine encroachment control) and hardwood maintenance and restoration treatments totals 724 acres (alternative B), 732 acres (alternative D), and 611 acres (alternative F) (see Table 10).

Alternatives B, D, and F would reduce available cover by 54%, 55%, and 47%, respectively. Alternatives B and D would, however, reduce road densities to 2.8 miles per square mile, and alternatives F would reduce it to 2.7 miles per square mile, compensating somewhat for the reduction of cover.

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 guideline 5.1-3201 states that deer and elk habitat effectiveness values should at least meet the following values:

Table 29. Habitat Effectiveness Values (%) by Alternative

Species & Season	Guideline 5.1-3201	Alternative A	Alternative B	Alternative D	Alternative F
White-tailed deer summer	40	50	51	52	52
White-tailed deer winter	35	37	38	38	38
Elk summer	43	51	51	53	53
Elk winter	34	39	38	38	38

As shown above, habitat effectiveness values are currently above the minimum guidelines for all species and seasons (alternative A). The action alternatives would maintain or improve habitat effectiveness for all species and seasons, except for *elk winter*.

While road density is the primary limiting factor on habitat effectiveness, the planning team determined that road density decreases beyond what is proposed are not possible at this time for the following reasons:

1. Private land access needs to be retained. Approximately 679 acres of private land is intermixed with National Forest System land, and other private parcels are adjacent to the project area.
2. The State snowmobile trail system runs on a number of National Forest system and non-system roads. It crosses other roads. The trail is generally wide enough for passenger vehicles, and many sections are used in summer and fall by all-terrain vehicles and four-wheel-drive trucks. Using the snowmobile trail for access, users can intentionally or unintentionally circumvent road closures.
3. Relatively flat terrain in much of the project area makes effective closure of certain roads especially difficult or expensive.

To meet Revised Forest Plan direction, visual screening will be retained on along at least 20% of arterial and collector roads (see mitigation, Section 2.5.6).

Merriam's Turkey

Turkey habitat consists of a mix of structural stages in all cover types. All alternatives would retain structural stage mixes that assure suitable habitat within the project area. Roosting habitat would be maintained throughout the project area for all alternatives (see mitigation, Section 2.5.6). Turkey populations are expected to persist throughout the project area under all alternatives.

Brown Creeper

This species uses dense mature coniferous (pine and spruce, structural stages 4B, 4C, and 5) and mixed deciduous woodlands, especially old growth forests (Panjabi 2003). It nests under loose bark of dead trees greater than 10" in diameter and winters in more open stands. Brown creepers occur in low abundance throughout the Black Hills (Panjabi 2003).

Alternative A would have no impact. Existing dense stands (4,055 acres, or 63% of ponderosa pine cover type) would remain unchanged, with short-term snag increases due to the current mountain pine beetle activity. Existing dense stands may be used by this species, but the optimum habitat is identified as old growth. There are no stands in the project area classified as dense old growth, but pine stands with characteristics of open, fire-maintained old growth do occur and would be managed under all action alternatives to promote these characteristics.

All action alternatives would reduce availability of potential habitat (structural stage 4B and 4C stands) to 43%, 39%, and 38% of pine acres for alternatives B, D, and F, respectively. In addition, potential nest sites could be lost if snags are cut for safety reasons. Frequency of snag cutting is, however, expected to be rare.

Since commercial thinning, as proposed in this project, emphasizes retention and release of larger trees, growth rates in these trees would be more rapid than if the stand were left untreated. Thus, the action alternatives would create short-term losses in habitat availability, but if at least a portion of these stands were managed for late and old structure in the future, optimal habitat (structural stage 5) would be available on the landscape sooner than under alternative A.

Due to short-term loss of habitat, the action alternatives may impact individuals. Since all alternatives would retain habitat within the project area, and long-term snag and green tree retention projections show these features would persist on the landscape, none of the alternatives would be expected to impact populations.

Mountain Lion

Treatments that benefit deer and elk, mountain lions' main prey species, are likely to benefit lions as well. Improved big game habitat effectiveness under the action alternatives indicates better habitat for deer and elk. Mountain lion denning habitat is scattered throughout the project area and would not be affected by any alternative.

Decreases in open road density under the action alternatives would also be expected to benefit mountain lion distribution.

Mountain Goat

There is no suitable habitat for mountain goats within the project area.

Brook Trout (*Salvelinus fontinalis*)

Brown Trout (*Salmo trutta*)

Due to a lack of permanent water sources precluding the potential for occurrence of these fish within the project area, none of the alternatives would have an impact on these species.

Cumulative Effects, MIS:

No cumulative effects are expected for Merriam's turkey or mule deer. Failure to improve forage habitat quality and quantity within the Black Hills is likely to contribute to lower habitat suitability and may become a limiting factor for white-tailed deer populations on the Forest. Further decreases in deer populations are likely to negatively impact mountain lion densities as well. Activities proposed under the action alternatives, including thinning, prescribed burning, and road density reductions are expected to benefit deer populations within the planning area. Increases in deer populations may translate into increased mountain lion densities where road densities are reduced.

3.2.3 Sensitive Plants

Affected Environment:

Ponderosa pine dominates the ridge tops and dry (xeric) slopes of the project area. The dry, ponderosa pine-dominated areas do not provide habitat for Region 2 sensitive plants. Most stands have been managed in the past by thinning and regeneration cutting.

Using the habitat type classification presented in The Nature Conservancy's *Black Hills Community Inventory* (Marriott and Faber-Lagedoen 2000), the plant community types in the Riflepit project area should include upland forests and woodlands, upland grasslands, sparse vegetation plant communities, and riparian/wetland communities. Small areas (less than 5 acres each) of mixed community types might be classified as additional types if they were larger in size. The small areas of mixed community type are hard to classify and not listed due to limited size, distribution, and importance across the analysis area, or are located adjacent to the analysis area and are better represented at lower elevations.

All species that could be reasonably expected to occur in the Riflepit Project analysis area can be found in Section II of the Riflepit Project Biological Evaluation. For the species-specific 'Risk Assessment' refer to Appendix B of the Riflepit Biological Evaluation.

R2 Sensitive Plant Occurrences in the Project Area

No US Fish and Wildlife Service (USFWS) federally listed plant species are known to occur in the Black Hills. Of the twelve R2 sensitive species for which suitable habitat exists in the project area, field surveys conducted in 2002 found no occurrences.

A new occurrence of *Botrychium campestre* (R2 sensitive species, 2003 occurrence) was recently located in the Black Hills about 10 miles north of the project area. This occurrence is the first documented within the Black Hills in about 30 years. Its biology, ecological requirements, and tolerance of disturbance in the Black Hills are not fully understood.

Plant Species of Interest Occurrences in the Project Area

Surveys found four occurrences of *Deschampsia caespitosa* (tufted hair-grass) and one occurrence of *Petasites sagittatus* (arrow-leaf sweet coltsfoot) within the Riflepit project area.

Environmental Consequences:

Generally, studies of specific biological requirements of R2 sensitive species and species of concern have not occurred. A sensitive plant survey was, however, completed for this project in 2002.

Direct Effects: Alternatives A, B, D and F

Suitable habitat exists for R2 sensitive plants *Adenocaulon bicolor, Arnica lonchophylla, Botrychium campestre, Carex alopecoidea, Carex pedunculata, Equisetum scirpoides, Lycopodium complanatum, Lycopodium dendroideum, Muhlenbergia glomerata, Platanthera orbiculata, Sanguinaria canadensis,* or *Scirpus cyperinus*. None of these species were found during sensitive plant surveys conducted in 2002, and no sensitive plant species are otherwise known to occur in the project area. No impacts on these species would be expected under any of the Riflepit project alternatives. Though it was also not detected during surveys, *Botrychium campestre* could possibly occur within the project area. Detection of *Botrychium* spp. ferns is complicated by prolonged drought and limited understanding of the species. In addition, these species do not necessarily appear above ground every year. The known and historic (1973) occurrences were found well outside the Riflepit project area and more than 2,000 feet lower in elevation. Direct impacts to *Botrychium campestre* are not expected.

No direct effects to the plant species of interest (*Deschampsia caespitosa* and *Petasites sagittatus*) would result from implementation of any of the Riflepit project alternatives. The known populations of these plants would be avoided during project layout and implementation (see mitigation section in Chapter 2).

Indirect Effects: Alternative A

Indirect effects could include long-range effects from wildfires in areas of untreated fuel accumulations. High-probability habitats for R2 sensitive plants and species of interest are generally among the more moist sites (mesic) and are unlikely to burn as intensely as drier sites. Without treatment of fuels, however, effects of a wildfire could be greater and could include the reduction of canopy closure, short-term increases of erosion and available nutrients, increases in competing early-seral vegetation, and increased risk of spread and introduction of noxious weeds. These effects could impact suitable habitat for R2 sensitive plants and species of interest (and possibly undetected *Botrychium campestre* occurrences), and the known occurrences of plant species of interest within the Riflepit project area.

Indirect Effects: Alternatives B, D, and F

Ground-disturbing activities can increase risk of noxious weed introduction (Sheley and Petroff 1999). Noxious weed infestations are a particular threat to R2 sensitive plants, species of interest, and suitable habitats. Mitigation measures to prevent weed introduction have been built into the project (see section 2.5.9).

Indirect effects from soil movement could include adding nutrients, which could have either positive or negative effects. Removal of vegetation and fuels would increase access for livestock, which could lead to negative effects from grazing, trampling of high-potential habitat, and introduction of noxious weeds.

Alternative F would treat fewer acres than alternative B or D, so less soil disturbance would occur.

These effects generally would be limited in scope and duration (small areas and less than five years). Generally these are presumed to be negative effects.

Proposed vegetation management and associated activities would enhance hardwood plant communities. This would increase suitable habitat for R2 sensitive plants and species of interest. Alternative D would accomplish more acres of hardwood enhancement and maintenance treatments than alternative B or F. Alternatives D and F may benefit these habitats slightly more than alternative B because more roads would be closed and/or fewer roads constructed. Due to the lack of specific knowledge about the habitat requirement of *Botrychium campestre, i*t is unknown whether these effects would be detrimental or beneficial. The 2003 and 1973 occurrences of *Botrychium campestre* both were noted as being in habitats that had experienced ground disturbance in an open forest setting.

Indirect effects from these activities are possible, but are expected to be of short duration (less than 5 years) and limited in scale.

Cumulative Effects (Common to all Action Alternatives)

Other projects that would reduce fuels, reduce the risk/spread of pine beetle outbreaks, improve wildlife habitat, and improve firefighting conditions by creating fuel breaks are

planned in the same watersheds as the Riflepit project. Other projects in the northern Black Hills, such as the Cement project to the northwest, incorporate mitigation measures to prevent direct effects on sensitive and other unusual plants and their habitat. Possibly impacts on *Botrychium campestre* from planned projects are not fully understood. Surveys for this species would continue to determine presence, but projects could affect undetected occurrences or occurrences that are exist in new habitat types. Indirect effects of these projects are expected to be limited due to planned mitigation of effects on known R2 sensitive plant occurrences and high-potential habitats. For a complete and site-specific list of plant-related mitigation measures for the Riflepit project, refer to Sections 2.5.5 and 2.5.9.

Determination:

None of the alternatives would impact R2 sensitive plant species for which potential habitat exists in the project area except possibly *Botrychium campestre*. A determination of "no impact" is made for *Adenocaulon bicolor, Arnica lonchophylla, Carex alopecoidea, Carex pedunculata, Equisetum scirpoides, Lycopodium complanatum, Lycopodium dendroideum, Muhlenbergia glomerata, Platanthera orbiculata, Sanguinaria canadensis,* and *Scirpus cyperinus* under all action alternatives. Due to recent rediscovery of *Botrychium campestre* in the Black Hills, lack of knowledge about the species, and the possibility that indirect and cumulative effects may occur, a determination of "may adversely impact individuals, but not likely to result in a loss of viability in the planning area nor cause a trend to federal listing" is made for *Botrychium campestre* for all action alternatives.

3.2.4 Range and Noxious Weeds

Affected Environment

The project area is characterized by large stands of ponderosa pine interspersed with long, open meadows and grassy draws. Portions of two grazing allotments extend across the state line into Wyoming and are administered by the Bearlodge Ranger District: Willow Springs/Stearns Park Allotment on the northern end of the project area and Grand Canyon Allotment on the south end. These allotments are divided in approximately the middle of the project area by part of the Little Spearfish Allotment, administered by the Northern Hills Ranger District. The three allotments total 2,034 Animal Unit Months (AUMs) with a grazing season of approximately mid-June through September.

Environmental Consequences

Direct/Indirect Effects

Under alternative A there may be an eventual decrease in forage production as stand canopies close and pine encroaches upon meadows and openings. This would decrease livestock distribution and increase utilization on the remaining meadows. This

alternative would not increase weed infestations on the District. Noxious weed management would continue to treat areas of infestation.

Effects would be similar under alternatives B, D, and F. The total amount of herbaceous and shrub production in the project area would increase due to reductions in basal area and overstory density. Management activities that reduce tree density would increase the amount of available forage. Increased forage production would be expected due to increased sunlight and available water resulting from decreased competition from pine and shade-tolerant species. Forage quality improves as plant composition shifts from shade-tolerant to shade-intolerant species. Changes in transportation management would have minimal effect on the range resource. There would be no increases in permitted livestock numbers under the action alternatives, though better livestock distribution could be expected. The meadow enhancement, prescribed burning, and timber harvest proposed under the action alternatives would result in the improvement and enhancement of meadows, and create additional secondary forage, though probably not enough to increase carrying capacity. The implementation of the alternatives would have varying potential effects on the habitat available for the invasion of noxious weeds. Those alternatives impacting a larger number of acres (ground disturbance) during project activities would have the greatest potential for increasing the number and extent of infestations. Mitigation measures (see Section 2.5.8 and 2.5.9) are included to minimize this effect.

Cumulative Effects:

Any negative effects from the combined ongoing range management plus the proposed actions on the range resource in the project area would be minimal following application of the identified mitigation measures. Planned adjacent timber sales and associated ground-disturbing activities could exacerbate the weed problem. Sites of residual weeds could serve as a source for new infestations on future timber sales, road construction and all areas of disturbed soils. Continued vigilant weed treatment would be necessary on all proposed timber sales to maintain the range resource.

3.3 Physical Consequences

3.3.1 Soil and Water

Affected Environment

Regionally, the project area is located in the northern Black Hills of west central South Dakota. The Bear Lodge Mountains of eastern Wyoming are also included within the Black Hills complex. The Black Hills are regionally situated south of the Williston Basin area (eastern Montana and western portions of North and South Dakota) and east of the Powder River Basin area (eastern Wyoming).

Topographically, the project area ranges in elevation from a low of approximately 6,200 feet (Sterns Park Springs area) to a high of approximately 6,700 feet (Laird Peak area). Terrain varies, ranging from meadow lands and rolling hills to broad and gently incised stream areas.

Watersheds: The Riflepit project area is located within four seventh-field watersheds (Hydrologic Unit Codes, or HUCs, 10120203020204, 10120203020203, 10120203020201, and 10120203020104). The four watersheds include about 4,630, 7,552, 6,756, and 7,949 acres respectively. They are direct or indirect tributaries to Cold Water Creek, Sand Creek, Redwater Creek, the Redwater River, and the Belle Fourche River, of the Belle Fourche River Basin, which all eventually drain into the Belle Fourche Reservoir.

As identified in Appendix K of the Revised Forest Plan (USDA FS 2001), the analysis area is located entirely within the landtype association designated as North Gently Dipping Plateau Lands. Stock-watering facilities (large-diameter metal or fiberglass tubs supplied by drain pipe) occur downhill of many spring locations. Ephemeral channels show little evidence of scour, and are stable and well-vegetated.

Water Courses: Water on the Black Hills National Forest varies by season and elevation. January is the driest month and June the wettest, with the project area receiving a total average of 34 inches of precipitation. The few project area ephemeral watercourse channel beds and banks that exist are generally stable.

Stream Crossings: Roads within the analysis area provide access for management activities and public use. In watersheds with perennial or intermittent streams, roads increase the drainage density (Wemple 1994) and contribute to increased sediment loads. Within the project area, the ephemeral nature of runoff combined with the grassy channels and surrounding meadows minimize the amount of soil transported by surface flows beyond the source. Therefore, it is estimated that the current road density does not have a measurable impact on water quality within the analysis area or downstream.

Native-surface roads can become rutted and mud holes can develop during wet weather where poor drainage exists. Erosion problems observed within the project area were localized. Dramatic movement of sediment off-site would not be expected under any alternative.

Connected Disturbed Areas: No connected disturbed areas are known to exist within the analysis area.

Soils: Soil material in the project area is generally comprised of weathered sedimentary units. With minor exceptions, proposed timber units are located on stable soils. At the southern end of the project area, two proposed management units are located on the potentially unstable Stovho-Trebor Association soil type.

Environmental Consequences:

Direct and Indirect Effects on Water Resources

The project area is well-vegetated in this upland region. **Sedimentation and erosion** in the harvesting areas and ephemeral draws would be expected to be negligible. Road construction and use could cause sediment movement. Application of specific mitigations measures, BMPs, and R2 watershed conservation practices identified for the would minimize project sediment delivery (see mitigation in Section 2.5.10). Overall, it is expected that sediment movement would be negligible because new road segments would be closed upon project completion and overall road density would be reduced from 4.1 miles per square mile to 2.7-2.8 miles per square mile.

None of the proposed activities would impact **riparian areas** or the vegetation of riparian areas, as these areas would be excluded from any proposed management activities. This practice would help ensure that soil disturbances are minimal and that mechanisms for resource disturbance or off-site soil movement are not provided. In other upland areas, any sediment entering the fluvial system would likely be retarded from movement further downstream.

Water yields attributable to vegetation treatments at this level are transitory and immeasurable because of the variables involved. The general project area may see a temporary increase in episodic peak flow runoff as project road construction, reconstruction, and use increase the overall drainage density until forest floor vegetation has sufficiently recovered and roads are closed. The proposed timber harvest activity would not be expected to have any direct or indirect effects on water quality. Harvest would not occur during periods of wet weather, including typical spring rainy season and snow melt runoff). Properly installed and maintained BMPs would ensure the effects of the proposed action meet Revised Forest Plan standards and guidelines.

Alternative A would not contribute to the Revised Forest Plan goal of sustaining or enhancing water yield because continued forest growth and density would reduce watershed yield.

Direct and Indirect Effects on Soil Resources

Timber harvest activities, including felling, skidding, decking, transporting of logs off-site, and slash disposal, can affect soil resources. Potential effects to soil resources include soil compaction, displacement, and furrowing. Prescribed burning can cause heat damage to soil, damage micro- and macro-organisms, and remove the protective litter and debris layer. Prescribed underburning conducted when soil moisture is adequate can be expected to improve soil health and robustness by adding nutrients to the soil (including micro- and macro-organisms).

Loss of soil nutrients is a potential indirect effect of the action alternatives. The majority of soil nutrients are concentrated in the foliage, branches, and the root system of trees. Where whole-tree yarding is prescribed, some of the nutrients are removed while some remain on-site in the roots.

Accelerated soil erosion is likely to occur temporarily following ground-disturbing activities as mineral soils are exposed to the forces of the weather, especially raindrop impact. Nutrient removal resulting from timber harvest activities would be mitigated by implementing Revised Forest Plan standards and guides regarding nutrient removal and

down woody material (objective 212, standards 1102, 2307, 2308) (see mitigation in Section 2.5.4).

Placement of slash on exposed soils, in addition to other proposed mitigation measures and BMPs, would reduce sedimentation and runoff. Over time, ecosystem and watershed health enhancement benefits would be expected from leaving the slash. As the slash decomposes, the organic matter feeds micro- and macro-organisms that develop soil structure.

Some soil compaction caused by skidding on designated skid trails would be likely and may persist for up to 10 years. By re-using existing landings and skid trails, creation of additional areas of compaction can largely be avoided. The effects of alternatives B, D, and F on watershed and soil resources would remain within Revised Forest Plan standards and guidelines. WCPs, BMPs and other mitigation measures listed in Section 2.5.10 would reduce effects to an acceptable level.

Cumulative Effects:

Past, current, and foreseeable activities in the analysis area that could impact watershed and soil resources are identified in Section 3.1. The Power and Geranium vegetation management projects are adjacent to Riflepit but separated by a hydrologic boundary. Therefore, sediment delivery to or from the Riflepit project from either of these projects is precluded.

The Cement project area is currently proposed for management actions, and environmental effects analysis is in progress. Runoff from the Cement area is expected to enter the lower drainage downstream of the Riflepit project. The proposed Moskee project area also drains into the same watershed as the Riflepit project area, although analysis has not yet begun. Flow regime of the Riflepit project area watercourses is ephemeral. Generally, the ephemeral water courses, meadows, and uplands are stable and well-vegetated. The ephemeral nature of the stream flow and the filtering effect of the meadows and vegetated channels serve to minimize any off-site sediment movement. Therefore, current sedimentation, water quality, and erosion conditions are not expected to change as a result of this project, and none of the alternatives would be expected to contribute cumulatively to the proposed Moskee or Cement projects downstream.

Due to the overall distance from the project area, perennial and intermittent streams below the four watersheds are not expected to experience a cumulative increase in sediment loads as a result of the proposed activities.

3.3.2 Transportation System

Affected Environment

There are currently approximately 54 miles of roads on National Forest lands in the project area. Present road density is approximately 4.1 miles per square mile, which is well above the 2.8 miles/sq. mile forest-wide road density average. The only paved road is US Highway 85 on the south end of the project area. Main gravel roads include National Forest System Roads (NFSRs) 105.1, 106.1, 107.1, and 175.1. The total of 54

miles includes 20 miles of non-system roads (generally two-track, native-surface roads). The remaining 34 miles are part of the National Forest road system. They provide access to private land, recreation sites, utility lines, and forest stands. Snowmobile trails run on or along 5.5 miles of system road and 5.0 miles of non-system roads. Most roads are open at least in summer. Several roads are gated seasonally or year-round, but some forest gates are subject to vandalism and often are not functional. Closures using large rocks, stumps, or other barriers are more effective, although gates are preferred when access to improvements such as stock watering tanks is needed.

Alternatives B, D, and F include road construction and/or reconstruction to accommodate planned harvest of timber stands. Roads identified for closure or decommissioning would be closed or decommissioned as funding and opportunity allows. Transportation system changes are shown on the alternative maps in Appendix C of this document.

Environmental Consequences: Direct and Indirect Effects

This discussion addresses effects related to **issue 3,** "effects of transportation system management" (see Section 1.5.2).

Under alternative A, road density would not change. No new road construction or reconstruction would occur. Road maintenance under existing authority would continue.

Alternatives B and D propose construction of up to 1.6 miles of new roads. These roads would create or improve access to stands proposed for treatment in accordance with Revised Forest Plan standard 9105 and guideline 9201f (USDA FS 1997). These roads would be closed upon project completion. Nearly 13 miles of roads would be targeted for decommissioning under the three action alternatives. Decommissioning is authorized by Revised Forest Plan standard 9106 (USDA FS 1997). This would reduce density in the project area to 2.7 to 2.8 miles per square mile (see table below). Reconstruction and maintenance under the three action alternatives would take place in accordance with Revised Forest Plan standards and South Dakota BMPs. Proper application of BMPs would minimize sediment movement and prevent sediments from entering stream courses.

Table 30. Summary of Proposed Changes to the Transportation System by Alternative

Activity	Miles (approximate)			
	Alt A	Alt B	Alt D	Alt F
Roads constructed	0.0	1.6	1.6	0
Roads reconstructed	0.0	14.2	14.2	6.7
Pre-use road maintenance	0.0	23.0	23.0	18.4
System roads decommissioned	0.0	0.5	0.5	0.5
Non-system roads decommissioned	0.0	12.5	12.5	12.5

Activity	Miles (approximate)			
Roads open summer only	0.2	8.6	6.3	6.1
Roads open all year	48.3	24.2	20.9	20.9
Roads closed all year	5.2	3.7	9.2	7.9
Total Forest Service roads	**53.7**	**36.5**	**36.4**	**34.9**
Total road density (miles of roads per square mile of land)	4.1	2.8	2.8	2.7

Table 31. Proposed Changes to Road Density

Proposed Changes	Miles of roads per square mile of land (system and non-system roads)			
	Alt A	Alt B	Alt D	Alt F
Roads open summer only	0.01	.66	.48	.46
Roads open all year	3.87	1.85	1.6	1.6
Roads closed all year	0.4	.29	.71	.6
Total road density	4.1	2.8	2.8	2.7

Cumulative Effects on the Transportation System

The cumulative effects analysis area for this resource is the project area, including both National Forest system lands and those under other ownership.

Since the 1870s, many roads have been established in the project area. Some of these roads may have resulted from timber cutting and settlement that took place before the National Forest existed. The Forest Service constructed some roads for management access while others continue to appear as drivers pioneer new paths on the project area's relatively gentle, open terrain. In recent decades, closure of damaged or unneeded roads has begun to take place, with varying degrees of success. Construction of short road segments continues to occur on National Forest lands and may continue to occur in the future, depending on management emphasis. Proposed timber sales identified in Section 3.1 of this report may include additional road construction, road closures, and decommissioning. The combination of these actions could affect National Forest access for the Riflepit area. Further road closures may take place as timber sales close and maintenance costs increase. Road construction takes place on subdivided private land and will likely continue. The action alternatives would result in a decrease in road miles.

3.3.3 Fire Hazard and Fuels

Summary

Based on the issues identified for this project and Revised Forest Plan direction, three analyses are needed to disclose effects on fire hazard and fuels in the project area:

1. Effectiveness of treatments in reducing the potential for damaging crown fires;
2. How treatments would change fuel loading; and
3. Potential tree mortality associated with wildfire and prescribed burning.

Historical practices such as leaving slash, not thinning small trees, and lack of underburning have resulted in increased fuel loading and the potential for high tree mortality during wildfires. Alternative A would take no corrective actions to address fire hazard or fuel management. Under the action alternatives, fire hazard reduction and other fuel management would take place through a variety of fuel treatments, including varying amounts of commercial harvest. Treatments would lower the hazard of crown fires and thereby reduce the likelihood of high fire-related tree mortality.

Affected Environment

Fire suppression and logging have been the predominant disturbances creating the present forest structure. Fire suppression and logging have led to: 1) maintaining large areas of continuous, moderately dense forest, 2) maintaining a fairly dense, multiple-layered conifer structure in pine, and 3) creating dense understory layers of conifer regeneration. These management practices result in forests that can produce or sustain crown fires or more intense surface fires, which cause mortality in most trees.

A few small fires (less than five acres) have occurred within the project area during the last 30 years. No fires greater than 50 acres are recorded in the Forest's fire history database.

Some harvest has occurred recently on private land within the Riflepit project area. Small slash piles are present at the edge of harvest units. These piles will likely be burned in the near future.

The Revised Forest Plan requires that all wildfires in the project area be suppressed (Standard 4101 for MA 5.1) (USDA FS 1997). Current fuel loading (dead and down trees, branches, needle and leaf litter, grass litter) is generally light, ranging from one to two tons per acre in the grass/meadow types and three to ten tons per acre in the ponderosa pine and hardwood types. The abundant grass and juniper within the project area could, however, create wildfire flame lengths greater than six feet. In some places, low crown base height, high crown bulk, and dense pine regeneration increase the potential fire hazard (fuel flammability) and risk (fire occurrence). Fires starting in these types of fuels can spread rapidly and quickly exceed five acres. The fire suppression objective is to control fires before they reach five acres in size, when they are relatively easy to control.

Environmental Consequences: Direct and Indirect Effects

Concern over possible escape of prescribed burns is part of issue 4 (see Section 1.5.2). The effects analysis of fire hazard and fuels management address this issue.

Alternative A:
Suppression of all wildfires would continue. MA 5.1 direction prohibits management (non-suppression) of natural ignitions (Wildland Fire Use for Resource Benefits, or WFU).

Because no management activities would take place that would abruptly modify vegetation, the existing vegetation, fuels condition, and subsequent fire types would gradually change over time. Ground fuels would continue to accumulate from annual needle cast, dieback, and tree breakage.

Tree mortality would continue to add surface fuel loads in the absence of fire. Natural regeneration of pine would continue, typically in stands with more open canopies. Conifer stands developing multi-layered structure or dense stand crowns would continue to increase the risk of sustained active crown fires (fire burning through tree crowns instead of along the ground). Crown fire started in one stand can carry into other stands if the tree canopy is dense.

Crown fire and torching cause high tree mortality. Hardwoods, which are sensitive to fire, would die and then sprout from the stump or roots. Forest structure would change.

Alternatives B, D and F:
Prescribed burns (pile burning and underburning) are a major feature of all action alternatives. Burn plans required for all management-ignited fires would consider weather and fuel moisture factors selected to meet resource objectives while limiting the risk of escape. Mitigation measures designed to reduce or eliminate the potential for escaped fire would include use of firelines and other manmade and natural barriers, and burning in the winter (see mitigation, Section 2.5.12). Required contingency plans would take into account the possibility of a prescribed burn escaping.

A thorough description of the proposed use of prescribed burning is available in the project file. The summary of acres of different fuel treatments for each alternative can be seen in Section 2.4 of this EA.

Recent management activities in the project area were designed to encourage pine regeneration. Passive crown fire potential increases as these young stands of regeneration grow. (Passive crown fire occurs when individuals and small groups of trees torch, but solid flaming in the canopy cannot be maintained except for short periods).

Alternatives B and D propose to treat approximately 520 acres that currently have a crown fire hazard. The combination of cutting vegetation and underburning, or underburning alone, removes enough ladder and surface fuels that a wildfire would likely remain on the ground and not develop into a damaging crown fire. Alternative F proposes the same types of treatments on 575 acres, reducing crown fire hazard on 55 acres more than alternative B or D. The reduction in crown fire hazard and fire intensity would be immediate but short-lived. Models estimate that surface fires could be expected

until about 2016. After this time, seedlings and saplings would be in abundance, creating ladder fuels and increasing the passive crown fire hazard. Thinning of pine regeneration would need to occur by about year 2020 to reduce the crown fire hazard (see Table 32).

Table 32. Comparison of Crown Fire Hazard before and after Treatment, and in Year 2020

Fire Hazard	Before Treatment	After Treatment		Year 2020		
	Alt A	Alt B&D	Alt F	Alt A	Alt B&D	Alt F
Passive Crown Fire (acres)	1,606	1,086	1,031	2,591	1,833	1,466
Surface Fire (acres)	7,288	7,808	7,863	6,303	7,061	7,863

Lopping and scattering slash during harvest would temporarily create a moderate to high **fire hazard risk**. The most flammable part of slash is the needles, which are expected to drop from the branches within 3 years of cutting. Decomposition normally reduces the hazard within seven to ten years. The action alternatives would burn some of the fuel hazard acres, generally within three years of harvest. Alternatives B and D propose minor acreages of slash chipping, which would effectively reduce the fire hazard on those acres. Alternative B would temporarily have the moderate to high fire hazard risk from lopping and scattering slash on 1,997 acres, with 445 of these acres proposed for underburning. Alternative D would have a similar temporary hazard on 2,305 acres, including 566 acres proposed for underburning. Alternative F would have 2,130 acres of temporary hazard, with 1,368 acres of that total planned for underburning. All action alternatives would require fuel break construction in some lop and scatter areas not planned for underburning to comply with fuel treatment guideline 4110 (USDA FS 1997). Overall, alternative F would result in the smallest short-term fuel hazard, alternative D the largest.

Whole-tree yarding, where prescribed, would eliminate fire hazard from slash. This harvest method would pile slash residue at landings and burn it during the winter, generally one year after creation. Stands occurring partially or completely within the WUI zones would be whole-tree yarded. Alternatives B and D would utilize WTY on 598 acres, whereas under alternative F it would occur on 408 acres. Alternative F would require less WTY because proportionally fewer acres adjacent to the WUI would be harvested. Alternatives B and D would effectively reduce fuel hazards on more acres adjacent to private property than would alternative F.

It is unlikely that all harvest treatments would be active at the same time, so slash would be concentrated in different areas at different times during the project. Concern over consuming too much large woody material can be addressed by underburning when large fuels (greater than 10” in diameter) have enough moisture to discourage substantial consumption (standard 2308) (USDA FS 1997). Lighting fire uphill from a log and constructing firelines around logs generally limit consumption of large logs. See also mitigation in Section 2.5.4 for further protective measures.

Some **tree mortality** is expected and desired, particularly in the smaller diameter classes. Burning objectives for all stands are to retain the larger pine trees while removing surface fuels and smaller trees (less than 9" in diameter) so that fire behavior in case of wildfire is less intense (see mitigation in Section 2.5.12). Mortality can be kept below upper limits, particularly in the larger size classes, by using backing fire and removing slash accumulations. The table below shows underburning and meadow burning for each alternative. Tree mortality caused by these proposed burns would vary depending on the burning conditions, characteristics of the stand being burned, and the fuel hazard at the time of burning. Meadow burning is included here because encroaching small trees would be burned to maintain the meadows.

Table 33. Acres of Underburning by Alternative

Fuel Treatment	Alt B	Alt D	Alt F
Whole-tree yarding followed by underburning	191	191	197
Lop & scatter followed by underburning	445	566	1157
Prescribed underburning only	540	550	765
Meadow burning only	208	208	195
Totals	**1,384**	**1,515**	**2,314**

Because alternative F would underburn the most acres, it could potentially cause the greatest tree mortality. Alternative F has the greatest potential for reducing small-tree ladder fuels. Under alternative F, most of the pine stands proposed for burning have been or would be thinned, leaving stands less susceptible to fire-related mortality. Underburning proposed in alternative F has less potential for fire-related mortality of large trees than alternative B or D, under which 122 and 171 acres, respectively, of dense pine would be burned with no prior mechanical harvest. This compares to 36 acres under alternative F.

Again, mortality would vary with each burn, so the amount of mortality cannot be viewed as strictly a function of acres burned. Fire-related tree mortality is due in large part to wind and temperature in combination with live and dead fuel moistures. Firing techniques can also affect tree mortality. These factors are duly considered in burning prescriptions to maintain the acceptable mortality limits as stated in standard 4108.

Cumulative Effects

The cumulative effects area is the project area, including private lands and adjacent proposed harvesting.

Fire hazard and fuel loading appear to have changed considerably since pre-settlement times (USDA FS 1996). Generally, suppression of fire in the last century resulted in a more continuous forest. Though timber harvest reduced fire hazard where dense stands were thinned, lack of low-intensity fires often resulted in a buildup of naturally occurring fuels.

Current standards require reduction of excess fuels resulting from timber sales. In addition to Riflepit, there are several adjacent timber sales planned (see Section 3.1 for description). Areas that have been previously harvested and/or are to be underburned will have a reduced surface fuel loading for the short term.

The North Zone (Northern Hills and Bearlodge Districts) intends to apply control burns to 4,000-6,000 acres annually (Hagen 2003). Proposed prescribed burning in the Riflepit project area and adjacent project areas would contribute to the accomplishment of this program. These projects may overlap during implementation. Slash will be treated according to Revised Forest Plan standards and guidelines. The Power project proposes to treat stands abutting the east boundary of Riflepit. Slash will increase the short-term fuel hazard where in close proximity or adjacent to Riflepit units.

Development of private land increases fire hazards and values at risk. Most of the current structural development within the project area is in Sections 19 and 20, Township 3 North, Range 1 East. Private land in Section 17, Township 3 North, Range 1 East has, however, recently been subdivided, leading to speculation that additional private land development may be imminent. If prescribed burns are completed before additional development occurs, hazard reduction will help protect potential new values at risk. If development occurs before prescribed burning, the additional values at risk would be taken into consideration in the planning and execution of prescribed burns.

The project area is well roaded and can be accessed by routes that are outside the boundary. Continuing to close unnecessary roads and trails for more effective roads management is unlikely to impede fire suppression efforts. The gravel roads within the project area also provide firebreaks, halting the spread of surface fires.

3.3.4 Air Quality

Smoke that is a result of human activities is subject to legal restrictions imposed by state and federal regulations. The Environmental Protection Agency has defined regulated air pollutants as those set in the National Ambient Air Quality Standards (NAAQS) for particulate matter, ozone (ground level), lead, sulfur dioxide, nitrogen dioxide, and carbon dioxide. Open burning is regulated by the State of South Dakota under statute 34A-1-18 (SD Department of Environment and Natural Resources, revised 1993). Open burning proposed under this project would help manage ecosystems and reduce fire hazards.

Affected Environment

South Dakota has one Class 1 area that could be affected by smoke from the project area. Wind Cave National Park is located about 35 miles southwest of the project area in the southern Black Hills. Air quality and visibility is good to excellent in the project area and surrounding areas. Air degradation occurs temporarily from wildfires and prescribed burning or other sources such as dust from roads.

Prescribed burning experience on the Northern Hills Ranger District indicates smoke emissions may impact receptors in the evening and early morning hours. Smoke emissions travel in the direction of transport winds. Prevailing wind directions are westerly (southwest to northwest) with northwest winds common in the winter months. Wind direction and burn duration are key factors in determining smoke impacts to Wind Cave National Park. Burning numerous large piles during the winter could impact the park.

Within the project area are one snowmobile trail and the Hardy Work Center, which is used by the State of South Dakota as a winter trail maintenance facility and office space. Rural residences are scattered in and around the project area. While there are many campgrounds near the Riflepit area, few are open in early spring, fall, or winter when underburning and pile burning would be implemented.

Drainages in the project area flow northwest and northeast. Spearfish Creek and US Highway 85 run parallel to one another and merge with Spearfish Canyon Scenic Byway. Smoke has the potential to collect in this corridor, creating haze, a traffic safety hazard. The Little Spearfish Creek drainage could also carry smoke to Spearfish Canyon. Many rural and urban residents near the project area burn wood for heat. Personal wood burning and prescribed burning smoke can linger in drainages and towns, causing haze during inversions.

Rapid City, located 30 miles southeast of the Riflepit area, has the highest particulate matter levels in the state due to industry types, dry conditions, and geographic features that cause air pollutants to become trapped. While Rapid City meets current air quality standards, some concentrations are near the 24-hour standard. Any large contributions of particulate matter from outside sources could exceed the PM_{10} standard in Rapid City. Burn plans prepared by the Northern Hills Ranger District require a smoke management prescription that predicts emissions, predicts daytime and nighttime smoke paths from the burn site, determines lift heights, and determines acceptable smoke dispersal directions. Local Forest Service personnel, Rapid City Air Quality Division (local air quality program) and the National Weather Service in Rapid City work together to ensure emissions do not exceed standards in Rapid City (Schultz 2002).

Environmental Consequences

Direct and Indirect Effects

Alternative A:
Alternative A, taking no action, would have no direct or indirect effect on existing air quality.

Alternatives B, D, and F:

Alternatives B, D, and F contain similar types of prescribed burning projects, but amount of treated acres would vary (see Section 2.4). Analysis of smoke emissions is based on the same assumptions regarding weather, fuel condition, and sensitive receptors, and the SASEM (*Simple Approach Smoke Estimation Model)* results are in the air quality specialist's report found in the project file.

Table 34. Acres of Burning by Alternative

Treatment	Alternative B	Alternative D	Alternative F
Pile and burn	407	407	211
Whole-tree yarding followed by underburning	191	191	197
Lop and scatter followed by underburning	445	566	1,368
Prescribed underburning only	540	550	765
Meadow burning	208	208	195
Total	**1,791**	**1,922**	**2,525**

Air quality within and adjacent to the analysis area would be temporarily affected by smoke from underburning, pile burning, and dust from road maintenance. Burning season determines the most likely success of smoke dispersal, reducing negative effects to sensitive receptors. From October through March the probability of inversions is highest, while good smoke dispersal weather is otherwise expected (during pile burning or underburning) from September through April in most years.

Modeling an underburn in the various fuel types with *SASEM* produces PM_{10} (particulate matter less than 10 microns in size) within the allowable daily emissions. Emission amounts of $PM_{2.5}$ (particulate matter less than 2.5 microns in size) are slightly higher and would exceed daily allowance for nearby receptors. This alerts managers to the potential safety problems attributed to haze, and activates mitigation measures, such as discontinuing ignition, shortening ignition time to allow for good venting, employing traffic safety signing, lights, etc., and notifying local smoke-sensitive residents. Duration of ignition can also be regulated to meet PM_{10} standards and reduce haze effects. Modeling suggests smoke produced for 10 hours would meet NAAQS standards, depending on proximity to sensitive receptors. The Northern Hills Ranger District would burn 100-400 acres per day depending personnel, terrain, fuel conditions, burn unit configuration and accessibility. By following mitigation measures (Section 2.5.13), burns are expected to meet or exceed standards for Rapid City, Wind Cave National Park, and towns and residents in the northern Black Hills.

Pile burning generates large quantities of smoke quickly. As winds become greater than 7 mph, concentrations of PM_{10} increase to near-threshold levels within one to two miles of the concentrations of the piles. Piles are generally scattered across the landscape in various drainages, which would not result in concentration of smoke predicted in the model, but if they occur in connected drainages, there is the risk that smoke will exceed standards. More small piles (hand piles) could be burned in a day if the burnout time is consistent with local experience of two to three hours. The short timeframe produces very little residual smoke. By following the mitigation and BACMs (see Section 2.5.13), burning well-cured material, and calculating dispersion, smoke problems can be avoided and PM_{10} standards would be met (150 micrograms per cubic meter).

Road maintenance is best accomplished when the roads are wetted so dust is minimized.

Cumulative Effects, All Alternatives

Cumulative effects of past, present, and reasonably foreseeable activities on air quality are difficult to address. Generally the effects of one activity are completed before another activity begins, or several activities may be going on at the same time (prescribed burning, rock crushing, etc.). Once these activities are completed, the effects on air quality desist and are not cumulative with the next activities.

Reasonably foreseeable activities that would influence air quality include road maintenance, prescribed burning, and wildfire. These can occur somewhat randomly across the District in any given year. The North Zone annual fuels program currently consists of:

- 1,000-1,500 acres of underburning;
- About 1,300 acres of mechanical fuels treatments such as cutting ladder fuels; and
- About 1,200 acres of activity fuels disposal (brush disposal, or BD), which is mostly pile burning.

Wildfires can generate smoke for days or weeks. Consumption of large fuels and live vegetation produce more smoke and particulate matter (PM_{10}, $PM_{2.5}$). Wildfires tend to create smoke throughout the day and night, and PM standards are often exceeded. Crown fire potential would be expected to increase over time, increasing the likelihood of air degradation from wildfire.

Prescribed burning is expected to increase across the North Zone to 4,000-6,000 acres annually. Current schedules call for active timber harvest in many areas across the Zone. The likelihood of burning slash is high. Historic and proposed projects are identified in Section 3.1.

Vegetation management projects may overlap during implementation. Slash would be treated in as timely a manner as possible according to Revised Forest Plan standards and guidelines.

Prescribed burning as proposed in the Riflepit area would be managed with the other prescribed burning to be within compliance with the air quality standards and the combined impact within the airshed. While proposed burn acreages vary modestly between alternatives B, D, and F, coordination of burning between any of these alternatives with burning in other project areas would be comparably the same. Compliance with daily emissions standards would be expected since not all acres of underburning or pile burning would be completed in one day. SASEM modeling is required for any given burn day to ensure that standards can be met.

Presumably the amount of road dust produced at a given time from all activities on all project areas would not exceed standards. The amount that dust would add to PM_{10} cannot, however, be predicted.

3.4 Social and Economic Consequences

3.4.1 Recreation Resources

Affected Environment

Primary recreational uses in the project area are fall hunting, ATV use, and winter snowmobiling. There are no developed campgrounds, picnic areas, or facilities on National Forest lands within the perimeter of the project area. Levels of developed and dispersed recreation use have shown a slight decline over the past five to six years on the Black Hills National Forest.

With implementation of mitigation measures (see Section 2.5.15), all alternatives would meet the Recreation Opportunity Spectrum (ROS) class of Roaded Natural as prescribed in the Phase 1 Amendment of the Revised Forest Plan.

Dispersed Recreation: Though the number one dispersed recreation activity on the Black Hills National Forest is auto travel and driving for pleasure, the Riflepit project area receives relatively little of this use. Driving for pleasure occurs mainly along US Highway 85 (US 85) and Forest Development Roads (NFSRs) 105.1, 106.1, 107.1, 175, 1, and 231.6A. The majority of drivers on US 85 are using the highway as a corridor, passing through the Riflepit area. There are no Forest Development Trails (FDTs) in the project area.

In the fall, hunters use the entire project area. Hunters are generally day users who hunt from their vehicles, use an ATV, or ride horseback to access their favorite hunting spots. Christmas tree harvesting and firewood gathering activities also occur.

In winter, the Riflepit project area and the surrounding environment receives more snow than most other portions of the Black Hills National Forest, drawing snow enthusiasts from across the state and beyond. There are approximately 10 miles of groomed snowmobile trails in the project area. Trailshead Lodge is a popular staging area and destination for snowmobilers, and is located on private land adjacent to US 85 in the project area. The snowmobile trail crosses US 85 on private property just south of the lodge. This is a reasonably safe crossing, but there is potential for a serious accident.

There are four special use permits issued in the Riflepit area. Three hunting outfitter/guides have the majority of their use occurs in the fall. A permit is also issued to South Dakota Department Of Transportation for a right-of-way (ROW) on US 85.

Non-System Roads: The number of non-system roads within the project area has increased over time. These non-system roads/trails are often created in riparian areas, on ridge tops, or in forest openings, causing resource degradation and failing to meet Revised Forest Plan standards for recreation.

Many system roads are located parallel to each other and access the same areas. In addition, many of these roads are closed seasonally to benefit wildlife or other resources. There are sufficient roads to access the area for resource management.

Environmental Consequences

Recreation impacts were qualitatively assessed using the ROS classification, evaluation of logging effects, and the intensity and duration of harvesting activities as they relate to the recreational experience in the project area.

The cumulative effects analysis area for recreation is limited to the project area, including both National Forest and private lands. Cumulative effects on recreational resources are evaluated on changes in recreational usage (increases vs. decreases in use levels and shifts in types of use).

The past, present and reasonably foreseeable actions that may affect recreation in the project area include private land development, proposed timber sales, and National Guard training. These actions are described in Section 3.1 of this EA.

Direct and Indirect Effects:

Alternative A:

Under alternative A, stands that are currently in a high stocking level would remain so, and additional stands would approach this level over time. As these stands reach higher stocking levels, it would be harder for forest visitors to see any depth into the forest. Some of the stands would remain dense stands of pole-size timber. This alternative would result in less visual variety of the forest canopy than would the action alternatives.

One effect of not treating stands would be the potential of reducing game hiding cover because of increased bark beetle activity. This could cause game animals to seek more suitable habitat, reducing hunting quality in the project area.

Under alternative A the existing number of system and non-system roads would remain on the landscape, retaining high road densities.

Alternatives B, D and F:

The ROS classification of Roaded Natural would be met under all three action alternatives with the implementation of the proposed mitigation measures.

Alternative B could temporarily affect recreation use in and around the treatment units. Short-term direct effects would include increased logging truck traffic, smoke, visual and auditory distraction along NFSRs 105, 106, 175, and 231, and US 85. These effects would mainly impact recreational ATV users and hunters in fall. If winter logging were permitted, snowmobilers could be affected as well. During winter logging operations, there could be a short-term direct effect of displacing game animals, hunters, and snowmobilers.

To reduce these effects, temporary closures and/or signing and restricted haul times may be required to ensure forest visitor safety and reduce user conflicts (see mitigation, Section 2.5.14).

Long-term effects of harvesting would enhance recreational opportunities. It would offer more opportunities for recreation by providing a more diverse landscape and healthier forest stands. After completion of the project, increased forage would contribute to wildlife habitat improvement. Harvesting would also open up the canopy in some areas, providing improved viewing depth into the forest. This also increases the distances hunters can see into the forest.

One indirect effect on recreation resources may be an increase in ATV use along newly created skid trails in designated treatment units. This ATV use is especially a concern in riparian areas and on ridge tops where trail/road scars can be seen from scenic travelways. To minimize potential impacts, all skid trails, landings, and paths created in treatment units would be rehabilitated with slash and seed (refer to soils, vegetation, and fire mitigation measures in Section 2.5).

Effects of Road Closures on Recreational Activities:

Closing and/or rehabilitating roads may mean that hunters and ATV users would not be able to access some areas using motorized vehicles. Even after proposed closures, however, the furthest a person would have to walk or ride a horse from an open road would be 1.5 miles.

Road closures may require increased law enforcement presence in the short and long term. When users realize closures are enforced, most people comply. Some of the hunters who are displaced may sense some frustration of not being able to access their favorite hunt areas by motorized travel. Other hunters may welcome the opportunity to hunt in areas not accessible by motorized vehicles.

Impacts on recreation under **alternative D** would be similar to those described under alternative B, with a few exceptions.

Most treatment units to the south of US 85 (between Trailshead Lodge and O'Neil Pass) would be burned following treatment. Recreationists driving for pleasure along US 85 would notice more smoke and logging activities than under alternative B. These effects would be of short duration.

All other effects relative to hunting, snowmobiling, ATV users, special use permittees, and roads would be the same as under alternative B.

Impacts on recreation under **alternative F** would be similar to those described under alternative B, with the following exceptions.

Harvest units and burning activities would be concentrated in the southern portion of the project area under alternative F. Harvesting and burning activities may have a greater impact on private landowners and recreational users along main travelways than under the other action alternatives. To minimize potential conflicts with recreation users in and around treatment units, mitigation measures described under alternative B would also apply to this alternative.

Recreationists driving for pleasure would probably be affected more than other user groups. As under alternative D, smoke mitigation measures would minimize these effects to an acceptable level.

Cumulative Effects

Alternative A:

Past and proposed management activities outside the project area have created a mosaic of forested areas interspersed with meadows and some pockets of hardwoods and spruce, providing diversity in the landscape. During ongoing management activities outside the

project area, recreational users may be displaced to the Riflepit area. This displacement is considered a short-term effect of the harvesting activities. The long-term effect would benefit recreational users by improved wildlife habitat and scenic enhancement.

The effects of ongoing private development adjacent to Forestlands could have negative effects on recreational resources. User-made roads and trails may result as landowners use adjacent National Forest System land for recreation.

Motorized use (ATV, motorcycle, etc.) would probably continue to increase in popularity under all alternatives. Without active management of existing non-system roads and prevention of creation of new roads, resource damage along these routes would continue to occur and increase throughout the project area.

Alternatives B, D and F:

The effects of private land development and land exchanges would be the same as those described under alternative A.

The combination of the Riflepit project and the ongoing and proposed timber sales listed earlier may have short-term direct effects on recreational users. Recreationists using the area may be displaced to other areas. Vegetation treatments planned outside the project area should have minimal effects on recreation, since these projects will be using different road systems.

National Guard training would likely continue regardless of harvest activity. Coordination between project and Guard activities would be necessary. The effect on recreation would be minor and temporary.

3.4.2 Scenery Resources

Affected Environment

Existing Landscape:

Most of the predominantly pine forest has been intensively managed for a long period of time. Management over time has resulted in an extensive network of roads. Spruce, aspen, other hardwoods, and meadows also occur on the landscape. Understory species include Oregon grape, willow species, common juniper, buffaloberry, snowberry, kinnickinnick, chokecherry, thimbleberry, wild rose, and salmonberry. Common wildflowers include lilies, yarrow, lupine, pea vine, and wild geranium.

Grazing allotments on the forest include dispersed meadows intermingled with stands of aspen, some birch, and pine overstories. Ranching is part of the cultural heritage of the area, and range improvements are generally accepted as components of the valued landscape character unit. Fire has also played a key role in the shaping vegetative mosaic of the landscape.

Forest lands serve as a backdrop for the mostly undeveloped private lands within or adjacent to the project area. Most occupied, developed private lands occur near US

Highway 85. A new subdivision is proposed in the area, and more private lands are anticipated to be developed.

This area provides recreation opportunities including hunting, snowmobiling, cross-country skiing, hiking, camping, and horseback riding. The unique Sturgis Motorcycle Rally draws thousands of tourists and 'bikers' who enjoy sightseeing in the Forest.

Existing Scenic Integrity:

Existing scenic integrity represents the current status of a landscape. Existing scenic integrity is the current visual state, which is measured in degrees of deviation from the natural appearance of the landscape character type. The existing scenic integrity in the project area is Low to Moderate with some High along US 85 (refer to Table 35). The majority of the area is consistent with a natural-appearing landscape with past management activities being subordinate to the natural environment.

Inventoried Scenic Classes and Scenic Integrity Objectives (SIOs):

Scenic class values demonstrate the importance of the views in different areas. Scenic class values 1 and 2 represent a high concern for scenery; scenic classes 3 through 5 represent a moderate public concern for scenery. The inventoried scenic classes in the project area are 1 through 5.

SIOs were adopted from the scenic class values. Areas with High SIO should appear natural and management activities should not be noticeable within one year after completion of the project. Areas with Moderate SIO should appear only slightly altered from the more natural appearing forest. Areas with Low SIO should appear moderately altered with management deviations becoming more noticeable. Management activities should not be noticeable within three years after project completion. Approximately equal amounts of the project area are assigned an SIO of Low or Moderate. There are a few scattered areas of High SIO.

Sensitive Travelways and Areas:

The project area is most visible from Sensitivity Level 1 and 2 travelways and occupied private lands.

Sensitivity Level 1 travelways include US Highway 85 along the southern edge of the project area. The management of this corridor should attempt to protect and enhance scenic and vegetative diversity in tree age, spacing, and species. Older, mature trees and unevenly spaced trees should be emphasized. Opportunities to expand or maintain aspen, spruce, and non-pine stands should be considered whenever possible.

Table 35. Proposed Treatment Units within Sensitivity Level 1 (US Highway 85 Corridor)

RIS Stand	SIO	Scenic Class	Alternative
70504 – 38	High	1	F
70504 – 39	High & Moderate	1 & 2	F
70504 – 84	High	1	B, D & F
70504 – 95	High & Moderate	1 & 2	B, D & F

70505 – 41	Moderate	1 & 2	B, D & F
70505 – 43	Moderate	1 & 2	B, D & F
71301 – 1	High & Low	1 & 4	D & F
71301 – 2	High & Low	1 & 4	B, D & F
71301 – 43	High	1 & 4	D & F
71301 - 101	High	1 & 2	B, D & F

Most of the stands listed above and 33 other proposed treatment stands are visible from dwellings on private land within the project area. Stands are listed in the Scenery Management Specialist's Report, located in the project file.

Sensitivity Level 2 travelways include NFSRs 105.1, 107.1, 175.1, 231.1, and the southern two miles of 106.1. Forested areas should appear natural with vegetative treatments creating a balance of differing structural stages (UDSA 1995 p. 8). The remainder of the project area is considered Sensitivity Level 3.

Landscapes adjacent to private lands with homes are given greater consideration when designing treatment units. Attempts should be made to minimize the sometimes strongly defined line between private and Forest Service ownerships.

Environmental Consequences

Direct and Indirect Effects

Scenery resources were analyzed for the Forest lands within the project area. With prescribed mitigation, all alternatives would meet the Scenic Integrity Objective classes prescribed in the Phase 1 Amendment..

Scenic impacts were qualitatively assessed using SIO classification, evaluation of logging effects, and intensity and duration of harvesting activities as they relate to scenic resources in the project area.

Alternative A:
No timber harvesting or roadwork would take place under alternative A.

Effects on scenic resources from not implementing any timber treatments in this area would include:

- Lost opportunity to increase visual variety and depth by enhancing aspen stands and meadows.
- The risk of the spread of beetle activity would increase with the lack of vegetative treatment. This could lead to beetle-killed ponderosa pine stands scattered across the landscape. This would not meet Revised Forest Plan direction for timber management, nor for scenery management along Sensitivity Level 1 travel routes.

Alternative B:
Alternative B emphasizes commercial thinning, shelterwood seedcuts, and shelterwood removals to reduce the current risk of mountain pine beetle infestation and improve long-term forest growth and yield. These treatments would also increase forest diversity by

changing the forest age-class distribution on the landscape, enhancing meadows and quaking aspen stands, and retaining some large trees.

Silvicultural prescriptions are described in Section 2.1: Treatment Definitions. Effects of implementation of silvicultural prescriptions would include:

Shelterwood preparation harvests would create more open stand textures and color in foreground and middleground views, but changes would be subtle.

Shelterwood seedcut treatments include retaining the well-formed characteristic overstory pine and clumps of hardwoods, creating:

- Openings combining the large seed trees and clumps of hardwoods to provide visual variety in the landscape of color, line, texture, and form.
- A park-like setting. Forest visitors would see farther into the forests than before, increasing visual variety.

Shelterwood removal would cause the most visual change by harvesting the large overstory trees and leaving young homogenous sapling stands. Some large trees would be retained for future snags. Units with aspen or other hardwoods would add variety in color and texture. SIO of all proposed units is Moderate or Low, which would be met in the long term with the implementation of mitigation measures.

Commercial thinning would increase health, growth, and vigor of the stand, and reduce risk of insect and disease problems. Many people consider healthy forest stands more visually attractive. Thinning would likely enhance the aspen component, thereby providing more color and textural diversity in the landscape.

Coppice and *coppice with standards* would cause aspen sprouting within the first year, providing a variety of color, texture, and edge.

Stands with *late-succession* characteristics would be underburned, affecting scenic resources by:

- Short-term minor charring of foliage and bark. This effect would be largely overcome within one year. If, however, the surface fire becomes too hot, potential long-term direct effects such as mortality of pole-sized trees, scorch marks on trees, and red needles could occur. Mitigation measures would be implemented to assure SIOs are met in Sensitivity Level 1 corridors and around private lands with dwellings.
- Maintaining the open stand characteristics of ponderosa pine.
- Regenerating aspen where present in the burn.

<u>Effects of Prescribed Burning:</u>

Effects of *underburning* on scenic resources would be the same as described above.

Effects of *slash piling and burning* would depend on how long piles were visible prior to burning, effects of smoke during burning, and extent of scorched ground upon completion of burn. Proposed mitigation would minimize effects along Sensitivity Level 1 corridors and around private lands (see Section 3.3.12).

Mechanical *control lines* can create geometric lines that do not appear to be natural. Hand-lines are not as visually obtrusive but can create contrasting lines. Hand-lines re-vegetate within a year of disturbance, lessening visual impacts. In visually sensitive areas, a hose lay can be used for short distances to create a control line. Mitigation measures define which type of line should be used in sensitive areas.

Fuel breaks would affect the scenic resources and visitor experience by opening up stands with thick understory vegetation, creating open, park-like settings and providing more visual depth into the forest.

Other Harvesting Effects:

Skid trails, landings, slash (pile or scattered) and *stumps* can introduce strong color contrasts and lines in the landscape that appear unnatural or out of place, resulting in a reduction in scenic integrity. Mitigation measures would reduce these impacts and the desired SIOs would be achieved.

Effects of Roadwork on Scenic Resources:

The action alternatives propose various actions on area roads. The roads that may affect scenic resources in High and Moderate SIO corridors are:

- RO1 – proposed new logging road adjacent to the High SIO corridor along US Highway 85. If road is located outside the viewshed of US 85, scenic integrity objectives would be met.
- U740017 (proposed conversion to system trail), U740010 and U740014 – proposed decommissioning and rehabilitation. These roads intersect with FDR 175.1 (lower half-mile of each road), which is a Sensitivity Level 2 corridor with a Moderate SIO. Proposed actions would enhance visuals along the corridor.
- U740022 – This road intersects with FDR 107.1 (Sensitivity Level 2, moderate SIO) and is adjacent to the High SIO corridor along US 85. Proposed actions would enhance visuals along said corridors.
- FDR 104.1H, U710010 – Proposed decommissioning. These roads are within the corridor associated with FDR 105.1 (Sensitivity Level 2, moderate SIO). Proposed actions will enhance visuals along this corridor.

With mitigation measures for road work, soil, and water listed in Chapter 2, reconstruction and decommissioning of roads would meet scenic integrity objectives of the areas the roads pass through.

Alternative D:

Impacts on recreation under alternative D would be similar to those described for alternative B, but additional harvest and burning would take place south of US 85 between Trailshead Lodge and O'Neil Pass. Recreationists driving for pleasure along US 85 would notice more smoke and logging activities than under alternative B. These effects would be of short duration.

Alternative F:

Impacts on scenic resources under alternative F would be similar to those described under alternative B, with the following exceptions.

Under alternative F, more treatment units and burning activities would be concentrated in the southern portion of the project area. Harvesting and burning activities may have greater short-term impacts on private landowners and recreational users along US 85, NFSRs 106.1 (south half), 107.1, 108.1, and 175.1.

Alternative F proposes to treat fewer units by shelterwood removal cut and coppice systems. The negative effects on scenic resources resulting from these types of treatments would be less pronounced under this alternative. This alternative would best emulate forest patterns and types known to exist under historic fire cycles in the Black Hills by treating stands in clumps, resulting in less fragmentation of landscape vegetation patterns.

Cumulative Effects:

The past, present, and reasonable foreseeable actions that may affect scenery resources in the project area include private land development and proposed adjacent timber sales (see description in Section 3.1).

The cumulative effects analysis area is the Riflepit project area, private land within the project area, and adjacent proposed project areas. Past management activities created a mosaic of forested areas interspersed with meadows and some pockets of hardwoods and spruce, providing diversity in the landscape.

Alternative A

There are no regulations related to scenic resource management on private lands, so private land management may have a variety of visual effects. Stands with current high stocking levels would remain in this condition under alternative A, and other stands would move towards a high stocking level. As this occurs, visibility into the forest from roads and trails would decrease with time.

Alternatives B, D, and F

The cumulative effects of land exchanges and increased development on private lands would be the same as described under alternative A.

Overall effects of prescribed burning under all proposed actions should move towards a "park-like" appearance, a characteristic generally desired by the public.

The combination of Riflepit and adjacent proposed projects would result in a forest with a variety of textures, patterns, and seasonal colors. Hardwood stands and meadows would be scattered across the landscape. Vegetation would display a variety of age classes, sizes, and densities. There would be greater visual penetration and the understory vegetation would be more visible. With proposed mitigation applied, slash would be at natural levels and slash piles would not be evident from highways and private land. The forest would continue to display evidence of management, as stumps would be visible for several decades. The planning area would have the open appearance people have come to expect as the “characteristic forest” of the Black Hills National Forest.

No detrimental effects on scenic resources would be expected from the combined past, present, and reasonably foreseeable future activities.

3.4.3 Heritage Resources

Affected Environment:

A Level I inventory indicated there are 16 cultural resources properties in the Riflepit project area that have been evaluated as "eligible" or "potentially eligible" for nomination to the National Register of Historic Places (NRHP). An additional 25 properties have been evaluated as "not eligible" for nomination to the NRHP. Among the 41 total sites are 29 prehistoric sites, 10 historic sites, and two sites containing both historic and prehistoric components.

Environmental Consequences: Direct and Indirect Effects:

Alternative A:

This alternative would have no direct effects on heritage properties. Indirect or cumulative effects on heritage properties may occur from wildfires or erosion.

Alternatives B, D, and F:

Under alternative B, 12 of the 16 previously documented culturally significant properties cited for protection would be located within or adjacent to proposed harvest units, fuel reduction areas, or planned road activities (Riflepit Analysis Area Heritage Report, No. R2003020300014). Under alternatives D and F, 14 of the 16 properties are located within or adjacent to areas proposed for management activities. Specific mitigation measures for each site are listed in the mitigation section of the Heritage Report.

There would be no effect on heritage resources under any alternative provided that all eligible and potentially eligible properties, Traditional Cultural Properties, and culturally significant areas are avoided or effects mitigated as described in the Heritage Report. Mitigation measures were developed in consultation with the South Dakota State Historic Preservation Office, Native American Tribal Historic Preservation Offices, and other applicable interested parties.

Timber and **fire management treatments** would result in various degrees of soil disturbance. Timber harvesting, skid trails, temporary road use, landings, equipment storage, and piling and disposal of slash can adversely affect heritage resources. Additional effects on heritage resources can occur as a result of low, moderate, and high intensity burn activities. This includes the construction of both hand and mechanical fire lines and breaks. Alternative D would disturb the greatest number of acres, followed by alternatives B and finally F. Alternative A would result in no additional ground disturbance. As the amount of potential ground disturbance increases, the potential for disturbance and adverse effects on heritage resources also increases.

Under alternatives B, D, and F, disturbance of heritage resources would be minimized through identification and avoidance or mitigation. Under any of the action alternatives,

the Forest Service would be in compliance with Section 106 of the National Historic Preservation Act if appropriate avoidance or mitigation measures are implemented.

Heritage resources can be adversely affected by **road construction and reconstruction** activities. Adverse effects can also occur under certain conditions through use of temporary roads and road maintenance, closure, and decommissioning activities. Effects on heritage resources are of particular concern where two-track roads are subject to maintenance and use as temporary roads. In most cases, mitigation using barrier cloth and additional material fill can reduce damage to heritage resources.

Alternative D would result in the greatest number of miles of road and hence have the greatest potential to affect heritage resources, followed by alternatives B and F. Alternative A has the lowest potential to affect heritage resources.

Alternatives B, D, and F propose road construction, reconstruction, and decommissioning activities, which have the potential to adversely affect significant historic properties. Specific mitigations were designed and addressed for these proposed road activities and are contained in the mitigation section of the Heritage Report. The South Dakota State Historic Preservation Office concurred on April 10, 2003 with the determination that there would be no effect on heritage resources provided the identified mitigation was included in the project. The identified mitigation measures that do not include site-specific information are included in this EA. Those that include site-specific information are found only in the Heritage Report.

Cumulative Effects:

Effects on heritage resources could potentially occur from hazard tree removal along fences and other range improvements, private land boundaries, power lines, new road access, and survey monuments. There would be little or no effect to heritage resources as a result of these undertakings provided that eligible and potentially eligible sites, Traditional Cultural Properties, and culturally significant areas are avoided or effects mitigated in consultation with the State Historic Preservation Office, Tribal Historic Preservation Offices, Native American Tribes, and any other applicable interested parties.

3.4.4 Economics

Affected Environment:

The Black Hills area lumber and wood products industry includes approximately 20 firms in seven counties and employs about 2,000 people (USDA 2001, p. 68). Mills utilize most commercial-sized trees because the industry is well integrated. Products manufactured include a full range of building material, chips, and value-added products such as kitchen cabinets. The sawmills have a combined capacity of about 190 million board feet (MMBF) per year. This is down about 15 percent from the late 1990s. For a detailed breakdown of the industry and its effects on the region's economy, see Revised Forest Plan, Phase I Amendment 2001, pages 68-71.

Environmental Consequences:

Direct and Indirect Effects

Figures comparing economic effects of alternatives B, D, and F were generated for comparative purposes only. Timber prices fluctuate over time and no accurate way is known for predicting future sales value at the time this timber sale may be sold.

The following table shows that the present net value of alternatives B and D exceeds that of alternative F.

Table 36. Economic Summary for All Action Alternatives

Alternative	Harvest Vol. (ccf)	Benefits ($) (present value)	Costs ($) (present value)	Present Net Value ($)
B	18,126	$1,216,908	-$1,032.252	$184,656
D	19,630	$1,311,518	-$1,140,229	$171,289
F	13,934	$ 895,663	-$1,188,476	-$292,813

Alternative B has the higher present net value because, though stumpage revenue would be less, project costs are considerably less than under alternative D. Alternative F has a negative present net value. Considerably more underburning is proposed, driving up the cost, and stumpage revenue would be less because fewer acres would be harvested.

The economic efficiency analysis was generated using QuickSilver, a Forest Service economic analysis program customized for the Rocky Mountain Region and the Black Hills National Forest. Cost and revenue figures were applied from a Black Hills National Forest report updated February 20, 2003 (USDA 2003a). North Zone Engineering staff generated road costs. The Transportation System Report in the project file details those costs. Most of the post-harvest treatment costs were based on the current Black Hills National Forest KV cost report (USDA 2003b).

The detailed values and calculations are in the Economic Effects report in the project file.

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 a specific project's contribution to this effect. Fuel reduction projects can seem costly in the short term, but the cost of a wildfire that may have been prevented by the fuel reduction could be exponentially higher. These costs are 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.

Cumulative Effects:

The proposed project, along with the other projects identified in Section 3.1, would support the regional economy and employment by offering commercial timber products for sale. This is part of a Forest-wide effort to stabilize timber sale offerings at about 70

MMBF annually. Because lumber prices continue to be weak, timber sale offerings alone would not ensure the profitability of the regional wood products industry.

The effects of the ongoing and proposed timber sales on tourism would probably be negligible; both industries have thrived coincidentally for decades.

3.4.5 Environmental Justice

A specific consideration of equity and fairness in resource decision-making is encompassed in the issue of environmental justice. As required by Executive Order 12898 (Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations), all Federal actions will consider potentially disproportionate effects on minority or low-income communities. Consideration of environmental justice issues should be highlighted for decision makers. Potential impacts or changes to low-income or minority communities in the project area due to the proposed action should be considered. Where possible, measures should be taken to avoid impact to these communities or mitigate adverse effects.

Within the project area, there are no communities with significant low-income or minority populations. Lawrence County was 96 percent white and the unemployment rate was 2.8 percent in 1996 (USDA FS 1996). Therefore, specific actions to address environmental justice concerns were not implemented for this project.

4 INTERDISCIPLINARY TEAM AND CONTRIBUTORS

4.1 Interdisciplinary Team

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Lower Brule Sioux Tribe, Cultural Resource Office
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Northern Cheyenne Tribe, Cultural Commission
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Southern Hills Company, Perry Hansen
Spearfish Canyon Resorts LLC

State of South Dakota
USDI Fish and Wildlife Service Fish &
Wildlife Enhancement
Wyoming Game and Fish Department
Wyoming State Historic Preservation
Officer, Wendy Bredehoft

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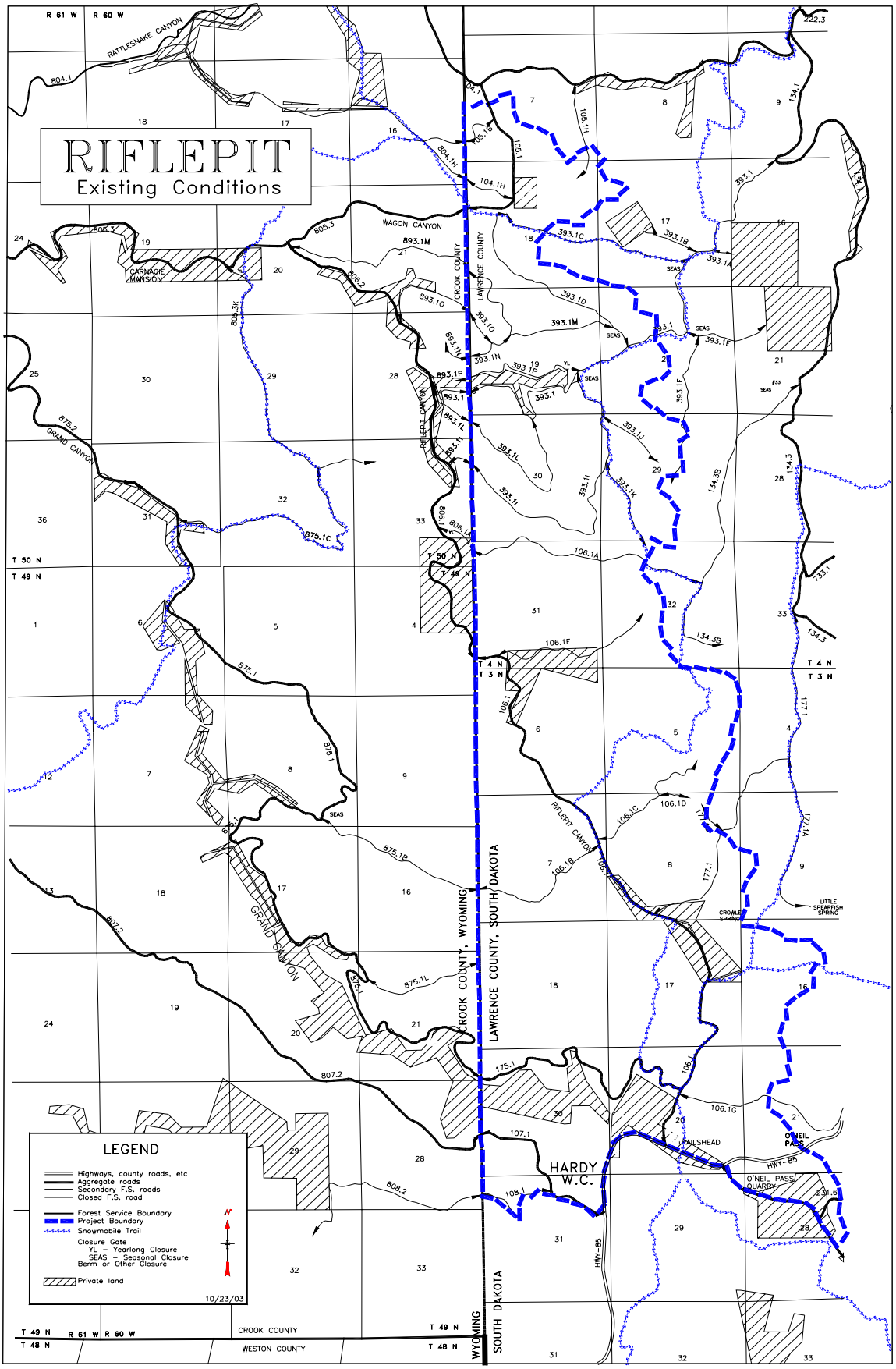
APPENDIX B: MONITORING PLAN

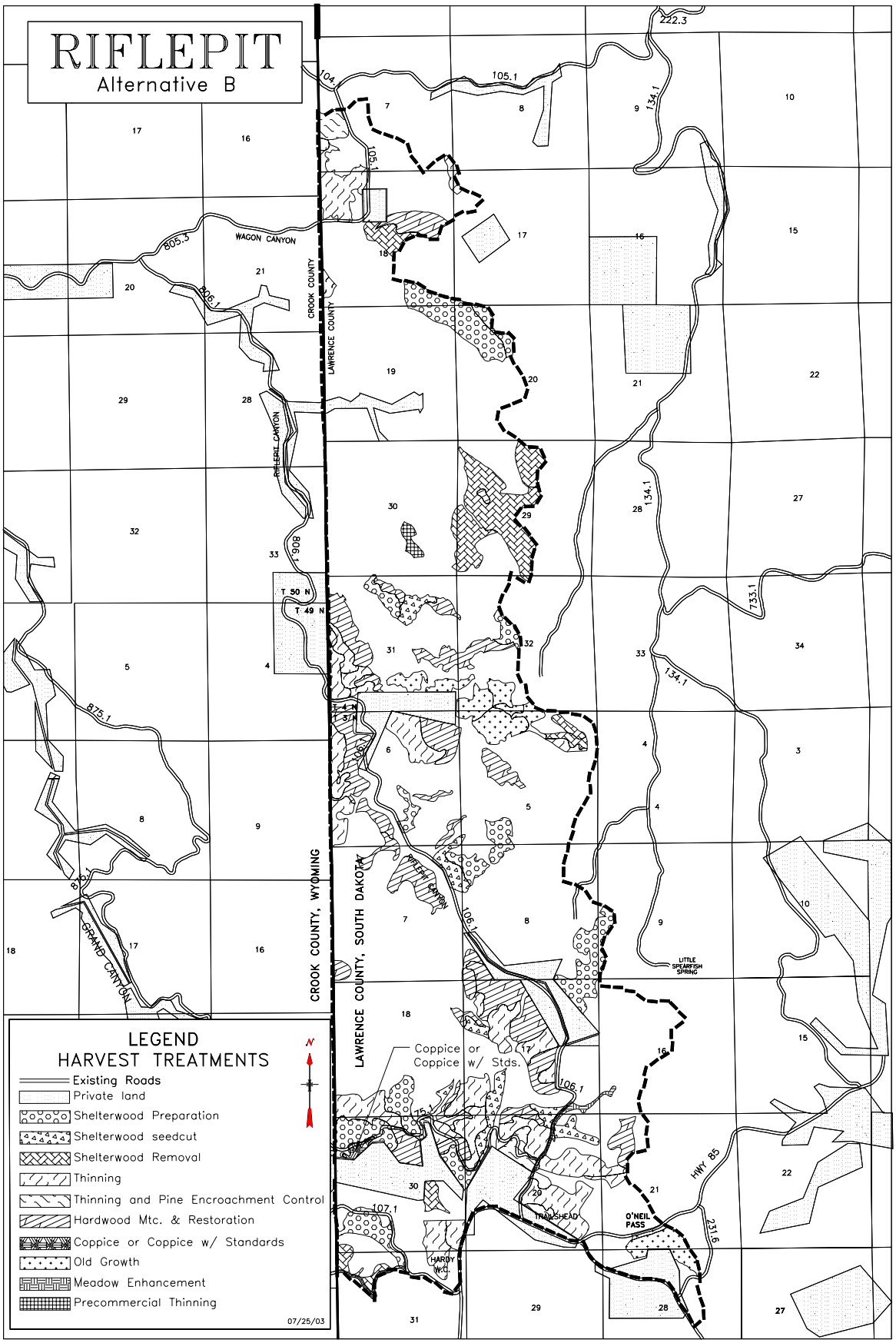
Action or Resource	Monitoring Method	Frequency of Measure	Purpose	Responsible Party
Wildlife				
Big game	Determined by SD Dept. of Game, Fish and Parks	Determined by SD Dept.GF&P	To determine population trends of game species in the Black Hills	SD Dept. GF&P
Management indicator species	Forest-wide field surveys	Annually	To determine presence and population trends of various MIS species in the Black Hills	Forest wildlife biologist or monitoring coordinator
Goshawks	Field surveys during nesting and fledging seasons	Annually	To find goshawks, breeding pairs or nests that may need protection during harvesting or post harvest operations	District or Forest Wildlife biologist
Snags	Field surveys	Following timber harvest	To determine need for snag creation	Wildlife biologist or silviculturist
Trees				
Pine and hardwood regeneration	Regenera-tion surveys	1, 3, and 5 years following harvest	Determine stocking and need for additional protection or treatment	Silviculturist and biologist
Pine regeneration	Site inspection	During unit harvest	Protect pine regeneration in shelterwood removal units	Timber sale administrator
Cutting unit layout and design	Office and field review	Following unit layout, prior to bid offering	Verify compliance with all requirements and mitigation measures, and determine planning effectiveness	Timber management assistant and NEPA coordinator

Action or Resource	Monitoring Method	Frequency of Measure	Purpose	Responsible Party
Visuals				
Visual quality	Office and field review	Before, during & after harvest	Evaluate the marking guides, field timber marking to ensure guides are followed	Landscape architect
Fuels Reduction				
Fuel loading	Site visit	Following underburns	To determine post-burn fuel loading and effectiveness of burn	Fuels 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
Road management				
Newly closed or decommission-ed roads	Check for indications of road closure violations, damage to closures	Ongoing after closure or decommission-ing	To determine effectiveness of closures/decommission-ing methods and show where more work is needed.	Travel management specialist

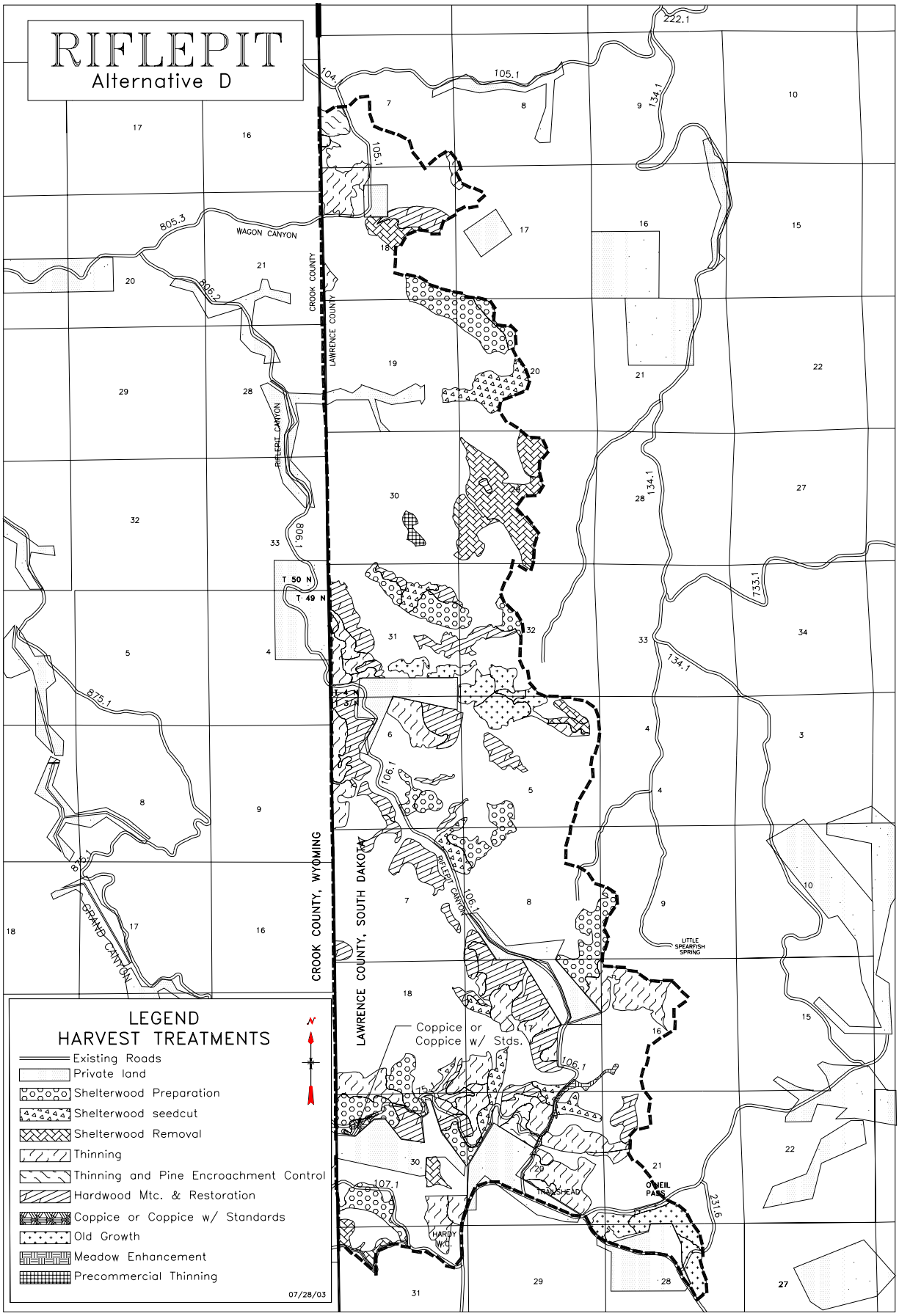
APPENDIX C: MAPS



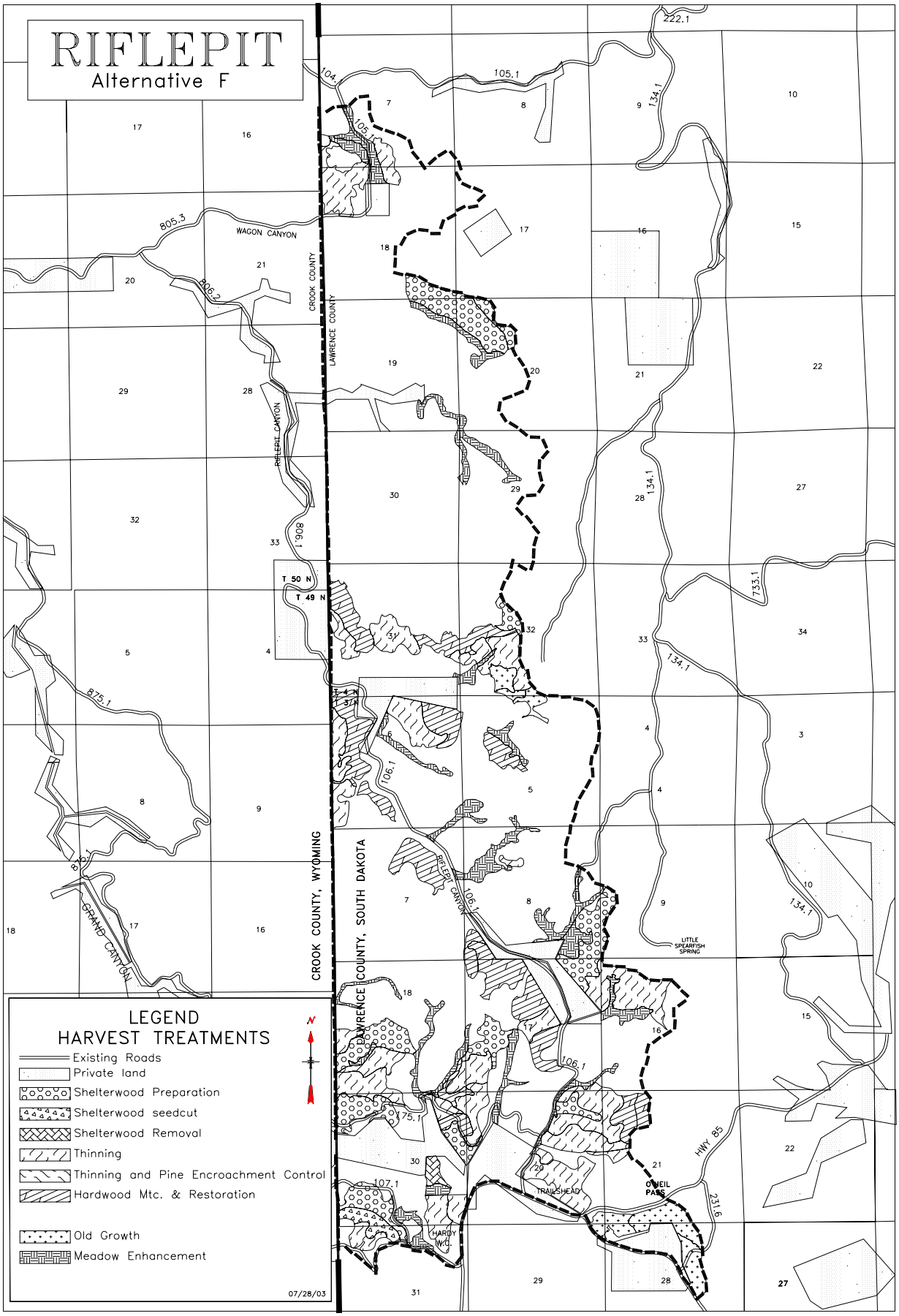
Map 1: Existing Conditions



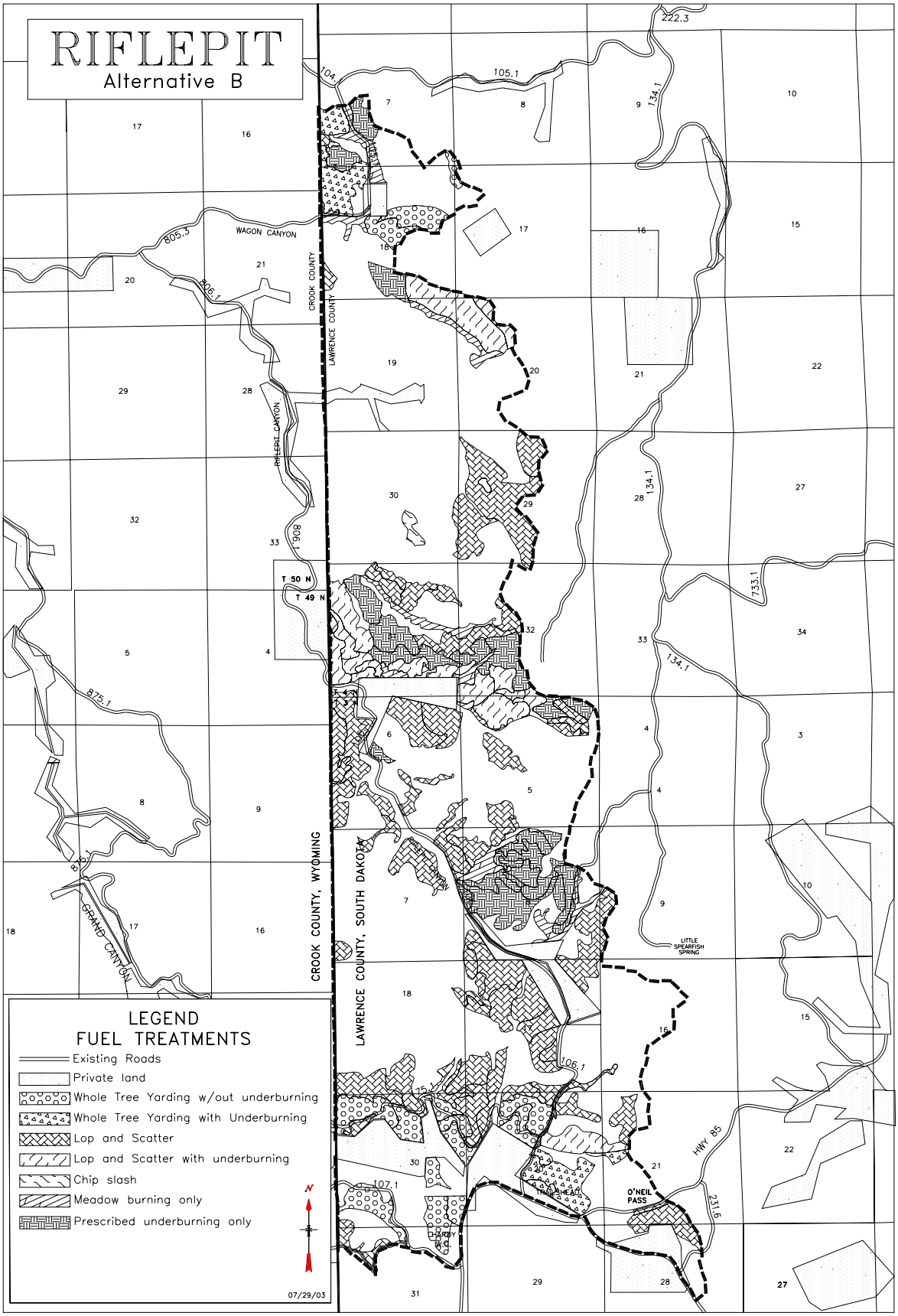
Map 2: Alternative B Harvest Treatments



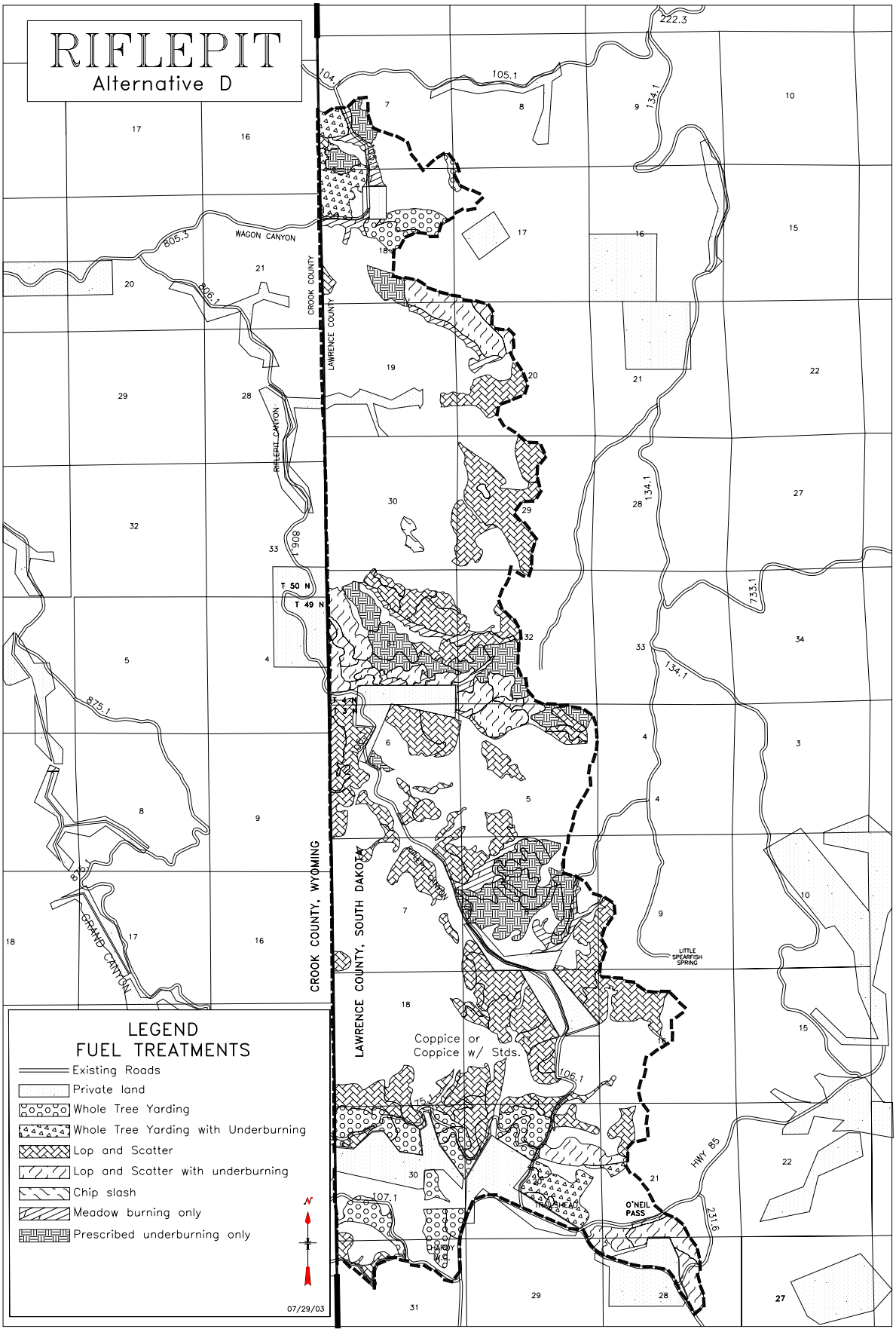
Map 3: Alternative D Harvest Treatments



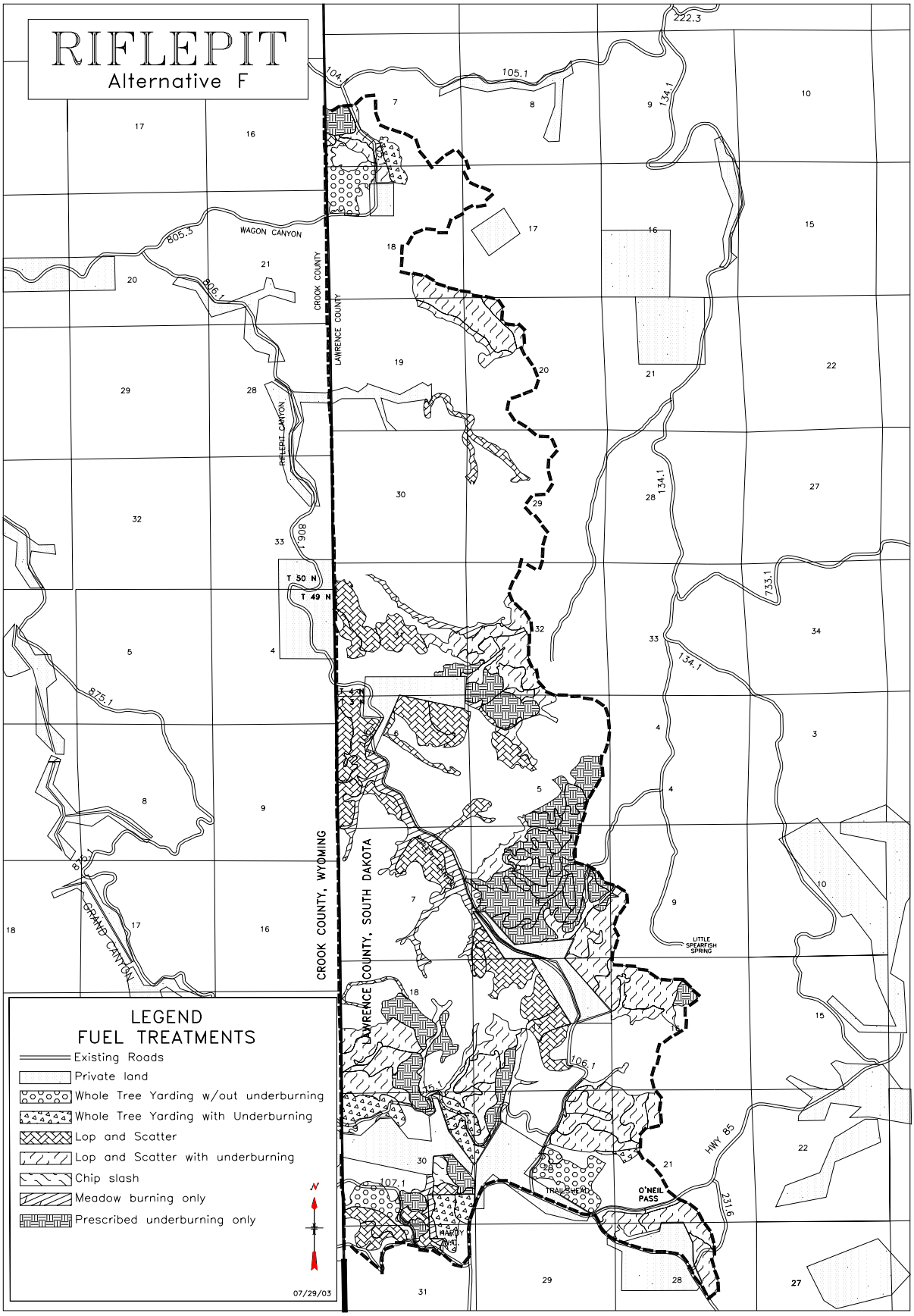
Map 4: Alternative F Harvest Treatments



Map 5: Alternative B Fuel Treatments



Map 6: Alternative D Fuel Treatments



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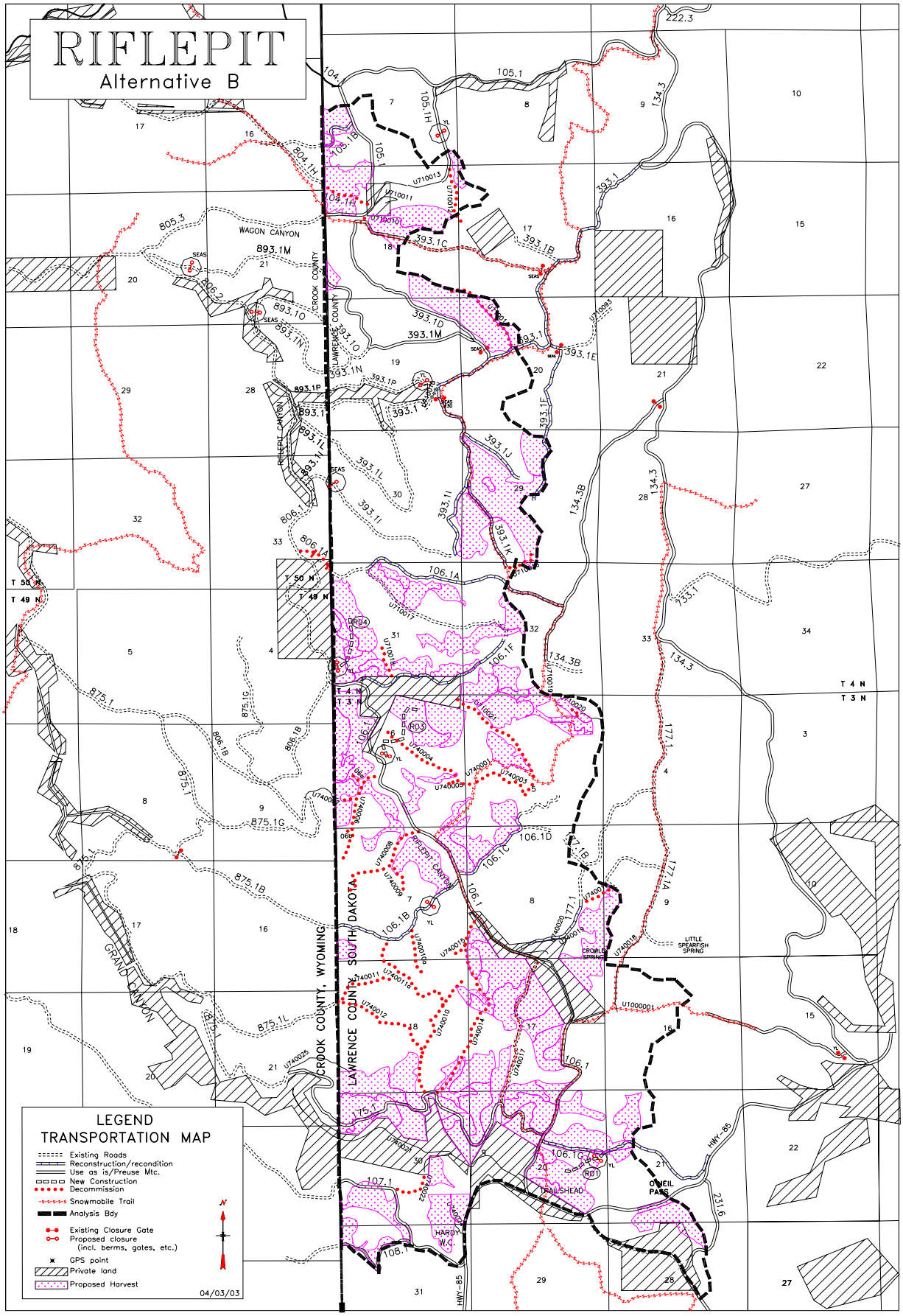
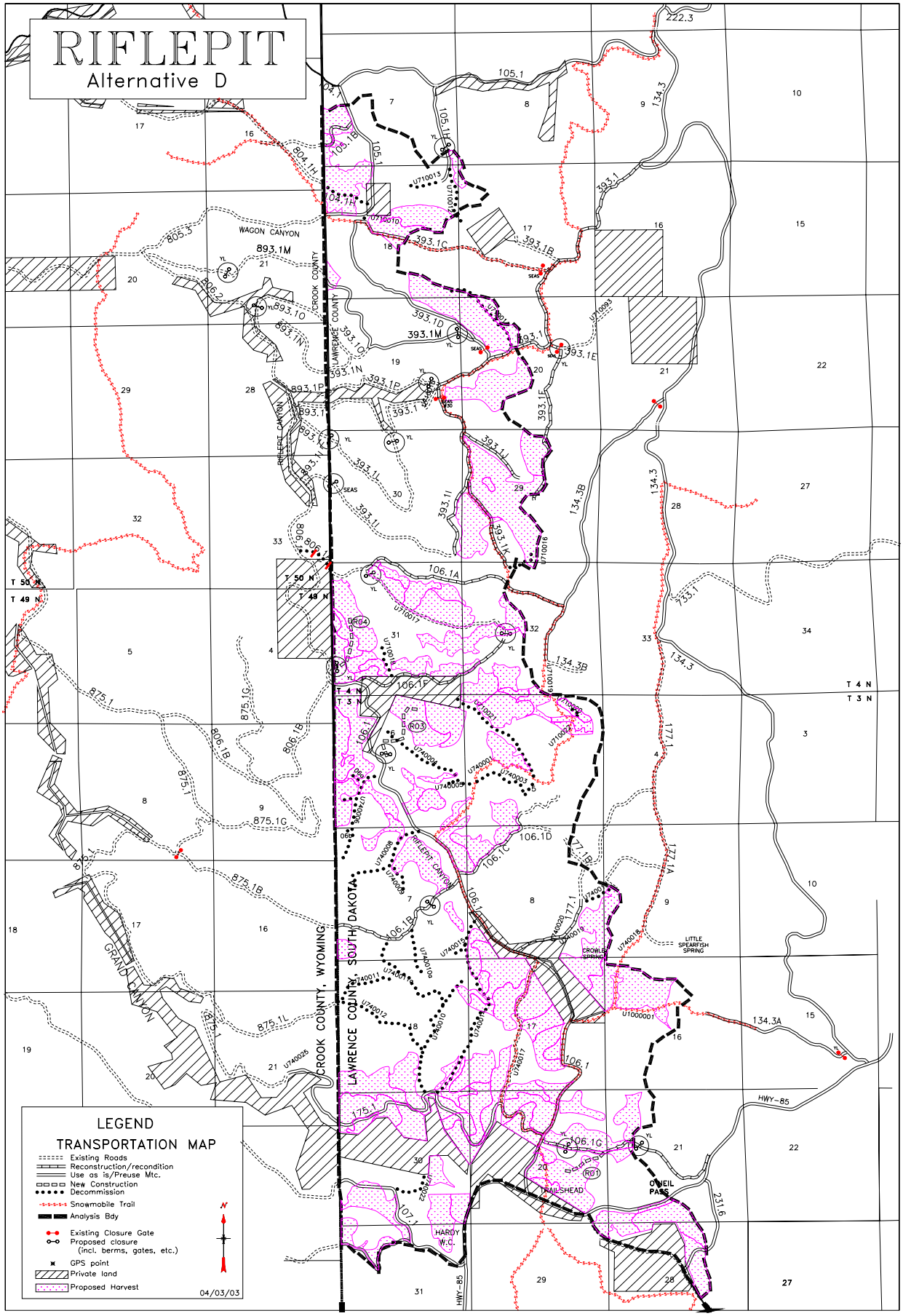
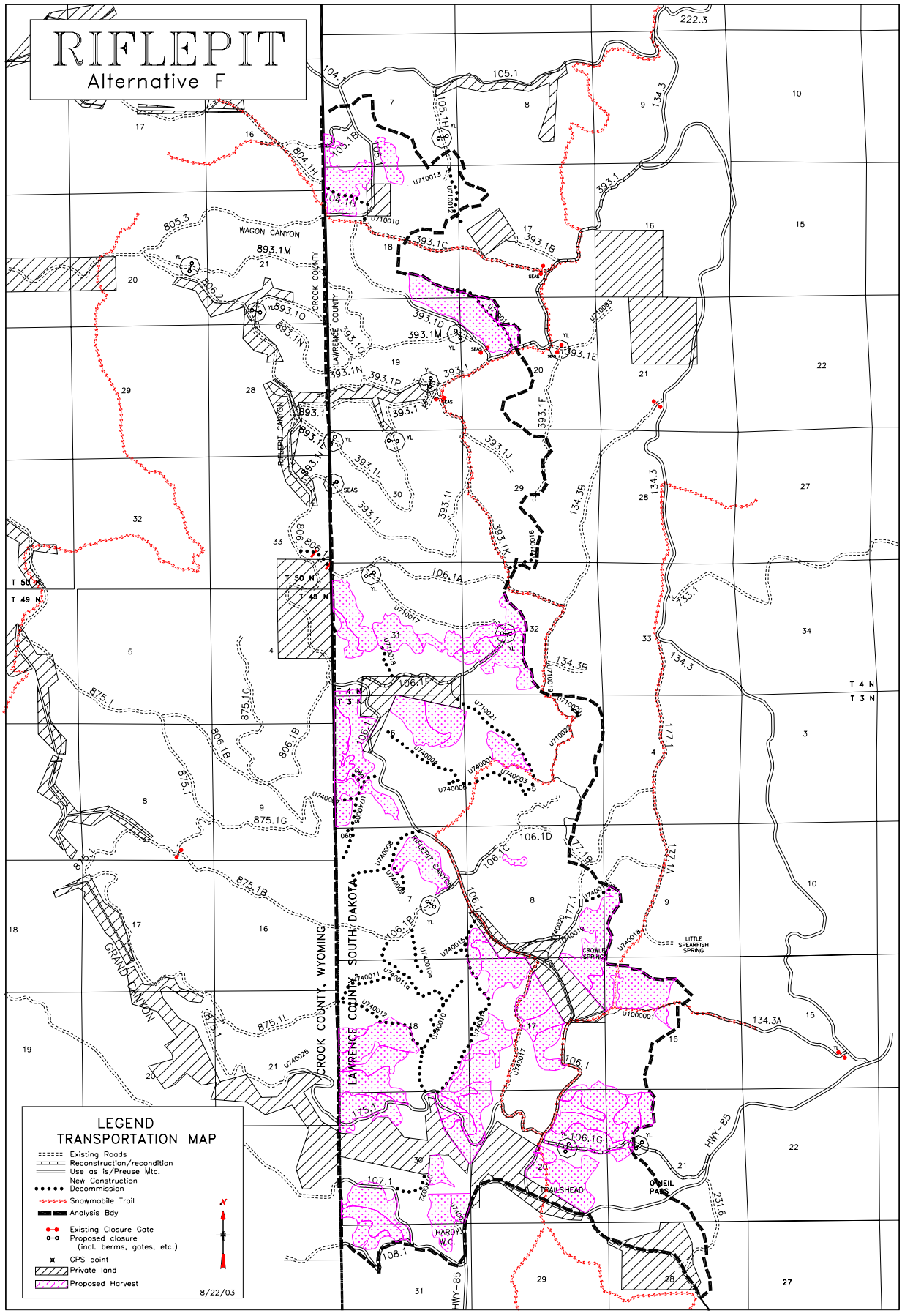


Map 8: Alternative B Transportation Map



Map 9: Alternative D Transportation Map



Map 10: Alternative F Transportation Map