CHAPTER 2 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Introduction

This chapter describes and compares the alternatives considered for the Elk Bugs and Fuels Project, including a description of each alternative considered and a presentation of the alternatives in comparative form. The comparison of alternatives sharply defines the differences between each alternative and provides a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., more thinning near private land) and some is based upon the environmental, social and economic effects of implementing each alternative.

After agency and public comments were analyzed, alternatives were developed by the ID Team to respond to the significant issues described in Chapter 1. Alternatives were developed through consideration of management needs and opportunities as determined by on-the-ground investigations, agency concerns, and public input received through the scoping process. The alternatives display a range of options that: could be implemented to manage the Elk Bugs and Fuel planning area; represent different levels of management; and provide a framework to analyze the significant issues described in Chapter 1. Alternatives eliminated from detailed study are included in this chapter.

Alternatives Considered in Detail

The Forest Service developed four alternatives, including the No Action, Modified Proposed Action and two additional alternatives in response to significant issues.

The tables displaying the proposed activities in each alternative contain various types of silvicultural treatments and road system activities. More information on the types of treatments can be found in Chapter 3. For ease in interpreting these tables, the following brief descriptions are provided:

Vegetative Treatments

Commercial Thinning

Where topography and access allow, conifer stands would be thinned from below to 80 square feet of basal area per acre, or to ½ of their existing stocking, whichever is less. Thinning decreases stand density, increases tree vigor, and reduces stand susceptibility to mountain pine beetle attack. Thinning from below removes the smallest commercial trees in stands and retains the largest dominant and co-dominant trees. In most cases, stands that are commercially thinned would need follow-up treatment to thin the smaller non-commercial trees. Stands with less than 80 square feet of basal area have been found to be vigorous enough to withstand mountain pine beetle attacks.

Non-commercial Thinning

Areas with no access, or ground conditions too rugged for logging equipment, would be thinned as discussed in the description of commercial thinning, with the trees left on-site. Smaller diameter trees would be thinned at the same time.

Stands that are of non-commercial size would be thinned to approximately 170 trees per acre.

Note: For both commercial and non-commercial thinning, stands within 200 feet of private land and identified for fuel breaks would be thinned to a wider spacing, with at least 15-20 feet of spacing between tree crowns. Wider spacing would reduce the risk of wildfire spreading through the tree crowns in addition to decreasing the risk on mountain pine beetle infestation.

Commercial Hardwood Restoration

Selected stands would be treated to maintain or enhance the existing hardwoods by removing conifers. Hardwood stands are generally less flammable and burn less readily during a wildfire, so it is desirable to maintain these stands, especially near private lands and homes. In most cases, the natural succession of hardwood stands, in absence of wildfire, is to ponderosa pine. Ponderosa pine often takes over hardwood stands, over time, in the absence of fire. Trees of commercial size would be removed from the site.

Non-commercial Hardwood Restoration

Non-commercial hardwood restoration accomplishes the same purpose as commercial hardwood restoration. Trees of non-commercial size, or where lack of access or rugged terrain prevents their removal, would remain on site and would be treated for fuels reduction.

Sanitation Cutting

Sanitation involves treating pine trees currently infested with mountain pine beetles prior to beetle maturation and emergence. This treatment reduces mountain pine beetle populations in local areas, and allows merchantable timber to be salvaged in some cases. Mountain pine beetles usually attack trees from early July through mid-September. The freshly attacked trees could be cut and processed at a sawmill, or cut and treated on site to kill the beetle larvae, which live just under the bark. This work would start in the early fall, but must be completed before the beetles start flying in July. Forest workers must carefully search an area for beetle-infested trees, looking for pitch tubes, signs of woodpecker activity, or boring dust at the base of trees. Once the trees are located and marked, logging crews or contract fellers would salvage or treat the infested trees.

Bait and Sanitation Cutting/Commercial Thinning, Bait and Sanitation

Cutting

Mountain pine beetles can be lured into an area with pheromone bait. Mountain pine beetles would attack the baited trees and adjacent trees. In the fall, winter, and spring, baited trees would be cut and processed at a sawmill to kill the beetle larvae. This treatment would be used to increase the effectiveness of sanitation cutting. Beetles can be lured to areas where sanitation efforts can readily take place. The local beetle population would determine the amount of tree mortality at any one baiting site. This treatment reduces mountain pine beetle populations in local areas and merchantable timber can be salvaged. Some stands would be commercially thinned in addition to the bait and sanitation treatment

Shaded Fuel Breaks

Creating fuel breaks along roads would involve thinning the overstory trees to 15-20 feet between the crowns. Understory conifers would be removed. Surface fuels would be removed or intensively treated. The conifers left within the fuel break would have the branches pruned up to 10 feet from the ground. The dimensions for the fuel breaks would be up to a distance of 200 feet on each side of the road surface edge.

Meadow Enhancement

Meadow enhancement consists of removing encroaching ponderosa pine trees and burning where appropriate.

Patch Cuts (Wildlife Habitat Prescription)

The intent of this prescription is to create habitat diversity within monocultures of young regenerating pine stands. Treatments include removing all trees within an area of 2-10 acres within a given treatment stand. More than one patch cut may be created within a treatment stand. Residual slash in patch cuts would be treated. Methods of treatment could include; lop and scatter, pile and burn, or prescribed burning.

Transportation Activities

New Construction

New road construction is defined as an investment in construction of a road that results in a new road corridor.

Reconstruction

Road reconstruction is defined as an activity that results in improvement or realignment of a road. These investments in construction activity raise the traffic service level of a road or improve its safety or operating efficiency. Realignment results in a new location of an existing road, or portions of existing road, and treatment of the old roadway. Activities are proposed to minimize sediment runoff and provide safe driving conditions.

Decommissioning

Decommissioning is defined as an activity that results in the stabilization and restoration of unneeded roads to a more natural state. There are five levels of decommissioning, ranging from: 1) blocking roads, 2) re-vegetating roads, 3) removing culverts, 4) removing unstable fills, or 5) re-contouring roadbeds. All roads proposed for decommissioning in the action alternatives are non-system "two track" roads developed through public use over time with the exception of 0.7 miles of Forest Road 557.1.

Alternative 1: No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No hardwood restoration, thinning, prescribed burning, fuel breaks or transportation activities would be implemented to accomplish project goals.

Under Alternative 1, management activities approved in previous documents and those approved by P.L. 107-206 would continue, but no new federal management activities would be initiated. Beyond completing on-going and previously approved activities, Alternative 1 would allow ecological processes to control vegetative development and mountain pine beetle activity. Commercial thinning, non-commercial thinning, commercial thinning with bait and sanitation cutting, and bait and sanitation cutting would not occur to help meet the need to control the spread of mountain pine beetle populations and reduce the susceptibility to intense wildfires. Shaded fuel breaks and prescribed burning would not be implemented to reduce the threat and severity of potential wildfire events. Commercial and non-commercial hardwood restoration treatments would not be implemented. Changes, such as road maintenance, could occur through current management direction, natural processes, or other management decisions in the future.

Alternative 2: Modified Proposed Action

The Modified Proposed Action was developed in order to move the project area from the existing condition towards the desired future condition as described in the revised Forest Plan and to meet the purpose and need as described in Chapter 1 of the Draft Environmental Impact Statement (DEIS).

This alternative is similar to the Proposed Action shown in the Notice of Intent and distributed to the public in the Scoping Letter. Modifications to the original Proposed Action were made to reflect changes resulting from public comments, additional survey information, and to better manage goshawk nesting habitat. The original Proposed Action has been moved to the Alternatives Considered but Eliminated From Detailed Study section of Chapter 2.

The Modified Proposed Action is designed to reduce the susceptibility of pine stands to attack by mountain pine beetles. The primary method of treatment is to reduce the basal area of stands to below 80 square feet of basal area per acre by prescribing both commercial and non-commercial thinning. The Modified Proposed Action also proposes to use a technique the lures mountain pine beetles to pre-selected stands with pheromone bait. The infected trees would then be cut and treated to kill the beetles.

Ponderosa pine trees are invading many hardwood stands. Alternative 2 proposes to remove encroaching pine trees, both commercially and non-commercially, in order to maintain or improve the diversity that hardwood stands provide.

Vegetation treatments are also designed to reduce the threat and severity of potential wildfires, particularly in the vicinity of private land. Many of the thinning treatments described above are located in the wildland urban interface (WUI) to reduce fuels and resistance to control in these areas. In addition to thinning, the Modified Proposed Action prescribes shaded fuel breaks along specific road corridors in order to prevent the spread of fire should one occur. Prescribed burning is also proposed in some areas in order to reduce the fuel loading.

New road construction, reconstruction, and decommissioning are proposed in Alternative 2.

The specific locations of the activities proposed in Alternative 2 can be found in the Alternative 2 map, located in the Map Set. Table 2 provides a summary of the treatments and transportation system activities proposed in Alternative 2.

Table 1 Alternative 2 Proposed Treatments and Activities

Alternative 2 Proposed Treatments and Activities		
Treatment	**Amount**	**Units**
Commercial Hardwood Restoration	278	acres
Non-commercial Hardwood Restoration	45	acres
Commercial Thinning	5430	acres
Commercial Thinning and Bait and Sanitation Cutting	364	acres
Non-commercial Thinning	2264	acres
Bait and Sanitation Cutting	32	acres
Prescribed Burning	339	acres
Shaded Fuel Breaks	1635	acres
Transportation Activities		
New Road Construction	16.2	miles
Reconstruction	26.3	miles
Decommission Existing Roads	60.7	miles

Alterative 2 would harvest approximately 20,700 CCF of sawtimber and 14,500 CCF of POL (products other than logs).

Alternative 3: Wildlife Emphasis

This alternative was developed to respond to Significant Issues D and E. Issue D suggests that grass, forb, and shrub habitat should be created within the project area to benefit wildlife species that utilize this type of habitat. Issue E suggests that big game

habitat should be maintained or improved by enhancing forage on south slopes while maintaining cover on north slopes.

Alternative 3 proposes to leave stands on north slopes in their present condition in order to maintain or enhance thermal and hiding cover. Selected stands on south slopes will be thinned to not more than 60-70 square feet of basal area per acre in order to create more grass, forb and shrub habitat. Non-commercial thinning of stands consisting of small diameter trees will be to approximately 170 trees per acre. This alternative proposes to enhance meadows by removing encroaching pine and burning where appropriate.

Low intensity fire would be introduced into stands with south and west aspects, where conditions allow, in order to improve grass, forb, and shrub habitat.

Patch cuts are proposed on 594 acres of the 2,219 acres proposed for non-commercial thinning. The patch cuts are proposed in order to create scattered openings and will range in size from 2 to 10 acres. The total amount of openings will not exceed 30 percent of any stand. See the Map Set for location of the proposed areas.

The specific locations of the activities proposed in Alternative 3 can be found on the Alternative 3 map, located in the Map Set. Table 3 provides a summary of the treatments and transportation system activities proposed in Alternative 3

Table 2 Alternative 3 Proposed Treatments and Activities

Alternative 3 Proposed Treatments and Activities		
Treatment	**Amount**	**Units**
Commercial Hardwood Restoration	278	acres
Non-commercial Hardwood Restoration	45	acres
Commercial Thinning	2047	acres
Commercial Thinning followed by Prescribed Burning	2390	acres
Non-commercial Thinning	1577	acres
Non-commercial Thinning followed by Prescribed Burning	642	acres
Meadow Enhancement	170	acres
Meadow Enhancement followed by Prescribed Burning	59	acres
Prescribed Burning	1761	acres
Shaded Fuel Breaks	1635	acres
Transportation Activities		
New Road Construction	11.5	miles
Reconstruction	23.0	miles
Decommission Existing Roads	62.0	miles

Alterative 3 will harvest approximately 15,400 CCF of sawtimber and 9,700 CCF of POL (products other than logs).

Alternative 4: Wildland Urban Interface Emphasis

This alternative was developed to respond to Significant Issues A, C, and F. Issue A, decommission fewer roads, was generated by comments that the Proposed Action

decommissions too many roads. The main concern was that some of the roads proposed for decommissioning could be used in the future for fire suppression access. The Forest Service reviewed the roads with respect to this issue and determined that most of the roads proposed for decommissioning in the Modified Proposed Action are not critical for fire suppression efforts. Roads 557.1, U090014, U090018, and U080017, totaling 4.8 miles, may be beneficial for future fire control efforts and are not proposed for decommissioning in this alternative. The remaining roads proposed for decommissioning in the Modified Proposed Action are also proposed for decommissioning in Alternative 4.

Issue F was generated from the Lawrence County Fire Advisory Board plan which suggests using a 200-foot radius survivable space zone around structures and a ½ mile radius Wildland Urban-Interface zone of reduced fuels around all inhabited structures in the county. Both of the treatment proposals from Lawrence county would require more thinning. Issue C, thin more small diameter pine stands, is also addressed by the additional thinning proposed in this alternative.

Alternative 4 incorporates all of the treatments proposed in Alternative 2, the Modified Proposed Action. While protecting potential goshawk nesting habitat, heritage sites, and sensitive plant habitat, an additional 240 acres of commercial thinning and an additional 83 acres of non-commercial thinning are proposed in this alternative. Alternative 4 also prescribes burning in 1211 acres within areas to be commercially thinned and 858 acres within areas to be non-commercially thinned. The principles of the Lawrence County Fire Advisory Board were applied to both Lawrence and Meade counties. While protecting potential goshawk nesting habitat, heritage sites, and sensitive plant habitat, an additional 240 acres of thinning are proposed in this alternative.

The specific locations of the activities proposed in Alternative 4 can be found on the Alternative 4 map, located in the Map Set. Table 4 provides a summary of the treatments and transportation system activities proposed in Alternative 4.

Table 3 Alternative 4 Proposed Treatments and Activities

Alternative 4 Proposed Treatments and Activities		
Treatment	**Amount**	**Units**
Commercial Hardwood Restoration	278	acres
Non-commercial Hardwood Restoration	45	acres
Commercial Thinning	4459	acres
Commercial Thinning followed by Prescribed Burning	1211	acres
Commercial Thinning and Bait and Sanitation Cutting	364	acres
Non-commercial Thinning	1489	acres
Non-commercial Thinning followed by Prescribed Burning	858	acres
Bait and Sanitation Cutting	32	acres
Prescribed Burn	874	acres
Shaded Fuel Breaks	1635	acres
Transportation Activities		
New Road Construction	16.2	miles
Reconstruction	26.3	miles

Decommission Existing Roads	55.9	miles

Alterative 4 will harvest approximately 21,300 CCF of sawtimber and 14,900 of POL (products other than logs).

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. A list of these alternatives and the reasons they were not considered further are included below:

Original Proposed Action

The original Proposed Action was presented to the public during the scoping period. During the scoping period, the ID Team discovered that it had inadvertently included for harvest consideration stands that could potentially provide goshawk nesting habitat. Until surveys are completed to determine those stands having active nests, or requiring designation as alternate conifer-forested goshawk nest stands, it must be assumed that goshawks are present. The original Proposed Action could violate Forest Plan Standard 3110 and would therefore be non-compliant with the Forest Plan.

It was discovered from comments received during the scoping process that several of the roads proposed for decommissioning are under Special Use Permits to the Dakota Territory Cruisers and Black Hills Four Wheelers clubs, making it necessary to remove these roads from the list of roads proposed for decommissioning.

Not all stands approved for treatment under P.L. 107-206 had been located on the ground at the time the Proposed Action was developed for the scoping process. Some of the stands chosen for treatment as part of P.L. 107-206 were part of the original Proposed Action for the Elk Bugs and Fuels Project so adjustments were necessary.

The results of botany surveys were received after the original Proposed Action was formulated. The survey information indicated that many of the proposed units could have the potential to affect sensitive plant habitat.

For the reasons discussed above, this alternative was eliminated from detailed study.

The original Proposed Action proposed four non-significant Forest plan amendments. As discussed above, potential goshawk nesting habitat and potential sensitive plant species habitat were removed from the original Proposed Action as part of the creation of the Modified Proposed Action. Reduction of the total amount of area proposed for treatment in all action alternatives negated the need for the four non-significant Forest Plan Amendments for forest-wide Standard 3203, M.A. 5.4 Standard 2101, M.A. 5.4 Standard 3203, and M.A. 3.31 Standard 3202.

Only Use the Existing Road System and Build No New Roads

The Forest Service considered an alternative raised by the public (Issue B) limiting treatments to areas accessible by the existing road system. This alternative was eliminated from detailed study because limiting treatments to areas accessible from existing roads would not treat enough area to have a substantial effect on the spread of mountain pine beetle infestations. Large areas would be left untreated and could be subject to mountain pine beetle attack. The same principle would apply to reducing susceptibility to catastrophic fire events. Large contiguous areas of dense pine stands would remain and potentially contribute to catastrophic fire events. For these reasons, this alternative was eliminated from detailed study.

Propose Treatments without Commercial Timber Harvest

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

Goal 3 of the revised Forest Plan is to provide for sustained commodity uses in an environmentally acceptable manner (LRMP, p. I-17). Goal 6, Objective 601 is to "strive to reduce net costs of both market and non-market programs" (LRMP, p.I-35). Both of these goals relate to Elk Bugs and Fuels Project Need Statement 7.

This alternative was eliminated from detailed study because it does not meet Goals 6 and 7 of the revised Forest Plan.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative.

Summary Comparison of Alternatives By Proposed Treatments

Table 4 Comparison of Proposed Activities by Alternative

Activities by Alternative				
Activity	Alt 1	Alt 2	Alt 3	Alt 4
Vegetation Management Treatments (Acres)				
Commercial Hardwood Restoration	0	278	278	278
Non-commercial Hardwood Restoration	0	45	45	45
Total Hardwood Restoration	**0**	**323**	**323**	**323**
Commercial Thinning	0	5430	2047	4459
Commercial Thinning followed by Prescribed Burning	0	0	2390	1211
Commercial Thinning with Bait and Sanitation Cutting	0	364	0	364
Total Commercial Thinning	**0**	**5794**	**4437***	**6034**
Non-commercial Thinning	0	2264	1577	1489
Non-commercial Thinning followed by Prescribed Burning	0	0	642	858
Total Non-commercial Thinning	**0**	**2264**	**2219**	**2347**
Bait and Sanitation Cutting	0	32	0	32
Meadow Enhancement	0	0	170	0
Meadow Enhancement followed by Prescribed Burning	0	0	59	0
Fuels Treatments (Acres)				
Prescribed Burning	0	339	1761	874
Shaded Fuel Breaks	0	1635	1635	1635
Transportation Activities (Miles)				
New Road Construction	0	16.2	11.5	16.2

Activities by Alternative				
Activity	Alt 1	Alt 2	Alt 3	Alt 4
Reconstruction	0	26.3	23.0	26.3
Decommission Existing Roads	0	60.7	62.0	55.9
Volume and Value				
Sawtimber Volume (Net CCF)	0	20,700	15,400	21,300
POL** Volume (Net CCF)	0	14,500	9,700	14,900
Net Cash Flow*** ($M)	0	-726	-2,307	-1,481

* Commercial thinning is to 60-70 BA in Alternative 3.

** Products other than logs.

*** Net cash flow is designed to show the relative difference between alternatives.

Comparison of the Alternatives to the Issues

Table 5 Response of Alternatives to Issues

Indicator Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Issue A. Decommission fewer roads.				
Miles of roads proposed to be decommissioned.	0	60.7 miles	62.0 miles	55.9 miles
Issue B. Use only existing roads.				
Amount of new construction proposed for each alternative.	0 Also, see Alternatives Considered But Eliminated From Detailed Study	16.2 miles	11.5 miles	16.2 miles
Issue C. Thin more areas, particularly small diameter pine stands.				
Small diameter pine stands thinned. *	0	9.275 acres	8,291 acres	10,048 acres
Issue D. Provide more grass, forb, and shrub habitat within the project area.				
Grass, forb, and shrub habitat improved. **	0	10,624 acres	10,281 acres	10,922 acres

Indicator Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Issue E. Maintain or create big game habitat in Management Area 5.4.				
Big game habitat effectiveness.***	Elk Summer-568 Elk winter-520 Deer Summer-501 Deer winter-474	Elk Summer-583 Elk winter-520 Deer Summer-512 Deer winter-475	Elk Summer-580 Elk winter-521 Deer Summer-514 Deer winter-477	Elk Summer-581 Elk winter-515 Deer Summer-510 Deer winter-470
Issue F. Propose more treatments near private property.				
Acres of treatments within ½ mile of private property.	0	9,251 acres	8,367 acres	9,881 acres
Issue G. Do not harvest any commercial timber.				
Whether or not an alternative proposes commercial timber harvesting.	No. Also, see Alternatives Considered But Eliminated From Detailed Study	Yes	Yes	Yes

* Includes all thinning, bait & sanitation, and fuel breaks.
** Includes all thinning, burning, fuel breaks, meadow enhancement, and bait & sanitation.
*** Big game habitat effectiveness is based on a scale of 0-1000, with a higher number indicating a higher habitat effectiveness.

Narrative Summary Comparison of Alternatives by Resource

Physical Environment

Soil and Water

Existing conditions for soil and water resources would continue under Alternative 1. However, both resources would be at risk if a large and intense wildfire were to occur. It is estimated that there is a 28% probability of a 10,000 acre fire within 10 years (Lewis, 2003). No roads would be decommissioned, allowing current road related sediment and water contributions to continue.

All of the action alternatives would reduce the risk of soil heating, increased erosion, and nutrient loss due to a potential large fire. Under all the action alternatives, overall road densities, and road densities within riparian zones, wetlands, and within 300 ft of streams are decreased. Development of fuel breaks under all action alternatives is expected to enhance hardwood restoration. Implementation of any of the action alternatives is expected to improve soil nutrients, riparian vegetation, and reduce sediment erosion, and sediment contributions to streams. Alternative 2 provides the smallest potential increase in sediment available for delivery to streams due to timber harvest and prescribed burning. No significant impacts to water quality are expected.

Transportation

The following tables summarize the transportation activities in the project proposal.

Table 6 Proposed Transportation Activities by Alternative

Alternative	New Road Construction	Road Reconstruction	Decommission
1	0	0	0
2	16.2	26.3	60.7
3	11.5	23.0	62.0
4	16.2	26.3	55.9

Table 7 Road Density by Alternative in Miles/Square Mile

Alternative	Open Y/Long	Open Seasonally	Closed Y/Long	Decommissioned
1	1.5	1.5	0.4	0.0
2	1.1	1.2	0.5	0.8
3	1.1	1.2	0.5	0.8
4	1.1	1.3	0.5	0.7

Table 8 Percentage of Open and Closed Roads by Alternative

Alternative	Open Y/Long	Open Seasonally	Closed Y/Long	Decommissioned
1	43%	45%	12%	0%
2	31%	34%	14%	21%
3	31%	34%	13%	22%
4	31%	35%	15%	20%

Fuels

Thinning from below would reduce the ladder fuels in ponderosa pine stands. The larger trees that remain on the site will be more resistant to fire due to decreased flame lengths from the removal of ladder fuels. Reducing the density of stands, limiting ladder fuels, and reducing pine beetle mortality will result in less chance for a wildfire to escape initial attack and subsequently spread to the adjacent private lands. The decreased density would be less likely to support running crown fires. Alternatives 2 and 4 generally reduce the density of the existing stands more than alternative 3.

Shaded fuelbreaks in the action alternatives will significantly alter the expected fire behavior in areas that have both the small and large tree stocking reduced. The areas within the fuelbreaks that only remove the smaller trees will require more effort and suppression forces to contain a fire. Less flammable patches of hardwoods along the fuelbreaks would be favored by reducing the pine trees in and directly adjacent to the sites.

Biological Environment

Vegetation

A large mountain pine beetle population exists, and there is suitable habitat for beetles in the project area and vicinity. The duration and extent of beetle caused mortality throughout the area is unknown. Treatments that have altered stand structure and diversity have decreased the overall area at risk to mortality. Stands of ponderosa pine which have been thinned in the last 10-20 years and are less susceptible to beetle caused mortality, however, large populations of beetles in nearby stands may continue to carry a population of beetles which may spread into these stands. On-going thinning and sanitation efforts in active timber sales and areas of treatment authorized by Public Law 107-206 should minimize mortality in treated areas. Alternatives 2, 3, and 4 decrease stand susceptibility to beetle caused mortality and reduce beetle populations, however suitable habitat may continue to support a large population of beetles. Treatments to reduce stand stocking, combined with sanitation efforts, are more likely to maintain moderately stocked pine stands if a large population of beetles continues to persist in the area. Alternative 4 would do the most to decrease stand susceptibility to beetle caused losses and reduce beetle populations, followed by Alternative 2 and 3.

Wildlife

Diversity of habitat would continue to decline under Alternative 1 as non-conifer types are encroached, but overall tree densities could remain higher. Habitat could also be affected by the continuation of mountain pine beetle attacks. The risk of a large fire is higher under Alternative 1, and should such an event occur, there would be a significant effect on wildlife habitat. The action alternatives would restore habitat diversity in treated hardwood stands and meadows. Mature spruce habitat would not be affected by any alternative. Density of existing snags is currently below Forest Plan direction in all but one watershed and would not change under any alternative. All alternatives would move density and distribution of snags and large green trees toward Forest Plan compliance in the long-term.

No alternative would affect threatened or endangered species. The action alternatives could impact individuals of 11 sensitive wildlife species, but would not affect populations. Beneficial impacts are expected for 3 species under all action alternatives. Alternative 1 would retain the most habitat for species relying on dense forest conditions, while retaining the least amount of open forest habitat. However, the increased potential for catastrophic wildfires could significantly affect habitat for species relying on dense stand conditions. The action alternatives would increase habitat for species associated with hardwood communities and more open pine habitat, and decrease habitat for species associated with dense forest conditions. The action alternatives are expected to increase large trees on the landscape in the long-term when compared to Alternative 1.

Fisheries

The No Action alternative will have no direct effects on fisheries resources. Indirect effects would occur because existing roads would continue to contribute erosion at the current rate. No new roads would be built, but no existing roads would be decommissioned. In the action alternatives, timber harvest, bait and sanitation cutting, and non-commercial thinning will have no direct effects on fisheries. None of these activities will occur within stream channels, and riparian corridors will be protected through the implementation of mitigation measures

Botany

In all action alternatives, known plant occurrences and areas deemed high quality habitat for R2 Sensitive and Species of Interest plants would be avoided during project implementation. Treatments in Alternative 3 are less intense and include fewer acres than Alternative 2 and indirect effects would be expected to be less. Alternative 4 is expected to have greater indirect impacts to plant habitat than Alternative 2 due to increased soil movement, risk of noxious weed introduction and spread, and greater livestock access resulting from additional treatments. Alternative 1 would not treat fuels, thereby increasing the chance of wildfire. Wildfire is expected to have a greater impact on habitat than the activities included in the action alternatives. Based on the analysis in Chapter 3 and the Biological Evaluation in the project file, the effects to R2 Sensitive and Species of Interest plants and their habitats will be kept below any reasonable level of significance.

Noxious Weeds

In all of the action alternatives, there are short-term increases in risks of the introduction and spread of noxious weeds from equipment used during project implementation as well as reductions of soil cover. Reduction of soil cover increases the risk of introduction and spread of noxious weeds. Noxious weed infestations are a particular threat to area plants and their habitats. Alternative 4 has a slightly higher risk of noxious weed introduction and spread than Alternatives 2 or 3. Mitigations to prevent the introduction and spread of noxious weeds into the proposed treatment areas have been built into the project (including avoiding known infestations during project implementation and requiring equipment operating off road to be free from weeds and soil before coming to the project area) and will reduce the risk of negative indirect effects from noxious weeds.

Range

The main difference between the alternatives is the amount of forage produced. Alternatives 2 and 4 are expected to have similar increases in forage from thinning, while Alternative 3 is expected to have less of an increase. In general, more forage and livestock access would be generated under Alternative 4.

Social Environment

Recreation

The only difference in effects on recreation is the number of roads decommissioned in each alternative. Alternative 1 does not decommission any existing roads so there would not be any impacts to motorized recreation. Alternative 2 would decommission 60.7 miles of undeveloped roads (non-system roads) within the project area. Alternative 3 would decommission 62.0 miles of non-system roads. Alternative 4 would decommission 55.9 miles of non-system roads.

Scenery

Scenic Classes

Scenic Attractiveness and Landscape Visibility are components of Scenic Classes. Therefore, the description of scenic classes addresses these scenery management components. Scenic classes 1-2 are landscapes that have been rated as areas of high public concern for scenery. Alternative 4 treats the most amount of areas of scenic classes 1-2 with 6,056 acres. Alternative 2 treats 5,520 acres followed by Alternative 3 treating 5,514 acres. The legislated activities add an additional 2,210 to any alternative. Scenic classes 3-5 are landscapes that have been rated as areas of moderate public concern for scenery. Alternative 4 treats 4,700 acres, Alternative 3 treats 3,235 acres and Alternative 2 treats 2,980 acres.

Scenic Integrity Objectives (SIO)

Areas with a High SIO are naturally appearing landscapes. The amount of acres proposed for treatment in the High SIO differs by 150 acres across alternatives. Alternative 4 treats the most with 2,150 acres, followed by Alternative 3 with 2,020 acres, and Alternative 2 proposing 2,000 acres of treatment. An additional 630 acres will be treated under the legislated activities. The activities proposed in High SIO will likely change these areas to a moderate SIO.

Areas with a Moderate SIO appear slightly altered to the Forest visitor. The amount of acres proposed for treatment in the Moderate SIO are greatest in Alternative 4, followed by Alternative 3 and 2 respectively. Implementation of these proposed activities will likely result in retaining the Moderate SIO.

Areas of Low SIO appear moderately altered. The majority of proposed activities occur in Alternative 2, followed by 4 and 3 respectively. The proposed activities would not change the SIO level.

Landscapes that appear heavily altered are classified as Very Low. Alternative 2 proposes to treat 440 acres in this SIO. The other alternatives would treat one acre of Very Low SIO. The proposed activities would not change the SIO level.

Visual Absorption Capability
Visual Absorption Capability (VAC) is the ability of the landscape to camouflage changes based on the natural landscape character. High VAC areas can withstand the most changes and still appear natural, while in areas of Low VAC, changes in the landscape will be apparent to Forest visitors. Only 12 acres of treatments are proposed in Alternatives 2 and 4, and none in 3. Alternative 4 proposes to treat 3,930 acres of Moderate VAC, Alternative 2 proposes 3,780 and Alternative 3 treats 3,780 acres. Activities proposed in High VAC cover 7,290 acres in Alternative 4, 7,040 acres in Alternative 3, and 6,580 acres in Alternative 2.

Recreation Opportunity Setting (ROS)
Semi-primitive Non-Motorized (SPNM) settings have subtle modifications to the landscape. Semi-primitive Motorized (SPM) settings may have obvious modifications to the landscape, but they do not attract attention of visitors in vehicles. Roaded Natural (RN) settings may have modifications to the landscape that are easily noticed and may dominate the landscape.

Proposed activities in SPNM are greatest in Alternative 3, treating 850 acres, followed by Alternative 4 proposing 762 acres, and Alternative 2 treating 730 acres. Activities such as road building and skid trails may convert this ROS class to SPM.

The majority of proposed activities occur in the SPM setting. Alternative 4 treats 8,280, alternative 2 treats 7,530, followed by Alternative 3 treating 7,470 acres. The proximity of new roads to the SPM areas may convert the to roaded natural ROS.

The proposed activities in the roaded natural class include Alternative 3, treating 2,280 acres, followed by Alternative 4 treating 2,190 acres, and Alternative 2, treating 2,120 acres. These activities would maintain the ROS class.

Heritage

Timber and fire management will result in various degrees of soil disturbance. Timber harvesting, skid trails, temporary road use, landings, movement of equipment, and piling and disposal of slash piles can adversely affect heritage resources. In comparing the alternatives, Alternative 4 would disturb the greatest number of acres, followed by Alternatives 2 and 3. Alternative 1 would result in no ground disturbance. As the amount of potential ground disturbance increases, the potential for disturbance and adverse effect to heritage resources also increases. Under Alternatives 2, 3 and 4, disturbance to heritage resources would be minimized through identification and avoidance or mitigation measures.

Heritage resources can be adversely affected by road construction and reconstruction activities. Adverse effects also occur under certain conditions through use of temporary roads, road maintenance, closures, and road decommissioning activities. Alternative 2 and 4 will result in the greatest number of miles of road and hence have the greatest

potential to affect heritage resources, followed by Alternative 3. Alternative 1 will result in the lowest potential to effect heritage resources.

The Forest would be in compliance with Section 106 of the National Historic Preservation Act under each alternative by avoidance of sites or the application of appropriate mitigation measures. All heritage resource site-specific mitigation measures have been developed in consultation with the State Historic Preservation Office, Native American Tribes, and pertinent interested parties, pursuant to the National Historic Preservation Act of 1966, as amended.

Economics

The actions proposed with this project are designed to help achieve Forest Plan objectives and outcomes. Any time resource management practices are performed, there are direct benefits and costs associated with them. The main criteria in assessing economic efficiency is Present Net Value (PNV), which is defined as the value of discounted benefits minus discounted costs. The financial values used for the economic analysis are from Black Hills National Forest cost guides based on experienced costs and revenues.

Present net value and benefit/cost ratios are displayed in the following table.

Table 9 Present net value and benefit/cost ratios

Measure	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Present Net Value	$0	-$725,978	-$2,307,134	-$1,481,003
Benefit/Cost Ratio	NA	0.69	0.34	0.53

Mitigation Common to All Alternatives

The Forest Service developed mitigation measures to be used as part of all of the action alternatives. Refer to Appendix B for the list of mitigation measures.

Monitoring Common To All Action Alternatives

District resource specialists will monitor implementation of Alternatives 2, 3 or 4, if selected. At least one interdisciplinary team meeting/field review will occur prior to the advertisement of any commercial timber sales to ensure that the objectives in this EIS are carried through the layout phase of timber sales. The proposed treatments will be monitored by resource specialists during project implementation as well as following completion of the prescribed treatments. The purpose of monitoring is to ensure that objectives are met and mitigation measures are implemented and effective. The final monitoring review would be conducted two years after a timber sale is closed. All

interdisciplinary team field reviews would be documented and a final monitoring report completed after project implementation.

Some of the project implementation monitoring would be done by the timber sale administrator or other contract administrators. Other resource specialists would be involved in monitoring of specific mitigation measures relating to their particular resource area. Appendix C, the Monitoring Plan, includes details on what would be monitored, the methods to be used, timing and frequency, purpose, and responsible party.

Consistency with Revised Forest Plan and Phase 1 Amendment

The Revised Forest Plan and Phase 1 Amendment contain direction in the form of 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. A guideline is a preferred course of action, and deviation is permissible if the responsible official documents the reasons for the deviation. Under the Phase 1 Amendment, certain guidelines are to be treated as standards (see USDA Forest Service [3] Appendix). 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. A full accounting of project compliance with Revised Forest Plan and Phase 1 Amendment direction is located in the Project File. All action alternatives considered in detail meet Revised Forest Plan and Phase 1 Amendment direction with the possible exception of snags. Although standard 2301 relating to snags may not currently be met in some watersheds, planned activities and retention of green trees would move the project area towards compliance. Also, the ongoing mountain pine beetle epidemic within the Elk Bugs and Fuel project area is expected to create numerous additional snags across the landscape in 4B and 4C stands under all alternatives.