APPENDIX A
OTHER ISSUES

A number of issues were considered but not determined to be "key" factors in the decision process for proposed fuel reduction activities in the Main Boulder project area. Following are the discussions of these issues that were analyzed but not found to be "key" factors.

A. Soils (Quality, productivity)

Analysis Area

The Main Boulder analysis area reaches from National Forest lands at the mouth of the canyon to a few miles above the Box Canyon Guard Station in the upper end of the canyon. Soils are affected only where intersected by treatment units that include ground-disturbing activities.

The analysis focuses on the environmental consequences of each alternative as they affect the soil resource. Most of the productivity of the soil is found near the soil surface. This is also the easiest layer to disturb through normal land use activities. Therefore, direct effects include soil compaction, displacement, and burning. The potential for these effects would result from the harvest system, fuel treatments, and the reconstruction/construction of roads. Compaction, displacement and burning can affect the soil's physical, chemical and biological properties, which indirectly can affect the growth and health of trees and other plants. Compaction reduces soil permeability and infiltration, which can cause soil erosion. Displacement reduces plant growth where topsoil and organic matter are removed. Minimizing soil disturbance from harvest activities requires consideration of the effects of the type of logging system, the method of slash disposal and slash treatment, and road development. Tractor and harvester-forwarder systems were considered and are included in the action alternative. These issue indicators include the number of acres treated by tractor and/or harvester-forwarder logging systems and the number of miles of temporary road construction.

Affected Environment

Soils and landscapes intersected by the treatment units were described using the Gallatin National Forest Soil Survey (Davis and Shovic, 1996.) Table A-1 on the following pages shows soil types for each treatment unit.

Table A-1 Landtype by treatment unit

Treatment Unit	Landtype	Acres in Landtype	Total Acres in Unit	Percentage of Total Acres
Main Boulder Station	35-4C	46	155	30%
Main Boulder Station	61-2A	88	155	56%
Main Boulder Station	85-2A	5	155	3%
Main Boulder Station	87-1B	16	155	10%
1	22-1B	3	19	18%
1	34-1C	15	19	82%
2	34-1C	7	19	37%
2	35-1C	12	19	63%
3	34-1C	49	49	99%
3	64-2A	0	49	0%
3	66-1A	0	49	1%
3B	34-1C	7	10	66%
3B	64-2A	0	10	5%
3B	66-1A	3	10	29%
3C	34-1C	23	25	92%
3C	66-1A	2	25	8%
4	34-1C	26	26	99%
4	64-2A	0	26	1%
5	22-1A	2	16	15%
5	34-1C	13	16	81%
5	64-2A	1	16	3%
5A	34-1C	6	10	57%
5A	64-2A	4	10	43%
5B	34-1C	2	46	5%
5B	64-2A	43	46	95%
5C	34-1C	0	19	1%
5C	64-2A	19	19	99%
6	34-1C	14	17	81%
6	64-2A	3	17	19%
7	34-1C	115	126	91%
7	35-1C	5	126	4%
7	64-2A	6	126	5%
7A	34-1C	1	11	12%
7A	64-2A	9	11	88%
7B	34-1C	11	31	34%
7B	64-2A	20	31	66%
8	34-1C	1	56	1%
8	35-1C	40	56	72%
8	64-2A	15	56	27%
8A	34-1C	10	35	29%
8A	64-2A	25	35	71%
9	34-1C	39	40	96%
9	64-2A	1	40	4%

Treatment Unit	Landtype	Acres in Landtype	Total Acres in Unit	Percentage of Total Acres
10	34-1C	21	24	89%
10	64-2A	3	24	11%
11	34-1C	3	30	11%
11	35-1C	24	30	81%
11	64-2A	2	30	7%
12	34-1C	70	71	99%
12	64-2A	1	71	1%
13	34-1C	59	59	100%
14	34-1C	11	11	100%
14A	34-1C	41	41	100%
14A	64-2A	0	41	0%
15	34-1C	4	4	99%
15	64-2A	0	4	1%
16	35-1B	37	47	79%
16	64-2A	10	47	21%
16A	34-1C	1	22	3%
16A	35-1B	16	22	75%
16A	64-2A	5	22	22%
17	34-1C	11	29	38%
17	35-1B	18	29	62%
17A	34-1C	0	27	1%
17A	35-1B	17	27	65%
17A	64-2A	9	27	34%
18	22-1A	0	75	0%
18	34-1C	75	75	100%
18A	34-1C	74	105	70%
18A	35-1C	2	105	2%
18A	64-2A	29	105	28%
19	34-1C	37	37	100%
19	64-2A	0	37	0%
19A	34-1C	15	15	100%
19B	34-1C	9	10	92%
19B	64-2A	1	10	8%
20	34-1C	6	8	74%
20	64-2A	2	8	26%
20A	34-1C	2	3	64%
20A	64-2A	1	3	36%
21	34-1C	11	54	21%
21	35-1C	0	54	0%
21	64-2A	43	54	79%
22	34-1C	32	39	84%
22	35-1C	0	39	0%
22	64-2A	6	39	16%
22A	34-1C	3	17	15%
22A	35-1C	0	17	0%

Treatment Unit	Landtype	Acres in Landtype	Total Acres in Unit	Percentage of Total Acres
22A	64-2A	15	17	85%
23	22-1A	5	30	18%
23	35-1C	15	30	49%
23	64-2A	10	30	33%
24	22-1A	2	218	1%
24	34-1C	162	218	74%
24	35-1C	53	218	24%
25	34-1C	91	104	87%
25	35-1C	13	104	13%
25A	34-1C	51	51	100%
26	34-1C	44	50	88%
26	35-1C	6	50	12%
26A	34-1C	30	30	100%
27	22-1A	73	146	50%
27	34-1C	67	146	46%
27	35-1C	6	146	4%
28	34-1C	25	25	100%
29	34-1C	36	36	100%
30	22-1A	82	215	38%
30	34-1C	134	215	62%
31	34-1C	79	79	100%
32	34-1C	65	65	100%

Soils information given in *Chapter 1-3* was taken from an analysis of this table.

Alternative A

Direct Effects

No direct effects would occur with Alternative A, as no temporary road construction or harvesting would occur. No fuel treatment activity would occur. There would be no compaction or displacement beyond existing levels.

Indirect Effects

The continued absence of fire would affect the structure, composition, and function of the soil resource (Lands berg, p. 8). In terms of indirect effects, continuing mortality would continue to ensure sufficient nutrient capital by creating large downed wood. As discussed in the fire/fuels section, the No Action alternative would have a higher potential for impacts to soils because of the greater risk for an intense wildfire than with the Proposed Action alternative. These impacts would increase the risk of soil damage that could detrimentally reduce the productivity of the soil. Erosion increases following a fire are directly proportional to fire intensity (Megahan, p. 146). Other effects would include the loss of organics, loss of nutrients, and reduction of water infiltration. (Wells, p. 26) Burns that create very high temperatures at the soil surface when surface soil moisture content is low, result in almost a complete loss of most woody debris and the entire duff and litter layer, exposing mineral soil. Many of the nutrients stored in these organics can be lost to the atmosphere through volatilization and removed from the site in fly-ash (DeBano, pp. 152-153; Amarnathus, p. 48).

Cumulative Effects

Some of the past management activities have, to some degree, detrimentally disturbed soils in the immediate harvest area. The Main Boulder River Corridor is a narrow strip (approximately ½ mile in width) consisting of National Forest and private lands. Over the past twenty years there has been very limited harvest activity on National Forest lands in this drainage. There have been only 26 acres of past regeneration harvests, which have been certified as stocked. These areas are currently in the sapling size class. Three acres have been treated for aspen regeneration enhancement. Sanitation Salvage has occurred on 79 acres to remove dead trees caused by bark beetle infestations. An additional 101 acres of road right-of-way clearing has occurred in order to improve the visibility and safety of travel on the narrow one-lane Main Boulder Road.

Below is a summary of these harvest activities that occurred on Forest Service lands:

Table 3-1 Past Harvest Activity in the Main Boulder Drainage

Sale Name	Compartment	Harvest Type	Acres	Year
Froze to Death #014735	127 128	Patch Clearcut Clearcut	5 10	1982 1982
Elkhorn #015442	116	Patch Clearcut	9	1982
Miller Creek Post&Pole #016820	117	Clearcut	2	1989 1989
Miller Creek Aspen #017687	117	Special Cut Aspen Regen	3	1995
Boulder Hazard Road Clearing #017737	121 124 127	Perm Clearing Perm Clearing Perm Clearing	27 15 23	1995/96 1995/96 1995/96
Box Beetle #017851	120	San/Salv I&D	13	1998
Boulder Fuels #017869	121	San/Salv I&D	62	2001
Windy Hicks #017992	118	San/Salv I&D	4	1998
Main Boulder Hazard Road Clearing #018149	116 117 118 121 124	Perm Clearing Perm Clearing Perm Clearing Perm Clearing Perm Clearing	7 6 9 5 9	2002 2002 2002 2002 2002

A hazard tree Categorical Exclusion was written for removal of dead and unstable “hazard trees” for a distance of 150 feet from either side of the Main Boulder Road. The contract was awarded and implementation was completed in the spring of 2004 on approximately 63 acres over a total distance of approximately three miles, with the majority of the trees located in the vicinities of Chippy Park and Box Canyon.

Units that were done in the early 80’s have soils that were impacted, to some degree, by tractor logging and dozer piling. All of these sites are now regenerated and considered fully stocked. The more recent hazard tree removal and the Box Beetle salvage harvest operations that were done over snow and frozen ground were found to have soils that were minimally impacted.

Future actions such as the continuing uses of existing facilities such as campgrounds, dispersed recreation sites, recreational trails, recreation residences, utilities and other special uses are all considered dedicated lands that are intensively developed. The loss of soil productivity on these sites is an irretrievable effect. No change in use would occur on these lands in the reasonably foreseeable future.

Alternative B

Direct Effects

To reduce the impacts to the soil, the Proposed Action would protect soil productivity through the use of Soil and Conservation practices as outlined in the Soil and Water Conservation Practices (SWCP) Handbook FSH 2509.22, BMPs described in Appendix C.

Temporary road construction would cause additional compaction and displacement temporarily. The construction of 9.27 miles of temporary road would equate to approximately 11 acres of detrimental soil impacts. It is important to note however, that the closure and rehabilitation of these acres would occur upon completion of the project. Obliteration and rehabilitation of these temporary roads would include culvert removal, surface drainage, scarification, and recon touring of the road prism, water barring, and seeding. This obliteration would decrease compaction, restore water infiltration of the road prism, and facilitate revegetation of these sites.

A total of approximately 2500 acres would be treated in Alterative B including 400 acres of prescribed burning in meadows, up to 1480 acres of mechanized harvest treatments on slopes up to 35%, up to 260 acres of harvest treatment on slopes of 35-45%, and up to 360 acres of hand treatments on slopes greater than 45%. Non-mechanized harvest fuel reduction treatments include hand piling, hand thinning with chainsaws (no ground based machinery), and burning.

For harvest treatments, a combination of either tractor skidding (conventional logging equipment) or a harvester-forwarder system would be the most likely harvest systems employed on up to 1740 acres. Many studies have shown that logging and skidding with tractors result in greater soil disturbance than cable or harvester-forwarder systems. This disturbance includes both soil compaction and displacement (Krag, 1991. p. 62). Skid trails are the major source of soil disturbance on such sites (ibid). To ensure that these effects are minimized by tractor operations, the spacing of skid trails is specified below and in the BMPs in Appendix C. The effectiveness of this mitigation is high in reducing detrimental disturbance.

Logging in the winter (Normal operating period would be from November 1 thru April 30) would produce fewer disturbances than summer harvesting on gentle slopes (Krag, p. 64). For Alternative B, winter harvest and skidding is the normal operating season proposed, in order to reduce the effects with respect to the degree of compaction and soil displacement.

Tractor logging systems are the most common harvest practice on the Gallatin National Forest. The following guidelines apply to these systems.

Regional Guidelines and standards for protection of long-term soil productivity would be applied. These are dated 11/12/1999 and are titled: FSM 2500 - Watershed and Air Management R-1 Supplement 2500-99-1, Chapter 2550 - Soil Management. These guidelines allow about 75 percent less disturbance than previous guidelines. This is due to an increase in understanding of the scientific effects of soil disturbance on soil productivity. Little detrimental disturbance occurs under helicopter or skyline harvest areas. Road construction effectively removes soils from productivity. Road obliteration does not restore soil to a productive state unless the roadbed is re-contoured and topsoil re-spread to a natural surface contour.

Slash disposal methods also were considered as part of the analysis. The major fuel treatments would include mechanical piling, hand piling, jackpot burning, and underburning. Grapple piling would result in less detrimental impact to the soil resource than the more conventional methods of dozer piling (Ford. 1993). Mechanical, grapple piling and hand piling would be the optimum methods for slash disposal and would be within Forest Plan standards for compaction and displacement. The piles would typically be burned in the fall or spring when soil moisture conditions would be high, and risk of fire escape would be low. Because the fuels would be concentrated, the burning would result in localized soil damage where the piles would be located. Mechanical or grapple piling would be completed on up to an estimated 1740 acres (ground based harvested units), and an estimate of up to 360 acres (areas of hand treatment above 45% slopes) would have hand piling. Hand piling may also be used on a portion of the same acres that are mechanically or grapple piled to supplement the cleanup of fuels. The landings in tractor units would also be mechanically or grapple piled, and burned.

The other slash disposal treatment would be underburning/jackpot burning. Prescribed burning in meadows would also be done to reduce build up of light fuels including grasses. Burning would not result in either soil compaction or soil displacement, or other detrimental soil impacts. Underburning and prescribed burning would be completed in the spring when soil moisture conditions would be high, therefore, avoiding detrimental effects. There would be no significant direct effects on soils expected to occur with implementation of the Proposed Action.

Indirect Effects

The potential for a high-intensity fire would be reduced with the action alternative. If a wildfire were to occur, the amount of soil damage incurred to the treated sites would be less than on the non-treated sites because there would be lower accumulations of fuels and the fire in those areas would likely not be as intense.

Timber harvest and fuel treatment would remove organic material from the site. However, long-term soil productivity would be maintained with the action alternative by leaving 5 to 10 tons per acre of downed woody debris for nutrient recycling.. Regional guidelines to maintain coarse woody debris and organic matter on site, as specified in Chapter 2, would be followed. These guidelines would maintain long-term forest productivity. The optimum level of fine organic matter is 21 to 30 percent and this equates to 1 to 2 inches of surface litter and humas. Regional guidelines and standards of maintaining sufficient large woody debris and nutrient capital would be met with the action alternative.

Because ground based harvest equipment would be used on terrain less than 45%, there would be a low potential for mass failure with implementation of the action alternative. There are no significant indirect effects on soils expected to occur with implementation of the Proposed Action.

Environmental Consequences

Following the ground operation BMP's outlined on p. 2-26 and described in Appendix C will prevent excessive soil disturbance. The BMPs require the concentration of disturbance to prevent excessive area-wide soil impacts. The effects of dispersed skidding practices in the past contributed to the need for these BMPs and their development on the Gallatin National Forest (Shovic, H. F. and K. Birkeland, 1992; Shovic, H. F. and G. Widner, 1991.) These studies showed that on the Gallatin Forest, displacement and compaction were the primary detrimental effects on soil productivity, and that tractor harvest with dispersed skidding allowed created high proportions of detrimental disturbance. Data showed cable (skyline) harvest systems created little disturbance. Based on these data, the Gallatin guidelines were developed, by geometrically defining commonly sized (40 acre) harvest units, and calculating minimum skid trail spacing to keep average disturbance below 15% when added to normal landing area. This was calculated only for slopes under 35%.

Dispersed skidding practices using equipment with low ground pressure have been successful on forests having deep layers of organic material and slash (broken branches.) This layer is from 6 to 20 inches deep and originates from existing organic layers plus slash from the harvest operation. It protects the soil surface from displacement and prevents compaction, and is a standard BMP on many Region-One Forests (Kuennen, L, et. al., May 2000.)

The situation is quite different on east side Montana Forests. There is no deep litter layer (Davis, C. E. and H. F. Shovic. 1996.) Harvest activities leave much less slash because trees are smaller and they are more widely spaced than on more productive sites. (Kuennen, L, et. al., May 2000.) Since we cannot match the soil protection layers used on Idaho forests and their documented protective capabilities, we do not recommend any form of dispersed skidding on the Gallatin National Forest, until enough research is done to show that dispersed skidding with new kinds of equipment is not detrimental to soil quality. Preliminary data on recent local harvest operations show that when existing soil guidelines are not followed, even with tracked harvester equipment, excessive soil damage may occur (Shovic, H., 1999.)

Provisions included in the Proposed Action are established as effective in preventing excessive soil compaction and loss of soil productivity due to harvest methods, given they are applied on slopes less than 35% in gradient. Slopes between 35 and 45% may be more vulnerable to soil compaction and displacement. However, operating on soils with at least 8 inches of snow cover, or over frozen ground to a least 4 inches in depth has shown that winter logging has negligible effect on soil or vegetation cover on up to slopes less than 45% as allowed by the Forest Plan p. A-8. If applied on soils with sustained slopes greater than this value, there is likely to be significant soil disturbance affecting soil productivity. Hand treatments would be utilized on slopes greater than 45%. See Harvest Type scenarios *on p. 3-37.*

These mitigative actions are designed to minimize soil compaction, disturbance, and erosion in harvest units. Specifically spaced, designated skid trails are recommended with no ground-disturbing machinery allowed off these trails. The trails would be rehabilitated following harvest.

Appendix C contains the Best Management Practices for protection of soil productivity on the Gallatin National Forest. They apply where harvest practices include tractors or other ground disturbing equipment on National Forest lands. The guidelines were developed using Regional and research input and modified for local conditions. Their purpose is to protect soil productivity for the next generation of forest vegetation. They reflect a "best estimate" of soil disturbance/soil productivity effects, based on scientific research and field experience. They may require modification for site-specific conditions and special logging practices.

Cumulative Effects

As discussed in Alternative A, under cumulative effects, there are some past harvest units, that to some degree, have detrimentally disturbed soils that were impacted by tractor logging and dozer-piling. Because these regeneration units were the areas that were detrimentally disturbed and were logged 15 to 20 years ago and are now fully regenerated with trees, there is little opportunity to decrease soil compaction on them.

By following design criteria on *p. 2-26*, and specifiying that the harvest operations occur during winter months, it is anticipated that there would be a very low risk for additional detrimental effects to soils to occur under the action alternative.

There are no significant direct or indirect effects on soils expected to occur with implementation of the Proposed Action. Cumulative effects are also unlikely as long as the Gallatin Guidelines, project design criteria, soil and weed mitigation *(p. 2-26*) are followed to prevent significant soil productivity damage.

Applicable laws, regulation, and Forest Plan Guidance

Soil and site productivity issues relate to the Forest Plan as follows: Soil and Water Quality Maintenance: The Proposed Action was designed to maintain land productivity (Gallatin National Forest Forest Plan, pp. II-1, II-24.)

Timber Production: Provide a sustained yield of timber products and improve the productivity of timber growing lands (Gallatin National Forest Plan, pp. II-1, II-24.) Site preparation and debris disposal methods to be implemented as a part of the Proposed Action would maintain an adequate nutrient pool for long-term site productivity through the retention of topsoil and soil organisms.

The Proposed Action is designed to comply with the BMPs, as listed in Appendix C, and has numerous restrictive design criteria and mitigation as outlined on *p.2-26* that are incorporated into project implementation.

B. Heritage Resources

Analysis Area

The Main Boulder analysis area reaches from Forest Service lands at the mouth of the canyon to a few miles above the Box Canyon Guard Station in the upper end of the canyon. The area is a major drainage that served as a prehistoric as well as historic travel route. It was known as a spur of the Bannock Trail that filters out of the Yellowstone Park area down several drainage options. The drainage was a major historic access to several developed gold fields and provided early agricultural activities to support the mining industry.

The analysis area is a narrow, steep sided drainage bounded by the Absaroka-Beartooth Wilderness on either side. Numerous small, repetitive archeological surveys have been conducted throughout this canyon for the many projects that have occurred throughout the years. Archeological surveys for this project were directed at each identified unit. Some units have not received previous archeological surveys and were surveyed utilizing standard methodologies. Those units, which have been surveyed or partially surveyed were sampled in high potential zones and previously recorded sites were revisited. The project report was completed in consultation with the Montana State Historic Preservation Office.

Previously Identified Heritage Resources –
24PA1004, 24PA1000, 24PA675, 24PA635, 24PA724, 24PA725, 24PA1088, and 24SW651.

Results of the 2002 Fieldwork –
24SW348, 24SW349, 24SW350 and 24SW351.

Affected Environment

This is an area with multiple previous archeological investigations. Previous work has indicated that there is not as high of a site density as might be expected, but there is a wide array of site types. There are historic mining sites, early “dude ranch” sites, historic agricultural sites, historic ranger stations, remnants of frontier battles, and an array of prehistoric site types.

The Jarrett site (24SW651) in the Four-mile vicinity on the Boulder exhibits Bison bone indicative of a past period when the environment was more conducive for these grazers (Lahren, personal communication and observations by this author). The Four-mile area may have been a nexus area of aboriginal trails, which accessed the Plains below, the high latitude areas of the Beartooths, the lithic sources of the Absaroka high country, and the Yellowstone Plateau. It is

likely that, from Besant Period times through the Late Prehistoric (i.e. 500AD – 1700), this valley was an open parkland and aspen-grasslands environment. This is somewhat confirmed by photos from the 1930's and 1940's that portray this image, although one can see the beginnings of conifer encroachment in this era.

Environmental Consequences

The following Effects Indicator was used to focus the heritage analysis and disclose relevant environmental effects:

- A qualitative assessment of effects to heritage resources

- Heritage resource inventories are required by the Forest Plan prior to all ground disturbing projects in order to locate and identify historic or Native American sites or artifacts. Once sites or artifacts are identified in a project area, protective measures are carried out, which would ensure preservation of the values associated with the sites are protected.

- Heritage resources can be diminished in value by any change in their historical, architectural, heritage, or archaeological character. Adverse impacts to heritage resource sites can result in damage or complete destruction of the sites; effects of this damage may be irreversible. Adherence to the regulation for implementing the National Historic Preservation Act insures that significant heritage resources are identified prior to project implementation and that project effects are identified and either avoided through project redesign or moderated. Site significance and project effects are determined through consultation with the MTSHPO and tribes.

Direct and Indirect Effects

The design measures for site protections can easily be implemented so that no direct or indirect affects would result from the treatments prescribed for the units to be treated with the Proposed Action. The treatments would significantly reduce fuel loadings adjacent to these sites, helping to make site protection more viable, were a wildfire event to occur in the corridor. With the No Action Alternative there would be no effect to any of the sites unless a large wildfire were to occur in the Boulder River Corridor. Currently there are excessive fuel loadings adjacent to many of the sites.

Unit Main Boulder Station

There are three sites in or near this unit, the Main Boulder Historic Ranger Station (24PA635), the Rock Art Site (24PA1004) and the CCC Camp (24PA1188). 24PA1004 is outside the unit and situated such that it could not be affected by the treatments and prescribed fire planned in this unit.

The objective of the treatments in this unit would restore a more open aspen/parkland/grasslands landscape reflecting the setting revealed from photographs of the ranger station in the early part of the 20th century. This objective would reduce fuels, providing greater opportunity to protect the historic site in case of wildfire.

There are combustible features within the CCC Camp that have designed protection in order to preserve those features as the area is being treated. The objective would restore the CCC Camp vicinity to a "look" more consistent with the 1930's setting.

Units 1 – 5B

These units would have no effect on cultural resources.

Unit 5C - 6
These areas are designed for avoidance of 24SW350. This is a series of dumps from an early dude ranch on the Boulder River. The dump is located in grassland fuel types and can be easily flagged and avoided during burning. If it were burned over, it would probably not hurt the artifacts.

Unit 7 – 8
These units would have no effect on cultural resources.

Unit 8A
This area has designated avoidance of 24SW351. The site includes some representative, early agricultural features and farm implements with combustible wooden parts. All of these features are located in the meadow and would not be negatively affected by prescribed fire as long as protection of these artifacts is designed into the prescription.

Units 9- 15
These units would have no effect on cultural resources.

Unit 16 and 17A
24SW348 is in this unit. The site is composed of "arranged" rock piles. They are not field clearing piles and most likely related to mining. The treatments proposed in this unit would have no effect on this site.

Units 16A and 17
These units would have no effect on cultural resources.

Units 18 – 20A
These units would have no effect on cultural resources.

Units 21 , 22, 22A
This area includes 24PA724; which is the historic Four-mile Ranger Station.
There is a dense wall of conifers that have encroached around the historic Four-mile Ranger Station. The remnant aspen groves near the station attest to a much different setting than what occurred 80 years ago. The nexus of the prehistoric trails and the Jarrett Site bison bone component attest to an open, aspen grasslands in this wide bottom as being prominent for the past 1,500 – 1,200 years. The spruce along Four-mile Creek, probably represent a riparian stringer that replaced the deciduous trees more than 100 years ago.

Aggressively reducing fuels in order to open up Units 21, 22, and 22A would help protect the historic cabin and assist in returning the area to a setting more reflective of the site type selected for the cabin originally. Regenerating an Aspen/grassland environment with stringers of conifers along the creeks would also provide a favorable vegetative community for meeting the purpose and need of the project.

24PA1000; Four-mile Prehistoric Site –

The only intact remnants of this large site are within an administrative enclosure along Four-mile Creek. This area is outside the treatment boundaries and would not be affected.

Units 23 – 28
These units would have no effect on cultural resources.

Units 29 and 30
In the meadow portion of this area is site 24PA675. It would not be affected by the treatments proposed in these units. However, due to the close proximity, it is recommended that operations be monitored to insure that the site is protected.

Unit 31
24PA725 is a prehistoric site that appears to be located within the meadow, east of the cabin. This meadow and site would not be affected by the proposed treatments, but due to the close proximity and access requirements, it is important that the activities be monitored to insure that this site is not impacted.

24PA1088 is the historic Box Canyon Guard Station. This historic USFS cabin has a very high degree of integrity. The treatments in this area would significantly reduce fuels and provide a better opportunity to protect the site in case of wildfire. Also, like the Four-mile Station, the original setting for the cabin was much more open and the aspen/grassland component was dominant at this site, when it was constructed in 1929.

Unit 32
This unit would have no effect on cultural resources.

Cumulative Effects

The Main Boulder Station, Four-mile Station, and Box Canyon Station are important historic sites, which have been evaluated as eligible to be included in the National Register of Historic Places. The evolution of conifer encroachment into this drainage has set the stage for a different and threatening fire regime. If no actions are taken to reduce this threat, it is unlikely that these historic ranger stations would be protected successfully under several possible wildfire scenarios.

Consistency with Applicable Laws, Regulations, Policy

The Forest Service is mandated to comply with the National Historic Preservation Act (as amended 1993) [Public Law 89-665]. Section 106 of the NHPA requires that federal agencies with direct or indirect jurisdiction over undertakings afford the Advisory Council on Historic Preservation (ACHP) reasonable opportunity for comment on such undertakings that affect properties included in or eligible for inclusion to the National Register of Historic Places (NRHP) prior to the agency's approval of any such undertaking (36CFR800.1). By following the mitigation measures outlined on p. 2-34 the Proposed Action would comply and be consistent with the above-mentioned laws and direction.

C. Livestock Grazing

Affected Environment

The proposed Main Boulder Fuels Reduction Project would occur adjacent to, or within and around, several existing Cattle and Horse Allotments in the Main Boulder drainage. Allotments and Administrative Pastures in the Main Boulder Drainage include:

Green Mountain Cattle Allotment	across River from M. Boulder Station Unit
Contact Horse Allotment	adjacent to M. Boulder Station Unit
Contact Cattle Allotment	just west of M Boulder Station Unit
Hawley Mountain Horse Allotment	Private and FS land near Hawley Mountain
Main Boulder Station Admin Pasture	same as M Boulder Station Unit
Four-Mile Admin Pasture	at & across road from 4-Mile Cabin
Box Canyon Admin Pasture	behind Box Canyon Cabin
Sheep Trail	entire length of M Boulder Corridor Sheep trailing occurs in July and again in September, 1200 ewes & 1800 lambs

Indirect/Indirect and Cumulative Effects

Weeds

Any increase in weeds in the Main Boulder could likely affect these allotments and administrative pastures. The Main Boulder Horse Pasture could be negatively affected by ground disturbance associated with harvest, burning, roading etc. as there are many noxious and non-native plant species already present. *See Weeds Effects Chapter 3-31.*

Logging Traffic

Sheep are permitted to trail up the Boulder in early to mid July and back down again in early to mid September. Since the majority of the harvest and skidding activities are scheduled to occur during the timeframe from November 1 – April 30, there should not be conflict with trailing. Horses are trailered up to Hawley Mountain and expected logging traffic should present no conflict with access for these horses.

Logging and logging activities

Removal of timber from the Main Boulder Station Administrative Pasture will be beneficial in reducing encroachment. Existing fences will be maintained or rebuilt following harvest. No actual harvest is planned in Contact Horse, Contact Cattle, or Green Mountain Allotment areas. Hawley Mountain Horse Allotment includes a small portion of Units 18A and 20. Care would be taken during timber unit boundary layout and harvest to maintain the integrity of the allotment's natural boundaries and fences. Fences would be maintained or reconstructed as necessary, following harvest. Four-Mile Administrative Pasture is located in Units 21 and 22. There are fences near the boundary between these two units and around part of the Four-Mile Cabin site, creating a pasture of approximately five acres in size. Rebuilding these fences and erecting new fences where natural boundaries of dense timber are removed near Box Canyon Administrative Pasture would maintain the integrity of this small pasture. There is a partially fenced pasture behind Box Cabin that is utilized for Forest Service stock during the field season. This fence was reconstructed following the Box Beetle Salvage Timber Sale and will be rebuilt or extended following harvest of Unit 31.

Consistency with Applicable Laws, Regulations, Policy

There are no specific laws relating to livestock grazing as long as the regulations associated with specific grazing allotments are followed. The Proposed Action would have no conflicts with any of the current grazing allotments.

D Road Density and Elk Effective Cover (HEI)

Analysis Area

The analysis area for the Main Boulder Fuels Reduction project consists of the Main Boulder Watershed, which is made up of timber compartments 116 through 129 and 136. This area includes numerous acres of wilderness and private lands, as well as Forest Service lands, all of which drain into the Boulder River corridor. The analysis area consists of the Boulder Watershed, which has approximately 151,000 acres with about 82% of those acres classified as wilderness and 2% privately owned.

Affected Environment

The proposed treatment area for the Main Boulder Fuels Reduction project consists of roughly 2500 acres of National Forest Land interspersed with adjacent private lands, which lie along the Boulder River corridor for a distance of approximately 24 miles and is approximately ½ mile in width. Vegetation management activities would be restricted to the non-wilderness National Forest Land located in the corridor along the Main Boulder Road (#6639).

The Main Boulder Road, which is the exclusive access road for the corridor, is a county road that lies in both Park and Sweetgrass Counties. Through a mutual agreement Sweetgrass County is responsible for maintenance and upgrades to this road. The only other roads in the corridor consist of short reaches that access private residences or Forest Service Administrative sites such as cabins and campgrounds. In portions of the corridor there are remnants of low standard roads that have served as access to gravel pits or were utilized in past harvest activities. Past harvest activities have been minimal in the corridor consisting of approximately 100 acres of regeneration harvest or sanitation salvage and another approximately 100 acres of hazard tree removal on acres adjacent to the Main Boulder Road.

Direct/Indirect and Cumulative Effects

Up to 9.27 miles of low standard temporary road may be needed to access the vegetative treatment units. Due to the anticipated timeframe (5-7 years) for the entire project to be completed, the project will be split into logical, manageable subdivisions with temporary roads constructed within these subdivisions remaining intact for one year following the completion of activities in that particular subdivision. Thus, the entire amount of temporary road necessary for the whole project would not be intact during any given period of time.

Temporary roads constructed for the project will be recontoured, removing the road prism and restoring the affected area as close to the pre-existing condition as possible. Public access will not be allowed on these roads either during or after completion of the project related activities. Forest Service personnel will administer access and usage of the temporary roads along with other contract related activities.

Using the Habitat Effectiveness Index, which is the model currently being utilized to measure Elk Effective Cover, all of the modeled timber compartments within the analysis area (Main Boulder Drainage) would comply with the current Gallatin Forest Plan Standard of not exceeding the 0.70 threshold, for both the existing condition and during implementation of the project related activities associated with the Proposed Action. Due to the large percentage of designated wilderness (approx. 82%) and the narrow strips of remaining National Forest acres, Habitat Analysis Units (HAU's) were not established for this drainage in the Forest Plan. For this reason, HEI had to be modeled by timber compartments, which trace hydrologic boundaries. Timber compartment 118 was combined with adjacent compartment 136 because of its orientation and logical ecological connections to the project area for elk habitat analysis. This was done to adequately represent an HAU where the compartment itself was too small (3,400 acres) to function at a meaningful scale for analysis of the topographic and vegetative features that contribute to a delineation of elk habitat.

Table A-2 on the following page, displays road density calculations and HEI for the timber compartments that comprise the Main Boulder Drainage. Keep in mind that the values presented are modeled predictions and may not be exact. More important than the exact effect is the comparison between the No Action Alternative (existing condition) and the Proposed Action (Alternative B). The values for Alternative B reflect the road densities and HEI during implementation of the project related activities. Within one year following completion of the project related activities, both road densities and HEI would return to the existing conditions that are reflected below with the No Action Alternative.

Table A-2 Road Density and HEI Calculations during implementation of the Main Boulder Fuel Reduction Project

Compartment	Road Density (No Action)	Road Density (Proposed Action)	HEI (Forest Plan Minimum)	HEI (No Action)	HEI (Proposed Action)
116	0.47	0.56	0.70	0.78	0.74
117	0.33	0.53	0.70	0.84	0.75
118/136	0.07	0.11	0.70	0.96	0.95
119	0.09	0.09	0.70	0.96	0.96
120	0.62	0.68	0.70	0.73	0.71
121	0.32	0.32	0.70	0.85	0.85
122	0.02	0.02	0.70	0.99	0.99
123	0.03	0.03	0.70	0.99	0.99
124	0.21	0.25	0.70	0.90	0.88
125	0.16	0.16	0.70	0.93	0.93
126	0.00	0.00	0.70	1.00	1.00
127	0.13	0.16	0.70	0.94	0.93
128	0.43	0.43	0.70	0.80	0.80
129	0.50	0.50	0.70	0.76	0.76

Consistency with Applicable Laws, Regulations, Policy

The Proposed Action complies with the Forest Plan Standard for Elk Effective cover (FP, p II-18) that states:

"The 1982 Elk Logging Study Annual Report contains procedures for analyzing elk habitat security as it is affected by timber harvest and road construction activities. An "elk effective cover" analysis based on this report will be conducted for timber sales and effective cover ratings of at least 70% will be maintained during general hunting season".

All of the affected timber compartments would retain a HEI rating of >70% after implementation of the Proposed Action as noted in Table A-2 above.

E. Vegetative Structure/Diversity/Old Growth

Introduction

No regeneration harvests are planned in the Main Boulder Fuels Reduction Proposed Action (Alternative B). Treatments are not designed to encourage reforestation, but "to provide for public and fire fighter safety by reducing the effects of potential human-caused fire starts and the potential for wildland fire leaving the wilderness and entering the wildland urban interface of the Main Boulder corridor."

However, vegetative structure and diversity, including old growth habitat would change somewhat as a result of the Main Boulder Fuel Reduction Project. The percentages of old growth and mature forest would change very little as a result of project implementation. Moreover, no timber compartment in the treatment area would have less than ten percent old-growth as a result of project activities. Any increases that would occur following completion of the project are in the percentages of non-stocked or small trees, which are the areas that are currently deficient.

Analysis Area

The Main Boulder Fuel Reduction Project area (Timber Compartments 116 - 129), which consists of approximately 122,500 acres is the area being assessed to determine the direct, indirect, and cumulative effects of the proposed project on vegetative structure and diversity. Cumulative activities previously identified in Chapter 3 define the temporal frame. Although there is no treatment planned in compartment 119, it was included in the analysis because of its orientation and ecological connection to the project area. The total acreage of planned treatments in the project is approximately 2,500 acres. Up to 2,1000 acres will have some type of vegetative harvest or fuel removal. The remaining 400 acres are identified for prescription burning, some of which will include slashing.

Affected Environment

The proposed project area lies at low to mid elevations of 5000 to 7000 feet. Compartments 116 thru 129 are comprised of approximately 130,000 acres of public and private lands. There are approximately 91,243 acres of coniferous/forested habitats in all compartments. Approximately 120,361 acres of the project analysis area are within the National Forest boundary.

Scattered throughout the area are pockets of grassy meadows, rocky outcroppings and riparian areas. Common understory plants include: *Aster conspicuous*, *Ribes lacustre, Shepherdia canadensis, Spiraea betulifolia, Vaccinium globulare, Vaccinium scoparium, Arctostaphylos uva-ursi, Calamagrostis rubescens, Carex geyeri, Festuca idahoensis, Agropyron spicatum, Linnaea borealis, Symphoricarpos albus, Physocarpus malvaceus, Arnica cordifolia, Galium triflorum, Thalictrum occidentale and Veratrum viride*. From a vegetative diversity standpoint, this area is very typical of forested lands found within the Gallatin National Forest and forested lands throughout southwest Montana.

Table A-3 Vegetative types of all USFS administered lands in Compartments 116 thru 129 (Total Acres 120,361).

Classification	Compartments 116 thru 129	
	Acres	Percentage
Coniferous Forest*	91,243	75.8 %
Shrub Lands	2,803	2.3 %
Grass/Forb Lands	8,872	7.4 %
Non-Vegetated Areas (rock and water)	12,404	10.3 %
Non-Classified Lands	5,039	4.2 %

Conifer species found within the area include lodgepole pine, Douglas-fir, Engelmann spruce, subalpine fir and limber and whitebark pine at the highest elevations. The forested cover types are as follows:

1) Relatively pure stands of lodgepole pine
2) Relatively pure stands of Douglas-fir
3) Mostly Douglas-fir mixed with lodgepole pine

These habitats include all age classes, from the youngest stands to old-growth stands. Remnant hardwoods (quaking aspen) currently comprise a small percentage of the analysis area. This species is found primarily on the wetter sites scattered throughout the landscape. One goal of the project is to enhance and restore these aspen clones wherever possible and in line with the established design criteria associated with the project.

Structural Diversity

No Action (Alternative A)

Direct and Indirect Effects

The current mix of forested successional stages in the Main Boulder Fuel Reduction Project Area is typical of drainages on the Gallatin National Forest. The Main Boulder drainage is dominated by older age class forest that encompasses 73.7% (67,268 acres) of the total coniferous lands (91,243 acres) in Compartments 116 thru 129. *See Table A-4*

The Forest Plan standard for vegetative diversity *(Gallatin Forest Plan standard 6.c., pg. II-19 and 20),* states;

- In order to achieve size and age diversity of vegetation, the Forest will strive to develop the following successional stages in timber compartments containing suitable timber: 10% grass-forb, 10% seedling/sapling, 10% pole, 10% mature and 10% old growth.
- Forest lands and other vegetative communities such as grassland, aspen, sagebrush and whitebark pine will be managed by prescribed fire and other methods to produce and maintain the desired vegetative conditions.

Within the Main Boulder Drainage, approximately 82 % of the National Forest land is designated wilderness, 2% is in private ownership, and 16% is in non-wilderness National Forest management areas.

Each timber compartment varies in acreages that are within wilderness or private ownership. Because only a small portion of each compartment is available be to vegetatively manipulated, it is not possible to meet the vegetative diversity standard within the Main Boulder drainage.

Table A-4 Existing vegetative structural stages in the Main Boulder Fuel Reduction Project Area. Figures are percentage of total USFS administered coniferous acres in Compartments 116 thru 129.

Comp. #	Grass/Forb		Seedling		Sapling		Pole		Mature		Old Growth	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
116	954	12.0	4	.05	284	3	2,158	27	3,716	47	1,819	23
117	130	1.6	3	.03	349	4	3,891	47	2,935	35	1,102	13
118	8	0.2	0	0	0	0	275	7	1,614	50	1,303	41
119	1,977	19.0	122	2	218	3	1,523	24	2,209	34	2,389	37
120	684	31.0	0	0	0	0	181	8	940	42	1,109	50
121	593	8.0	0	0	0	0	303	4	4,278	60	2,592	36
122	906	11.0	0	0	19	0.2	1,400	17	5,508	66	1,400	17
123	1,320	16.0	81	1	24	0.2	1,514	18	5,283	63	1,535	18
124	410	4.0	67	0.6	25	0.2	3,343	33	5,231	51	1,587	16
125	718	10.0	0	0	17	0.2	710	10	4,852	68	1,525	22
126	48	0.7	45	0.6	279	4	1,444	21	4,046	60	974	14
127	303	5.0	53	0.8	0	0	2,794	43	2,691	41	962	15
128	230	6.0	3	0.1	0	0	119	3	2,714	69	1,116	28
129	591	13.0	0	0	0	0	2,727	60	1,231	27	607	13

With the No Action alternative, the structural diversity in the Main Boulder Drainage would show very little change, barring the occurrence of a major wildfire event.

Proposed Action (Alternative B)

Direct and Indirect Effects

Table A-5 *on the following page,* displays the total forested habitat that will result from implementing fuels reduction activities in the Main Boulder drainage across all compartments. It is very clear from this table that the proposed project will have very limited impacts to overall vegetative cover in the Main Boulder drainage due to the fact that no regeneration harvest treatments are planned. The greatest change will occur in compartment 116, where a reduction of approximately 16% of forested cover may occur. The majority of this reduction will be in the mature and old-growth component, but mature will remain at 45% and old-growth at 22% following treatments. These percentages are still well above Forest Plan standards. All other compartments would have very minimal reductions and would still retain sufficient mature and old-growth timber to meet or exceed Forest plan standards.

Table A-5 Forested habitat acreage and percentage in Compartments 116 thru 129 for both pre and post treatment.

Compartment #	Total Treatment Acres	Forested Habitat			
		Pre-Treatment		Post-Treatment	
		Acres	Percent	Acres	Percent %
116	281	7,981	80 %	7,700	73 %
117	333	8,280	95 %	7,947	91 %
118	537	3,192	95 %	2,655	79 %
119	0	6,461	62 %	6,461	62 %
120	70	2,230	48 %	2,160	46 %
121	410	7,173	81 %	6,763	77 %
122	43	8,327	82 %	8,284	82 %
123	36	8,437	77 %	8,401	77 %
124	317	10,253	83 %	9,936	80 %
125	126	7,104	68 %	6,978	67 %
126	76	6,788	85 %	6,712	84 %
127	90	6,500	75 %	6,410	74 %
128	13	3,952	70 %	3,939	70 %
129	155	4,565	62 %	4,410	60 %

Vegetative Diversity

Table A-6 below, shows the likely vegetative response for understory species after project activities. Vegetation would respond to the reduced canopy resulting from treatment activities, and from ground disturbance activities associated primarily with mechanical (cable or tractor) harvest activities. Disturbance in mechanical units would be kept to a minimum by using designated skid trails, piling slash on skid trails, and operating over-snow or frozen ground in order to minimize impacts. Fuels management would be restricted to pile burning, and spring or fall understory prescribed burning on limited areas and therefore have little effect on the stand diversity. In general, shade tolerant and disturbance sensitive plants would temporarily be reduced as a result of project implementation and shade intolerant plants would increase and could compete with regenerating conifers.

Table A-6 Potential vegetative response for some plant species found in the Main Boulder Fuel Reduction Project Area.

Plants Species Likely To Increase After Disturbance	Plants Species Likely To Decrease After Disturbance	Plants Species That Have A Neutral Response After Disturbance
Galium triflorum	*Juniperus communis*	*Vaccinium globulare*
Ribes lacustre	*Pyrola sedunda*	*Vaccinium scoparium*
Shepherdia Canadensis	*Thalictrum occidentale*	*Berberis repens*
Arctostaphylos uva-ursi		*Smilacina racemosa*
Calamagrostis rubescens		*Festuca idahoensis*
Carex geyeri		*Agropyron spicatum*
Arnica cordifolia		
Physocarpus malvaceus		

Vegetative Structure

Table A-4, *p. A-18* displays the current conifer vegetative structure in Compartments 116 thru 129. Although past harvest activities have converted some stands to early successional stages, the Project Area does not currently meet the Forest Plan Standard requiring that 10% of each compartment be maintained in each successional stage. There is a deficit of grass/forb, seedling, sapling, and pole sized stands for several of the compartments. However, there are no regeneration harvest units associated with the Proposed Action, making the opportunity for conversion to nonstocked or early successional stages very limited. The present vegetative condition meets and is well above the standard for old growth and mature forest habitat for all compartments. The grass/forb component meets the standard in Compartments 116,119,120, 122, 123, 125, and 129 but is below the standard in Compartments 117, 118, 121, 124, 126, and 128. Seedling and sapling habitat are well below the standard in all of the compartments represented. Pole sized stands are below the standard in Compartments 118, 120 and 121, but exceed the standard in all other compartments. The implementation of the project would not directly change the structural diversity in the area. As displayed in Table A-7 below, proposed fuel treatments would only minimally alter the existing percentages of vegetative structure in the analysis area. In particular, the mature and old-growth percentages would still remain well above the Forest Plan standard. Furthermore, there would only be a slight reduction of old growth or mature habitats and a minimal increase in grass/forb or seedling habitats, which are currently deficit.

Table A-7. Vegetative structural stages resulting from the proposed Main Boulder Fuel Reduction Project. Figures are a total forested acres effected by proposed treatments and percentages after treatment in Compartments 116 thru 129

Comp. #	Total Treatment	Seedling		Sapling		Pole		Mature		Old Growth	
		Ac.	%	Ac.	%	Ac.	%	Ac.	%	Ac.	%
116	280	1	**.03**	8	**3**	76	26	132	45	64	22
117	333	1	**.02**	13	**4**	157	45	117	34	43	13
118	536	0	**0**	0	**0**	38	**8**	268	42	220	34
119	0	0	**2**	0	**3**	0	24	0	34	0	37
120	70	0	**0**	0	**0**	6	**8**	29	40	35	48
121	410	0	**0**	0	**0**	16	**4**	246	56	148	34
122	43	0	**0**	<1	**0.2**	7	17	28	66	7	17
123	36	<1	**1**	<1	**0.2**	7	18	23	62	7	18
124	317	2	**0.6**	1	**0.2**	105	32	162	49	51	15
125	126	0	**0**	<1	**0.2**	13	10	86	67	28	21
126	76	<1	**0.6**	3	**4**	16	21	46	59	11	14
127	90	1	**0.8**	0	**0**	39	42	37	41	14	15
128	13	<1	**0.1**	0	**0**	<1	**3**	9	68	4	28
129	155	0	**0**	0	**0**	93	58	42	26	20	13

Cumulative Effects

Cumulative activities that could influence vegetative structural stages in the Main Boulder Project Area include public and private land timber and salvage harvest, natural and prescribed fires, firewood gathering, or the occurrence of a large wildfire.

Harvests activities on USFS administered lands have occurred in the Boulder River drainage. The most recent harvest was the Main Boulder Hazard Tree Salvage harvest that will be completed in the spring of 2004 and removed approximately 148 mbf on 63 acres located 150 feet from either side of the Main Boulder road in the Main Boulder drainage.

There are many private developments and church camps and checkerboard private section ownerships within the Main Boulder River drainage. The majority of the private lands are located north of the confluence with Four-mile Creek. Some private land harvest has been completed recently, associated with fuel reduction and salvage of Douglas-fir beetle killed trees. Silvicultural treatments employed on these private lands are mostly selective harvest. An estimated 100 acres of USFS administered lands have been selectively harvested in compartments 116 thru 129 in the past 5 years. Although mature timber was reduced as a result of harvest activities, the majority of mature and old-growth timber is located in the wilderness and is not available for commercial removal.

The only foreseeable, future timber harvest on National Forest lands in the Main Boulder drainage, following completion of the fuels reduction project, would be the removal of insect and disease killed or weather damaged trees that present a hazard to the public.

There will likely be ongoing maintenance/removal of small diameter trees/ladder fuels to maintain post-activity fuel conditions.

Firewood gathering has occurred in the Main Boulder drainage for years. The area is open for firewood gathering, but little is gathered beyond one hundred feet from the road or above the confluence with Four-mile Creek. Firewood gathering activities remove dead down and standing wood primarily from along roadways. Dead and down wood does not appear to be a limiting resource in the Main Boulder drainage. Because firewood activities remove only dead down and standing dead trees from a stand, they have not reduced the mature component of the coniferous habitat.

A major wildfire event, were it to occur in the Main Boulder drainage, has the potential to drastically alter the vegetative structure, given the current heavy fuel loadings and continuous vertical and horizontal fuel characteristics. Lowering the fuel loadings and breaking up the continuity of fuels would help to reduce the extent of change to vegetative structure that would occur due to wildfire, under most conditions.

From a historical perspective, shifts have occurred in structural composition of vegetative habitat, especially over the last century. The amount of immature successional stages has declined and there has been a corresponding increase in the amount of mature and old growth. There has also been an increase in the forested zone with a corresponding decrease in habitats previously non-forested. In addition to the shift in age class distribution, there has been, in recent decades, a continuing increase in fuel accumulation. Although it is unclear at this time how much, what type, and what location, forested landscapes should have to maintain viable populations of all species, creating a mix of forested structural stages is favorable to a wide range of wildlife species.

Consistency with Applicable Laws, Regulations, Policy

The Proposed Action alternative is in compliance with applicable laws, regulations, and policies as described in the Forest Plan (Gallatin Forest Plan standard 6.c., pg. II-19 and 20) except for meeting the recommended percentages for all vegetative categories. Some successional stages in each compartment of the Main Boulder Fuel Reduction Project Area do not meet the Forest Plan Standard requiring that 10% of each successional stage be maintain in timber compartments. It is important to note that a majority of the acreage in the timber compartments represented in the treatment analysis area are located within the Absaroka-Beartooth Wilderness. Thus, a majority of the analysis area (Approximately 82%) is unavailable at this time for active management solutions to alter successional stages. The seedling and sapling habitats are below the standard in all compartments needing treatment. Pole size stands in compartments 118, 120, 121 and 128 are also below the standard. The proposed stand treatments will temporarily convert a small number of acres of mature and old growth stands into grass/forb habitat. Depending on the amount and length of time necessary for follow-up fuel reduction treatments (prescribed burning), these stands would gradually naturally regenerate to conifers and grow into the seedling/sapling stage. Over the decades, harvested stands would continue to progress through successional stages. With the proposed treatment, the project area would result in a more open forest structure that would somewhat increase the younger aged forested structures in moving toward meeting the Forest Plan standard for vegetative diversity.

F. Economics

Introduction

The Proposed Action is designed to modify vegetation in a way that will reduce the effects of potential human-caused fire starts and the potential for wildland fire leaving the wilderness and entering the wildland urban interface of the Main Boulder corridor. One of the modifications being considered entails felling standing trees and removing the portions that are suitable for manufacture into wood products. Cash would be generated by making the product potential of stumpage (standing trees) available for bid in a competitive market. The dollar return from the sale of stumpage would be available to compensate an operator for work done that contributes to meeting the Purpose and Need and either yields no marketable products or entails costs in excess of return. Since meeting the Purpose and Need will require actions to modify the vegetation that have no profit potential, there is an issue concerning how much of the unprofitable work can be financed by selling standing trees.

Affected Environment

The affected environment is the market for wood products at the time of the analysis. Labor and equipment costs will be estimated from data published in 2003. None of the values will be discounted. Stumpage value (the value of standing trees that contain a merchantable product) will be estimated using Transaction Evidence equation 03-4 (Fourth quarter, FY 2003).

No Action Alternative

Direct and Indirect Effects:

The No Action alternative would continue current management within the analysis area. Since none of the actions being proposed would occur, there would not be a concern for financing actions that contribute to meeting the purpose and need and have no potential for profit.

Alternative B (Proposed Action)

Direct and Indirect Effects

The Proposed Action calls for modifying vegetation to reduce the rate at which a fire would be expected to spread. The alternative acknowledges an opportunity to work towards meeting this objective by felling standing trees, some having a potential for manufacture into wood products. The action alternative could realize a dollar return from the sale of these trees and it would use the money received to finance other actions that contribute to meeting the Purpose and Need but have no potential for profit. There is a risk that the current market for wood products will result in too few dollars being returned to finance the full array of actions to be implemented. Supplemental fuels dollars are expected to be available to complement fuel treatments.

For those fuels treatments that call for felling marketable trees, the R1 Transactions Evidence (TE) Equation 03-2 was used to estimate current market value. This model predicts how various alternative project and tree attributes affect the 'Predicted Gross Value'. Although termed a 'gross value,' the predicted market value is actually net of the costs of all the activities involved in felling standing trees and eventually hauling the marketable portions to a milling facility.

Harvest was assumed to involve a Cut-To-Length system/and or tractor since these logging systems are thought to be the only means of accessing the stands while satisfying resource concerns, especially those dealing with ground disturbance and the resultant risk of invasion by noxious weeds.

Table A-8 Analysis Results for Approximate Market Values

Alternative	Volume of Raw Material (Hundreds of Cubic Feet or CCF)	Market Value per CCF	Total Market Value
A	0	0	0
B	8,349	$33.25	$277,577.46

The market value disclosed above has to be adjusted downward to allow for the cost of constructing approximately 9.27 miles of low standard, temporary roads. These roads are needed to access those stands or portions of stands where there is an opportunity to contribute to the desired, post-treatment fuel loading and arrangement by harvesting marketable trees.

Table A-9 Approximate Cost of Temporary Road Construction

Road Standard	Estimated Miles	Cost per Mile	Total Cost
Temporary	9.27	$12,623	$99,814

Adjusting the Total Market Value to allow for the cost of road construction and obliteration, as needed, results in the following estimate of the dollars potentially in hand to finance non-profitable activities:

Table A-10 Adjusted Market Value of the Alternatives

Alternative	Total Road Development Cost	Potential Dollar Return
A	0	0
B	$99,814	$177,763

Harvest would be limited to rates of slope and stand conditions that are operable by ground-based logging systems (skidders, Cats, Cut-To-Length). The areas that are unproblematic or well suited for logging using conventional systems were identified on slopes less than 35% and represent only a portion of the total area identified for some type of fuels treatment. In total, approximately 1060 acres are assumed unproblematic or well suited for fuels treatment using conventional, ground-based logging systems, including the Cut-To-Length system. Additional areas between 35 to 45% slope and outside of unproblematic treatment areas may be more conditional /or restrictive for use of ground-based logging systems in order to meet resource protection concerns. Areas greater than 35% slope may be winter logged (frozen ground or 8 inches of snow) or have a sufficient slash mat in place to protect the soil resource. These areas include an additional 680 acres adjacent to identified stands for potential use of conventional treatment. Ground-based logging systems could be used on these areas as long as concerns for safety and soil protection can be met. Alternative B proposes to modify fuels by reducing stand density on approximately 2100 acres. The area above 45% slope –approximately 360 acres – would have to be operated by some other, non-conventional means such as hand treatment. The costs of operating on steeper ground would contribute to the cost of responding to the Purpose and Need.

Conventional systems were identified as a base line for estimating the *maximum* dollars potentially available through the sale of wood products since any other system would entail a greater cost per unit of raw material brought to the market. Helicopters and downhill skyline systems could remove marketable trees from slopes too steep to operate safely using Cut-To-Length. However, using these systems would likely generate greater costs than the trees to be removed are worth, especially in today's market for wood products. As such, timber harvest using helicopters and skyline logging systems would represent a drain on the dollars potentially available to finance unprofitable actions.

The following actions (services) have been identified:

Table A-11- Activity Descriptions and Associated Costs

Activity Code	Description	Performance	Direct Cost per Unit
4220T	Thinning	Contractor	N/A
4991A	Tractor Skid Unmerchantable Material	Contractor	$43.08/ac.
4465A	Slashing	Contractor	$62.75/ac.
4983	Grapple Piling	Contractor	$75.23/ac.
4997Y	Burn Landings: Unmerchantable. Material	FS	$52.29 ea.
4977	Burn Grapple Piles	FS	$34.32/ac.

These actions are expected to result in a post-treatment condition that will contribute to satisfying the purpose and need, but only on areas suitable for initial, stand density reduction harvest using either skidders or Cut-To-Length logging systems. No allowance has been made for treatments on slopes greater than 35%.

The direct costs displayed above were adjusted using the standard Forest Service allowances for contractor and agency overhead. For activities scheduled in the future, a further allowance was made to anticipate inflation and real increases in the cost of doing business.

Table A-12 Predicted Cost Analysis- Alternative B

Alternative	Predicted Gross Value (Adjusted)	Road Costs	Total Activity Costs	Difference
A	0	0	0	0
B	$277,577.46	-$99,814	-$296,233.37	-$118,469.91

The analysis supports a concern that the anticipated return from the sale of wood products will be less than the total cost of the activities likely needed to realize the desired post-treatment condition. Any additional treatments, whether they were to occur within the boundaries of the units identified for conventional harvest or on steeper, adjacent slopes, will require a supplemental source of funding.

Cumulative Effects:

The balance of cash flows between profitable and unprofitable actions is not expected to have any cumulative effects.

Forest Plan Direction:

The Gallatin Forest Plan does not provide forest wide management direction specific to managing cash flows within a project. There are no goals (Forest Plan, pages II-1-2), objectives (Forest Plan, pages II-2-7), standards (Forest Plan, pages II-14-29) or management area directions (Forest Plan, pages III-1-73) that require such cash flows be disclosed or guide a decision maker in applying the results of such a disclosure to a project level decision.

Irreversible and Irretrievable Commitments of Resources:

None

G. Insect and Disease

Analysis Area

The Main Boulder drainage encompasses timber compartments 116 through 129 and 136 on the Big Timber Ranger District. Total acres within these compartments are approximately 151,000 acres, of which 82% is in wilderness where no treatments are planned and another 2% is private ownership. The remaining 16% is the areas where the vegetation/fuels treatments will be focused.

Affected Environment

Vegetation ranges from Dry Limber pine and mixed Douglas-fir stands to moist high elevation Whitebark pine-Subalpine fir stands with inclusions of Aspen-Mixed Conifer/grass stands.

There are active populations of Douglas-fir beetle (DFB) throughout the drainage and corridor, mountain pine beetle in lodgepole pine and whitebark pine is active in the wilderness within the drainage with occasional occurrences in the corridor, and western balsam bark beetle is active throughout the drainage and corridor. Initial infestations started by movement out of the adjacent wilderness areas surrounding the corridor. Attacks are progressing across federal and private lands as the populations move north thru the corridor. These attacks are one of the largest contributing factors to the high natural fuel loadings within the corridor. Past salvage harvest has been accomplished in an attempt to reduce fuel loadings and pheromone trapping has been used to reduce the impacts of the beetle attacks.

Douglas-fir Beetle

Over the past several years, the following guidelines have been helpful in reducing Douglas-fir beetle mortality in Region 1. It is helpful to realize that the greatest benefits in dealing with actual or potential Douglas-fir beetle infestations are derived from efforts aimed at preventing outbreaks rather than suppressing them (Schmitz and Gibson, 1996). To the extent possible, susceptible stands should be identified and conditions altered to make them less susceptible, before some type of stand disturbance occurs that may trigger an outbreak. Likewise, disturbances such as blowdown, defoliation, drought, and fire damage should be moderated to an acceptable level as quickly as possible to help prevent possible beetle infestations from exceeding acceptable levels. There has not been a true hazard-rating system developed for Douglas-fir beetle in the Northern Region; but know what stand conditions are most conducive to beetle depredations, once outbreaks are generated. They are as follows:

1. Stands where Douglas-fir is the predominant species and sites where those stands are most commonly found. The higher the percentage of Douglas-fir in the stand (particularly in excess of 50-60 percent), the greater the susceptibility. Douglas-fir habitat types on south-facing slopes and dry ridges sustain more beetle-caused mortality than other types. Much of the Main Boulder drainage meets these criteria.

2. As Douglas-fir reaches maturity--and becomes overmature—it grows more slowly and is susceptible to beetle infestation and mortality. Trees that are greater than 80 years old are considered to be susceptible, with those beyond 120 years becoming extremely susceptible. Existing data for Douglas-fir stands in the Main Boulder corridor indicates the average age of Douglas-fir is 129 years old.

3. Size of Douglas-fir in the stand. Usually associated with age, stand susceptibility is also reflected in the size of host trees. Generally, the larger trees in the stand are the more susceptible. Trees less than about 16 inches dbh are not as likely to be attacked successfully. Existing data indicates average dbh to be 8 inches (this value is heavily influenced by the number of trees per acre especially in the smaller size classes (1-7 inches dbh) in the modeling calculations. The ongoing / continuing epidemic would indicate there are sufficient large diameter (greater than 16 inches) trees to sustain the epidemic. The epidemic in the Main Boulder corridor is sufficiently strong and spill over is occurring into smaller diameter (ten to fifteen inch diameter) trees that are being attacked and killed.

4. The overall stand density also contributes to epidemic levels of infestation. When stocking levels exceed 80% of "normal" stocking for the site, susceptibility to attack increases significantly. The denser the stocking, which increases between-tree competition and also provides a cooler, more shaded environment preferred by the beetle, the greater the probability of infestation. As a rule, if total stand stocking exceeds 150 square feet of basal area, susceptibility to the beetle correspondingly increases. Existing data for beetle epidemics indicate the average basal area to be 153 square feet.

Management activities, which alter one or more of these stand conditions (species, size, composition, age, or stocking) can correspondingly reduce the stand's susceptibility to

Douglas-fir beetle. Where infestations occur, it is usually desirable to salvage recently killed and currently infested trees. It would be of even greater benefit to reduce stand susceptibility by thinning before the stands are infested. Where management objectives and other resource considerations permit, removing the larger, older Douglas-fir component from susceptible stands will significantly reduce future beetle-caused mortality in those stands and in adjacent, less-hazardous stands.

Mountain Pine Beetle

The mountain pine beetle is the primary predator of lodgepole pine. It will also attack whitebark pine. This beetle is normally present at low populations or endemic levels. As the susceptible trees age, the inner bark or phloem thickens and makes a more viable host for the mountain pine beetle. As the tree ages, its growth rate declines, and its ability to defend itself against insect and disease attack is reduced. This reduced vigor, in conjunction with suitable environmental conditions, leads to beetle population explosions. Improving the vigor of individual trees and stands, through harvest and other cultural treatments, helps to maintain lodgepole pine on a site for longer periods of time by lowering the likelihood of mountain pine beetle infestation.

The hazard rating system currently recommended was developed by Shore and Safranyik (1992).

Stands where Lodgepole pine is predominant and sites on which those stands are most commonly found are the most susceptible. Higher percentages of lodgepole in species composition and high stand densities also contribute to greater susceptibility. The average basal area of infested lodgepole pine stands is 148 square feet.

As Lodgepole pine becomes mature to overmature, it slows in growth and is more susceptible to beetles. Lodgepole of 80 years and greater are considered to be highly susceptible and beyond 120 years extremely susceptible. The average age of inventoried lodgepole stands in the corridor is 113 years. The average age of infested lodgepole pine stands is 114 years.

Lodgepole stands with a stand density between 300-600 trees per acre appear to be the most susceptible. As lodgepole stands become denser than 600 trees per acre, usually indicating smaller-diameter trees, susceptibility actually decreases.

Stands located at an elevation/latitude combination conducive to beetle survival (at 46 degrees north latitude, stands at elevations lower than 6200 feet) are at high hazard; as elevation increases, hazard becomes correspondingly lower (stands between 6200 and 7200 feet) are at moderate hazard.

Western Balsam Bark Beetle

Low populations of western balsam bark beetle maintain themselves in sub-alpine fir that are weakened by old age, root disease, storm-damage, or in slash. During periods of drought, (Montana is heading into it's sixth straight year of drought) or other environmental stress, infestations can build and spread to less-susceptible sub-alpine fir stands. Weakened, beetle infested, or wind-thrown trees should be salvaged logged. Logging slash should be destroyed or moved to non-forested areas to keep epidemics from developing. (Forest Insect and Disease Identification and Management)

Mistletoe

Mistletoe seriously infects nearly half the lodgepole stands in the Northern Rockies. If mistletoe infected trees are left alive on a site after timber harvesting, they will infect newly regenerated trees within a few years. The result will be a regenerated stand of mistletoe infected, stagnated, unhealthy trees. Selective removal of infected trees will help lesson the occurrence of this problem until the entire stand is sanitized by a stand replacing activity.

Direct/Indirect and Cumulative Effects

If No Action is taken within the Main Boulder corridor to reduce stocking density, age and composition of the existing stands, within the next five to ten years, it is estimated that the Douglas-fir beetle, mountain pine beetle, and western balsam bark beetle will kill the majority of these trees in the most susceptible stands along the river corridor. The beetle attacks and subsequent mortality will create more fuel loadings in addition to the existing high fuel levels, as the standing dead trees begin to fall or be wind-thrown. In the event there is a fire start within the corridor, the fire would spread more rapidly through the corridor endangering the public and private landowners utilizing the corridor. These higher fuel loadings would hamper fire control actions and create public safety hazards during efforts to control the fire.

Healthy forests require more than a reaction to the attack of insects and diseases on trees. While direct suppression can be a part of the strategy, it is important to understand pest dynamics and how to prevent conditions that favor population buildups. Silvicultural treatments that reduce insect and disease risk and damage, play a major role in the strategies involved with the preparation of the Proposed Action. (Forest Health and Ecological Integrity in the Northern Rockies). The Proposed Action will reduce stocking densities; remove unhealthy and/or diseased trees, improving the health and vigor of individuals and groups of remaining trees within the treatment units. Harvest activities will also remove trees that are currently beetle-infested (reducing current beetle populations in the area) and reduce downed fuel loadings, all of which contribute to healthier stand conditions that are less susceptible to beetle and mistletoe occurrences. It is important to note that the Proposed Action treatments will only improve the vigor of the stands treated and reduce fuels within the actual treatment units that are located along the river corridor. The proposed treatments will do little to effect the population and fuel buildup that is occurring in the wilderness areas of the drainage, which comprises approximately 82% of the drainage. Effectiveness of the treatments for insect and disease reduction would be noticeable only within the river corridor where the treatments occur, not the entire Main Boulder drainage.

Applicable Laws, Direction and Forest Plan Guidance

The Proposed Action complies with the Forest Plan timber related standard pertaining to identification and treatment of Insect and Disease occurrences (p. II-22 of the Gallatin Forest Plan).

H. Inventoried Roadless Areas

Affected Environment

The Gallatin National Forest Plan, (Appendix C-5, 1987) provides the baseline for IRA boundaries and acreage. As identified, a portion of the Main Boulder Station Unit lies within the North Absaroka IRA #1-371. At least one additional unit, Unit 7, lies adjacent to this IRA. Current regulations and Forest Service direction compel us to analyze the effects of any proposed activity that would substantially alter the roadless characteristics of IRAs so as to render them unsuitable for future designation as wilderness. Roadless qualities and characteristics to be evaluated under this mandate include:

Remoteness: Remoteness is a perceived condition of being secluded, inaccessible, and out of the way. Physical factors that can create "remote" settings include topography, vegetative screening, difficulty of travel, and distance from human impacts such as roads and structures. A user's sense of remoteness in an area is also influenced by the presence of roads, their condition, and whether they are open to motorized vehicles.

Solitude: Solitude is a personal, subjective value defined as isolation from the sights, sounds, and presence of others and human development. Common indicators of solitude are numbers of individuals or parties one may expect to encounter in an area during the day, or numbers of parties camped within sight and sound of other visitors. Solitude is directly related to remoteness of an area and primitive, unconfined recreational opportunities.

Natural Integrity: Natural integrity of an area is related to its physical setting and the extent to which long-term ecological processes are intact and operating. Impacts to natural integrity are measured by the presence and magnitude of human-induced change to the area. Possible impacts include physical developments (e.g. roads, utility rights-of-way, fences, lookouts, cabins), recreation developments, domestic livestock grazing, mineral developments, wildlife and fisheries management activities, vegetative manipulation, and fire suppression activities.

Apparent Naturalness: The apparent naturalness of an area means the environment looks natural to most people using the area. It is a measure of importance of visitors' perceptions of human impacts to the area.

Special Features: Special features are those unique geological, biological, ecological, cultural, or scenic features that may be located in the roadless portion of the project area.

Manageability of Boundaries: This relates to the ability of the Forest Service to manage an area to meet the size criteria (minimum size requirement of 5,000 acres for wilderness) and the five elements discussed above.

The purpose of the Main Boulder Fuels Reduction Project is to restore the characteristics of ecosystem composition and structure to reduce the risk of uncharacteristic wildfire effects. No treatment will occur within the IRA, other than the slashing of vegetation eight (8) inches or less in diameter for future prescribed burning, which is allowed in an IRA without further approval. Likewise no roads would be constructed within the IRA.

Direct, Indirect and Cumulative Effects

Slashing and burning will have a minor short-term effect on the apparent naturalness of the treatment area. Opportunity for solitude and the feel of remoteness will be affected temporally for only the duration of the project. The natural integrity of the area will be affected by the reintroduction of fire back into the ecosystem. The other roadless characteristics will not be affected.

Proposed treatment will not substantially alter the roadless characteristics of the IRA so as to render that portion of the Main Boulder Station Unit unsuitable for future wilderness consideration. Proposed treatments within other units may have similar short-term, temporal effects to the neighboring or adjacent IRA.

To assure no encroachment into the IRA, the approximate boundary of the IRA will be determined and posted on the ground to insure that the wilderness characteristics of the roadless resource will not be affected in the vicinity of Unit 7.

The following values or features of IRAs may also exist independent of an area's future as designated wilderness:

1) High quality or undisturbed soil, water, and air
2) 2 sources of public drinking water
3) Diversity of plant and animal communities
4) Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land
5) Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation
6) Reference landscapes
7) Natural-appearing landscapes with high scenic quality
8) Traditional cultural properties and sacred sites
9) Other locally identified unique characteristics. Specific impacts to these values or features are addressed in other parts of this document. Nothing in the proposed action or the no action alternative would significantly affect these values.

Applicable Laws, Direction and Forest Plan Guidance

The Forest Plan identifies Inventoried Roadless Areas (IRAs), including area 1-372, the North Absaroka (FP, pg. V-9 through V-10 and Appendix C-5), which is located within or adjacent to portions of the project area. The activities associated with the Proposed Action would not substantially alter the roadless characteristics of the area so as to render them unsuitable for future wilderness designation. The Proposed Action complies with the Forest Plan direction for Inventoried Roadless Areas.

I. Wilderness

Affected Environment

The Wilderness Act (P.L. 88-577) defines wilderness as an "area where the earth and its community of life are untrammeled by man…". Wilderness retains "its primeval character and influence, without permanent improvements", which is to be "managed so as to preserve its natural conditions…". Wilderness "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable…". It also has outstanding opportunities for solitude or a primitive and unconfined type of recreation.

The Absaroka-Beartooth Wilderness was established under public law 95-249 on March 27, 1978. This Act set aside almost 1,000,000 acres on the Gallatin, Custer and Shoshone National Forests as part of the National Wilderness Preservation System. In designating the Absaroka-Beartooth, Congress, in its wisdom, assured that this enduring wilderness resource would be secured for the American people of present and future generations.

The Main Boulder area represents a roaded corridor leading into the Absaroka-Beartooth Wilderness. Although the non-wilderness corridor is, in places, highly developed and within the

immediate sight and sound of the designated wilderness, the Forest Service has the responsibility of assuring that no unauthorized uses occur within the wilderness itself.

Decades of fire suppression have increased fuel loadings and have created unnatural conditions in the Main Boulder area. Because the wilderness boundary is located only a short distance above both sides of the Main Boulder Road, consideration was given to treating fuels in the Absaroka-Beartooth as part of this project proposal. Although timber harvest is not allowed in designated wilderness, in some cases fuel manipulation and the use of management-ignited fire can be used within wilderness to restore the natural fire regime of the area. Specific direction exists defining the conditions where and when fuel treatment by management-ignited prescribed fire can be used.

The July 1993, Absaroka-Beartooth Wilderness Fire Management Guidebook established procedures for implementing fire regimes within the wilderness. It is incorporated into the Gallatin Forest's Fire Management Action Plan, which is the document that implements overall fire management based on direction derived from the Gallatin Forest Plan. Read together with Forest Service direction found at FSM 2324, the two references identify applied fuel treatments, methods, and rationale that managers may use to enhance the ability of the Forest Service to reintroduce fire into the wilderness.

Specifically, management-ignited prescribed fire may be used in wilderness to reduce unnatural buildups of fuel only if all of the following are met:

1. The use of prescribed fire or other fuel treatment measures outside wilderness is not sufficient to achieve fire management objectives,
2. An interdisciplinary team of resource specialists has evaluated and recommended the proposed use of prescribed fire,
3. The interested public has been involved appropriately in the decision, and,
4. Lightning-caused fires cannot be allowed to burn because they will pose serious threats to life and/or property within wilderness or to life, property, or natural resources outside of wilderness.

Furthermore, the management-ignited prescribed fire must:

- Permit lightning-caused fires to play, as nearly as possible, their natural ecological role within wilderness or,
- Reduce to an acceptable level the risks and consequences of wildfire escaping from the wilderness.

The ID Team looked at opportunities to use management-ignited prescribed fire in the wilderness, however it was determined that Conditions 1 and 4 could not be met. See Alternative C, p. 2-40 under alternatives considered but not in detailed study.

Direct, Indirect, and Cumulative Effects

The wilderness boundary will be surveyed in areas where treatment will occur in close proximity to the wilderness. Neither the Proposed Action nor the No Action Alternative includes treatments within the designated wilderness; however, short-term temporal, indirect effects could occur to some wilderness characteristics. The sense of solitude and remoteness within the wilderness in proximity of treatment units outside the wilderness could be affected during the life of the project. Mitigation as discussed in other sections of this document will soften any potential indirect impacts to the wilderness resource, and potential negative effects to the character and integrity of the Absaroka-Beartooth Wilderness can be dismissed from further analysis.

Applicable Laws, Direction and Forest Plan Guidance

This being the case, the Forest Plan provides direction to manage resources within the Absaroka-Beartooth to maintain their wilderness character and to provide for their use and protection (FP, pg. II-1. The 1964 Wilderness Act (P.L. 88-577) and the Absaroka-Beartooth Wilderness Act (P.L. 95-249) provide specific direction for the Absaroka-Beartooth Wilderness.

The Proposed Action does not include fuel reduction or burning activities in the wilderness. Additionally, wilderness boundaries that are adjacent to the proposed units will be monumented before fuel reduction activities begin in the unit.