CHAPTER 2
Issues and Alternatives

I. INTRODUCTION

Chapter 2 of this document describes and compares the alternatives that wholly or partially meet the purpose and need for this project as identified on Ch. 1-13. The proposed action alternative and a no action alternative are described and considered in detail on Ch. 2-11 through 2-13. There are also five action alternatives that were considered but didn't warrant detailed analysis. These are described on Ch. 2-43 through 2-46. The purpose and need for action and the desired future condition provided the framework for alternative development along with the significant issues identified during scoping. The alternatives each reflect a different response to the issues identified through both the scoping and analysis processes, and the alternatives have different environmental effects. Chapter 3 discloses the effects of the two alternatives in terms of the "key" issues. Chapters 2 and 3 provide information to enable the decision maker to make a reasoned choice between alternatives. Chapter 2 also discusses the scoping and public involvement process, environmental issues, alternative development, design criteria and mitigation, and alternatives considered but not studied in detail.

II. CHANGES BETWEEN THE DRAFT EIS AND THE FINAL EIS

Section VII. Alternative Development Process

- Alternative Development Process was added to the FEIS.

Section VIII. Alternatives Considered in Detail

- The description of Alternative B-proposed action was modified.
- Item D) Tree retention, an element in the 'Design Criteria Common to all Treatment Groups,' was modified.
- The description of the Detailed Stand Treatments was clarified in the FEIS.
- Descriptions of Stand Treatment Groups 1, 2,and 4 were modified.
- Miles of Temporary Road Needed was modified.
- Table 2-1 proposed action Unit Descriptions has a remarks column added indicating which units have Park Electric power lines and other unique features.
- The proposed action Maps 2-1 through 2-4 were modified.
- Maps 2-5 through 2-8, showing locations of possible temporary roads and existing roads, were added to the FEIS.

Section IX. Design Criteria and Mitigation

- B. Fisheries- The last two bullets under mitigation 12) were changed.
- D. Soils – Mitigation 22) was modified.
- F. Wildlife – The second paragraph in <u>Effectiveness</u> pertaining to snag management was modified.
- G. Wild & Scenic River Eligibility – Mitigation 39) has a sentence added indicating that 15-20% leave islands do not pertain to Treatment Group 3. Mitigation 42) verbiage was modified.
- I. Recreation, Safety, and Special Uses – Mitigation 47) verbiage was clarified.
- K. Road Maintenance/Rehabilitation – Mitigation 55) verbiage was modified.

Section X. Project Monitoring

- The first paragraph pertaining to the Forest Plan Monitoring Report for 1998-2003 was added.

Section XI. Alternatives Eliminated From Detailed Study

- The descriptions for all of the Alternatives considered are described in further detail, as are the reasons for eliminating them.

III. PUBLIC INVOLVEMENT AND SCOPING PROCESS

Project History

In 1991, the Big Timber Ranger District developed an Integrated Resource Plan for the Main Boulder River Corridor consisting of comprehensive fuels modification, fire prevention, and pre-attack fire plans. The purpose of this initial plan was to identify opportunities for fuels treatment on Forest Service lands until such time as a comprehensive plan could be developed. Through analysis, it was determined that there was significant potential for a large wildfire to occur in the Main Boulder Drainage and that the potential for this type of stand replacing fire could be reduced by implementing fuel reduction activities.

In winter of 94/95 the Main Boulder multi-resource planning team initiated Phase 1 of the Boulder Fuels Reduction Plan. Fuels reduction techniques were prioritized (1.life, 2. property, and 3.resource protection) and analyzed, breaking the drainage into three sections. Several small, localized fuel reduction proposals were initiated. They were to be implemented over the next several years. Included in this plan was the education and advising of private landowners and church camps, in order to create fuel breaks and protect structures in the event of a large fire. It was recognized that insect and disease infestations in the Upper Boulder drainage were creating tremendous fuel loadings, thus the implementation of the Boulder Fuels and Box Beetle Salvage Sales. Heavy infestation levels in the wilderness were not available for control or treatment. Prescribed fire in the wilderness was thought to be too risky to consider at that point in time. While the small-localized fuel reduction projects were successful, it was recognized that they did not begin to treat a large enough area to effective deal with the fuels buildup and resulting risk in the Main Boulder River corridor.

Planning for the Main Boulder Fuels Reduction Project began with publication of a Notice of Intent to prepare an Environmental Impact Statement in the Federal Register on November 6, 2002. A legal notice concerning the Main Boulder Fuels Reduction Project was published in the Big Timber Pioneer and the Bozeman Chronicle on December 6, 2002. On December 8, 2002 an article was published in the Bozeman Chronicle explaining the purpose and need of the Main Boulder Fuels Reduction Project.

Scoping

The first step in an environmental analysis is to determine what needs to be analyzed. To do this the NEPA outlines a process termed "scoping" (refer to 40CFR 1501.7). This is an open process designed to determine the potential issues associated with a proposed action and those that are significant to the decision. First, comments are obtained from interested and affected parties, both within and outside the agency, to identify potential issues. Second, the potential issues are reviewed by the interdisciplinary team to determine: (a) the key issues to be analyzed in depth, and (b) issues which are not key or which have been covered by prior environmental review and therefore should be eliminated from detailed study.

A scoping letter initiating the Main Boulder Fuels Reduction Project was sent to interested parties on December 6, 2002 (Mailing List, Project File). More than 300 letters were mailed to private individuals, organizations, groups, businesses, media and elected officials. Eighteen responses were received. The environmental issues to be addressed in this document were identified through scoping. Key issues were used to develop alternatives to the proposed action presented

in this EIS and to focus the scope of the analysis on the issues that are truly significant to the decision to be made. Documentation of the review of scoping comments and potential issues can be found in the Main Boulder Fuels Reduction project file.

Once the scoping process was completed, the interdisciplinary team (ID Team) searched for alternatives to the proposed action with specific features designed to address the key issues. For the Main Boulder project area, the no action alternative and the proposed action alternative were determined to warrant detailed consideration. The Main Boulder project was identified on the Gallatin National Forest NEPA Quarterly Project Listings for Summer 2003, Winter 2003 and Spring 2004.

The purpose of an Environmental Impact Statement (EIS) is to disclose the foreseeable effects and consequences of the alternatives being considered in detail and to solicit public input regarding this project. This Final Environmental Impact Statement (FEIS) is being issued after careful consideration and analysis of comments received on the Draft Environmental Statement (DEIS) that was released in July 2004. The Forest Supervisor will make a decision about the project after considering the project alternatives and their effects. This decision will be documented in a Record of Decision sent to interested parties in conjunction with publication of the FEIS.

Public Involvement

During the winter/spring of 2002/2003, the Big Timber District Ranger regularly attended meetings of the Main Boulder Watershed Association, developing a relationship with the group and helping identify goals for fuel reduction in the Main Boulder River Corridor that are shared by the Forest Service, county, and private entities.

On January 16, 2003, the district ranger led a field trip to inform interested local groups of the Forest Service's proposed fuel reduction activities in the Main Boulder River Corridor. Participants included a staff representative of Senator Max Baucus, a rep. from the Greater Yellowstone Coalition, several representatives from Sweet Grass County including commissioners, road supervisor, rural fire department, and representatives from the Main Boulder Watershed Association.

A meeting was held on May 7, 2003 at the American Legion Hall in Big Timber to discuss how fuels reduction work along the Main Boulder River Corridor proposed by private landowners might coordinate with the Main Boulder Fuel Reduction Project proposed by the Forest Service. The meeting was well attended with representatives from the Main Boulder Watershed Association, private landowners, Natural Resource Conservation Service, Montana Department of Natural Resources, Big Timber Rural & Park County Fire Departments, Sweetgrass County Commissioners and Planners, Sweetgrass County Disaster and Emergency Services, Forest Service, and the State and Private Branch of the Forest Service. Representatives from the Department of State and Private Forestry Branch of the Forest Service and Montana Department of Natural Resources stated that grant money is available to the private and county for fuels reduction work and that interested parties needed to prepare a request. The Department of State and Private Forestry Branch of the Forest Service agreed to assist in writing a grant request and developing a plan. The Sweetgrass County Fire Department mailed letters to private landowners, notifying them of the proposed projects and telling landowners that the department would perform home and property assessments for interested parties. Meeting participants agreed that a private coordinator was needed to serve as a contact person between the Forest Service and the other involved groups. The meeting accomplished its goal of bringing as many partners as possible to the table to share ideas and goals for fuel reduction in the Main Boulder River Corridor.

In June 2003, the Big Timber Rural Fire Department performed seventy "firewise" assessments on private structures in the Main Boulder Corridor. The Boulder River Fuels Reduction

Cooperative has been awarded two grants, one from the USDI Bureau of Land Management, and another from the Montana Department of Natural Resources and Conservation, to assess and implement fuels reduction efforts on private land. The Boulder Fuels Reduction Cooperative has hired a project coordinator to manage the program and engaged a consultant firm, Fire Logistics, to develop the Boulder River Community Assessment and Mitigation Plan. This plan, developed independently from the Main Boulder DEIS, assessed fire risk and fuel conditions in the Main Boulder Corridor, and identifies actions necessary on private land to protect private land values as well as providing for public and firefighter safety. Three demonstration fuel reduction sites were completed in spring of 2004. Fuel activities have been completed or are currently occurring on approximately fifteen additional private sites.

Numerous other field trips to the project area were conducted during the summer/fall of 2004. Those attending included both members of the public and various organizations including the US Fish & Wildlife Service, Montana Environmental Protection Agency, Trout Unlimited, and the Greater Yellowstone Coalition.

IV. IDENTIFICATION OF ISSUES

Through the scoping process, the public and other agencies raised several concerns in response to the proposed action. Issues were identified following review of written and verbal comments from the public, input from Forest Service resource specialists, and comments from state and other federal agencies.

Comments identified during scoping were evaluated against the following criteria to determine whether or not the concern would be a major factor in the analysis process:

1) Has the concern been addressed in a previous site-specific analysis such as in a previous project analysis or though legislative action?
2) Is the concern relevant to and within the scope of the decision being made and does it pertain directly to the proposed action?
3) Can the concern be resolved through project design or mitigation (avoiding, minimizing, rectifying, reducing, eliminating, or compensating for the proposed impact) in all alternatives?

For this proposal**,** eight issues were found to be "key" to the decision, in addition to achievement of the purpose and need. These are discussed in the issues section of this chapter and also in Chapter 3-24 through 3-110. These are the issues that the interdisciplinary team and decision-maker concluded were the primary factors to be considered while developing the alternatives and making a decision among the alternatives.

V. KEY ISSUES

The purpose of scoping is not only to identify a list of issues and concerns over a proposal, but to determine the key issues to be analyzed in depth and to eliminate from detailed study those which are not key (40 CFR 1501.7). Key issues become the focus of interdisciplinary interaction and alternative development. Key issues are not readily mitigated, they pertain to the decision to be made and their resolution is within the scope of the project. The magnitude of a key issue is not minor and the issue pertains to a resource, as the resource will be affected by a proposed action.

A number of issues identified during scoping were determined not to be “key” or were outside the scope of this proposal. There are nine other issues identified that would either not be affected by this project or their impacts could be mitigated or resolved through project design. These other issues are discussed in Appendix A of this document. A complete list of all comments received

during scoping and an explanation of how each was addressed by the Interdisciplinary Team is contained in the Project File at the Big Timber District Office. Design Criteria and mitigations for all resources are described on Ch. 2-31 through 2-41 and unit specific treatments and mitigation measures for the proposed action are in Appendix B-1 through B-4.

Based on the assessment of effects and public comments, the agency has determined that the following issues are key to the decision to be made:

Issue 1: **A wildland fire could threaten public and firefighter safety within the Main Boulder River Corridor. Years of successful fire suppression and a resulting lack of low intensity, stand maintenance fires have resulted in changes to forest structure, tree densities and associated fuel characteristics within the Main Boulder River Corridor.**

> **Indicator:** The distribution of fuel loadings by size class and tons/acre, as well as the vertical and horizontal continuity/arrangement within the fuel bed. A fire risk analysis is performed using the following models:
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> *Forest Vegetation Simulation (Fire/Fuel Effects extension) (FVS-FFE)* - This model is used to indicate changes to fire behavior by comparing the current condition (with no treatment) against the proposed treatments. The model simulates fuel dynamics and potential fire behavior over time and accounts for stand development and management (e.g., proposed silviculture and fuel treatments). FVS-FFE modeling generated several components (crown bulk density, canopy depth and crown fuel load) that were then run in the NEXUS model to determine potential fire type (active, passive or surface fire).
>
> *NEXUS* – NEXUS is an Excel spreadsheet that links surface and crown fire prediction models. Using inputs from FVS-FFE simulations for the no treatment and proposed treatment alternatives, NEXUS is used to: a) estimate surface, transition and crown fire behavior; b) generate site-specific indices of torching and crown fire potential; and c) evaluate alternative treatments for reducing the risk of crown fire.
>
> *BEHAVE* – The model is a set of interactive computer programs for fire behavior prediction and fuel modeling. Fire behavior predictions can be obtained including rate of spread, flame length, intensity, area, perimeter and spotting distance.
>
> *Fire Weather Conditions* – All modeling considers typical seasonal weather conditions for a day in August, such as: Temperature 84 degrees, relative humidity 10%, mid-flame wind speed 8 mph. These conditions represent a fire growth day typified by recent wildland fire events.

Concern: There is a lack of safety zones (safe areas), unnaturally high fuel loadings, and a tendency for continuous fuels throughout the Main Boulder River Corridor. This combination of circumstances contributes to the difficulty of gaining rapid control of a potential wildfire, creating a concern for public and firefighter safety. In addition, the Main Boulder Road concentrates traffic in a single lane, adding to the time necessary to move people out of the drainage in an emergency situation.

Scale of Analysis: The analysis considers the history of fire and fire suppression throughout the Main Boulder drainage. We also address the current fuels situation in relation to recreation and other uses of National Forest resources in the Main Boulder River Corridor.

Issue 2: This project could increase the spread and density of noxious weeds where suitable habitat exists within the proposed project area, adjacent private lands, and wilderness area. There could be direct effects to native vegetation, as well as indirect effects to dependent animal species and soils. Weeds are spread through soil disturbance caused by mechanized equipment, burning practices, and by reduction in the forest canopy cover. Proposed changes in the Main Boulder River Corridor would create potential habitat for noxious weeds and could reduce the competitive success of native vegetation.

> **Indicator:** Impacts to existing native herbaceous vegetation were evaluated by assessing existing infestations and their location relative to proposed fuels reduction units. Mapped weed polygons by species were overlaid on unit boundaries and analyzed, both on maps and in tabular form.

Concern: The proposal contains a number of actions that will modify existing habitat conditions in the Boulder drainage. Factors contributing to the spread of noxious weeds include a reduction in the canopy cover, allowing increased sunlight to reach the valley floor, use of mechanized equipment to harvest and skid trees over the ground, constructing landings or slash piles and repeatedly driving and skidding trees to these locations. These actions contribute to soil disturbance and compaction within the treatment units, along access routes and in materials storage areas. Disturbed or compacted soils are an ideal seedbed for competitive, non-native plant invaders. In addition, local noxious weed seed sources exist on private land, adjacent to proposed treatment units and in many cases within treatment units. Expansion of existing infestations is somewhat kept in check by relatively healthy, intact native plant communities and dense forest canopy cover. Habitat components such as slope, soil type, aspect and elevation are generally not limiting factors to weed expansion in the Boulder river corridor outside of the wilderness.

Scale of Analysis: The analysis area for evaluating effects of this project on native herbaceous plant communities and their habitat is the Main Boulder River Corridor, including public and private land. Also considered was the local area of influence including weed infestations on private and right-of-way land below the forest boundary and the roads used to move equipment and materials into the Main Boulder drainage.

Issue 3: Proposed fuel treatments along with the cumulative effects of existing roads and recreation and private land development could affect water quality by introducing additional sediment to the Boulder River and its tributaries. Increased nutrients in the Boulder River from prescribed burns may exceed water quality standards.

> **Indicator:** Sediment yield as measured in tons/year and percent over natural modeled at the Forest Boundary and primary tributaries is a management indicator for water quality.

Concern: Increased sediment delivery could adversely affect stream channel conditions, water quality, aquatic habitat and/or downstream beneficial uses.

Scale of Analysis: The geographic and temporal scale of water quality analysis consists of cumulative sediment modeling of all National Forest and private lands, roads, and recreational developments within the Main Boulder drainage. The R1R4 model was used for sediment analysis for all activities from 1980 to 2011. The accounting point is the Main Boulder River at the Forest Boundary.

Issue 4: Fuel reduction, including timber harvest, construction of roads and log landings, disturb soils and increase the potential for erosion and sediment transport and deposition in streams. Increased fine sediment in streams has been shown to reduce habitat quality and cause adverse effects to fish populations. Harvest activities may reduce riparian integrity and bank stability. Fuel reduction treatments may also reduce the amount of large woody debris (LWD) recruited to stream channels. LWD in mountain streams creates structurally diverse and complex habitats that are important for all life stages of fish.

> **Indicator:** Project fuel treatments and activities in riparian zones against channel sensitivity analysis. Evaluate relative importance of LWD in project area streams and potential for LWD reductions after treatment. Evaluate potential for adverse habitat effects due to increased sediment using R1/R4 sediment model results and established guidelines.

Concern: There are three primary concerns. 1) How will riparian harvest influence riparian integrity and streambank stability? 2) Will riparian harvest degrade fish habitat by reducing the amount of LWD available for recruitment to the stream channel, and 3) Will fuel reduction activities increase sediment delivery to stream channels and degrade fish habitat?

Scale of analysis: The analysis area for this issue includes the main Boulder River within the project area downstream to the national forest boundary. It also includes all reaches of tributary streams within the project area.

Issue 5: Harvesting and other fuel management activities could affect the integrity of the scenery in the Main Boulder drainage. Changes in the scenic integrity of the landscape viewed from the Main Boulder River could affect the eligibility and potential classification of specific sections of the Main Boulder River for study and possible inclusion into the National Wild and Scenic River System as a Scenic and Recreational River.

> **Indicator:** The level of visually discernible dominance of deviations from the area's scenic character caused by the fuel treatment and harvest activities, as viewed primarily from the Main Boulder Road, the Main Boulder River and recreation sites.

Concern: Fuel management activities could affect the scenery and potentially jeopardize the continued eligibility and potential classification of the Main Boulder River as a National Scenic and Recreational River in two ways:

1) If no fuel reduction were accomplished, the forest and developed urban interface areas would be at more risk for an unusually large crown fire. Crown fires in forested areas may result in large, continuous areas or entire viewsheds that have primarily blackened dead shrubs and trees for many years, as opposed to smaller fires that would result in a vegetative mosaic. A change this drastic in the character of the scenery is often viewed as undesirable by people who live in, recreate in or use those forested areas. While this would effect viewers' perception of the scenery, it would not affect the Scenic and Recreational River eligibility and potential classification, as per the Forest Plan, Amendment No. 12, dated June 1993. A change such as this, due to natural ignitions, is outside the scope of the Forest Plan standards for visual quality.

2) Conversely, certain elements of the proposed fuel management activities could cause visually dominant deviations from the scenic integrity. These elements include stumps, slash piles, skid corridors, unnatural vegetation patterns and a potential increase in the visibility of constructed features formerly hidden by vegetation. Depending upon the level of visual dominance, these deviations could transform the scenic character from one that is largely defined by the natural appearing setting, interspersed with mostly rustic and

subordinate constructed features to a character that appears to be heavily managed and unnatural. The integrity of the scenery would no longer comply with the Forest Plan Standard for Visual Quality of Partial Retention.

Likewise, a character that appears to be heavily managed and unnatural would render the Main Boulder River ineligible for potential classification and inclusion as a Scenic and Recreational River for many years.

Scale of the Analysis: The spatial boundary for evaluating the effects of this project on the scenery, in terms of compliance with the Forest Plan standards for visual quality, is the viewshed from the Main Boulder Road and recreation sites on National Forest lands. Due to the steepness of this drainage, this generally means that the area of analysis extends from the east ridge top to the west ridge top. Ridges and rises in topography define the extent of the viewshed on the north and south.

The spatial boundary for evaluating the effects of this project on the eligibility of the Boulder River for consideration for potential classification and inclusion in the National Wild and Scenic River System corresponds with the area covered by any future Scenic and Recreational River Study. That area, which will be considered the "river corridor" for any future study, will extend one quarter mile, at a minimum, in width from each river bank along segments of the river: the Gallatin National Forest boundary to Blakely Creek; from Miller Creek to Bramble Creek; from Blakely Creek to Miller Creek; and from Bramble Creek to the Wilderness boundary.

Issue 6: Effects to wildlife and plant species, including threatened, endangered and sensitive species, management indicator species and other species of concern and effects to wildlife and plant habitats, including snags management, riparian areas, biodiversity, biological corridors, old growth late successional habitat, and wildlife and general habitat improvements goals.

Indicator: Impacts to wildlife species were evaluated by assessing quantitative factors relative to habitat change; e.g. loss of denning/nesting/foraging habitat, loss of security/thermal cover, loss of snags, loss of coarse woody debris component, road density, etc. and qualitative factors such as potential for disturbance or displacement

Concern: The cumulative effects of existing roads, recreational use, past timber harvest, activities on adjacent private property and the proposed activities in the project area could have negative impacts on wildlife species through habitat alterations. Disruptions associated with human activities can disturb and/or displace wildlife, resulting in greater energy expenditures, potential relocation into poorer quality or unfamiliar habitat, and increased vulnerability to predation, competition with other animals or adverse effects from humans elsewhere.

Scale of Analysis: The analysis area for evaluating effects of this project on wildlife species and their habitat was based on timber compartment boundaries. The compartments on the District were used to establish lynx analysis units (LAU) with suitable lynx habitat. The total acreage of the combined compartments used for this analysis is 163,620 acres, not including private lands within compartments. The area affected by the project includes approximately 650 acres located in 31 separate treatment areas. These treatment units are also distributed fairly equally among eight separate lynx analysis units. Preliminary treatment proposals consist of pre-commercial thinning, commercial thinning, small clearcuts, aspen regeneration cuts and thinning, and broadcast prescribed burning. The spatial scale chosen for this assessment was based on average home range sizes of various wildlife species singled out for effects assessment; e.g. threatened, endangered and sensitive species, management indicator species and other wildlife species of concern. Recognizing that home range sizes vary widely for different wildlife species, it was determined that LAU boundaries provide an adequate spatial scale for analysis based on the following:

1. LAU boundaries are based on hydrologic and topographic features and do not change over time.
2. The eight LAU's used for this analysis cover 20 timber compartments; an area more than large enough to encompass the home range of most wildlife species of concern for the project.
3. All proposed actions associated with this project are confined within the boundaries of the LAU's used for effects assessment.

The temporal scale for effects analysis includes the timing and duration of project actions, which ranges from one to ten years. A period of ten years allows for consideration of direct impacts caused by the proposed action, which is expected to take one to five years to complete thinning and commercial activities and five to ten years to complete prescribed burning activities. Indirect effects of the project might continue to occur after the completion of project implementation.

Cumulative effects assessment requires consideration of past, present and reasonably foreseeable future events. Vegetation altering processes like timber harvest, wild and prescribed fire, agriculture, residential and road development, livestock grazing, and mining can have very long-lasting (e.g. hundreds of years) effects on wildlife habitat. Past impacts to wildlife habitat are reflected in the current baseline vegetation and road data used for analysis of the proposed project. The analysis of potential future actions and events was limited to those activities currently planned, proposed, or contemplated in the analysis area. There is no way to reasonably predict what may occur beyond these known potential events. Further, any future federal actions in the project area that are not being considered at this time, will undergo a separate analysis, based in part on an understanding of the consequences to wildlife habitat incurred by the currently proposed Main Boulder Fuels Reduction Project.

Issue 7: Fuels management activities could affect recreation opportunities by affecting the sense of place, displacing recreationists and/or creating conflicts at recreation sites or on the Main Boulder Road.

> **Indicator:** The location and treatment of proposed units in relation to developed recreation facilities, dispersed use areas, and private land will be used to determine impacts to recreation opportunities. Changes to the physical setting surrounding recreation use areas on National Forest System lands should be evaluated in relation to the visual quality and maintenance of vegetative screening.

Concern: The Main Boulder area is a heavily used recreation corridor with numerous Forest Service and private developments. Although decades of fire suppression have increased fuel loadings, and have created potential hazardous conditions within the one-way in one-way out canyon, Forest users have become accustomed to the area's setting. Past recreation analysis for the Main Boulder indicates most Forest users do not want the recreational setting and opportunities to change. People like it the way it is. Removing vegetative screening could alter the perceived recreation experience and the sense of place of the area.

Fuel treatments including timber harvest, slashing, prescribed burning, and associated hauling on the Main Boulder Road may temporarily prevent recreational use of some facilities or dispersed opportunities.

Scale of the Analysis: The spatial bounds of this analysis needs to include areas around Forest Service recreation facilities, dispersed sites and permitted areas within the Boulder River drainage from the vicinity of the Main Boulder Ranger Station to approximately one mile south of Box Canyon Trailhead. The temporal bounds of the analysis needs to consider impacts from human induced change including past fuels management projects, timber harvest, and hazard tree removal in relation to vegetative screening and recreation opportunities.

Issue 8: Understory and pile burning associated with the Main Boulder Fuels project may temporarily increase $PM_{2.5}$ levels along residential areas in the Main Boulder Canyon and impact the air quality in the adjacent Absaroka Beartooth Wilderness. Smoke from the Main Boulder Fuels project may temporarily obscure visibility along the Main Boulder Road and temporarily obscure views to scenery.

Indicator: Smoke in as measured in $PM_{2.5}$ in tons of total emissions, tons/day, and in downwind concentrations in ug/m3.

Concern: Increased smoke from understory and pile burning could adversely affect health of people in the Main Boulder River canyon area and reduce visibility along the Main Boulder Road.

Scale of Analysis: The geographic and temporal scale of the air quality analysis consists of air quality modeling of each burn at 0.1 mile to 50.0 miles with consideration to sensitive receptors south of the Main Boulder Canyon.

VI. OTHER ANALYSIS ISSUES

The National Environmental Protection Act (NEPA) provides for the identification and elimination from detailed study the issues which are not significant or which have been covered by prior environmental review. This narrows the discussion of these issues to a brief presentation of why they will not have a significant effect on the human environment or providing a reference to their coverage elsewhere (40 CFR 1501.7(3)). While these concerns are important, they were either unaffected or mildly affected by the proposed action, or the effects could be adequately mitigated.

A number of issues were analyzed but not “key” factors in the decision process for proposed fuel reduction activities in the Main Boulder project area. These issues were eliminated from further analysis in this EA for the following reasons:

1. They were not relevant or specific to this proposal for fuel reduction in the Main Boulder analysis area.
2. They were beyond the scope of this project level analysis and decision to be made;
3. Experience or analysis from other similar projects on the forest has consistently demonstrated that effects related to this issue are not “key”.
4. The proposed action was modified to include mitigation, which is effective in alleviating any major impact.

Following is the list of issues analyzed but not found to be “key” factors in the decision for this project. A discussion of these nine issues can be found in Appendix A.

A. Soils (Quality, productivity)
B. Heritage Resources
C. Livestock Grazing
D. Road Density and Elk Effective Cover (HEI))
E. Vegetative Diversity/Structure/Old-Growth
F. Economics
G. Insect and Disease
H. Inventoried Roadless Areas
I. Wilderness

VII. ALTERNATIVE DEVELOPMENT PROCESS

The Main Boulder Fuels Reduction Project was developed in order to provide for public and firefighter safety and to buy time for evacuation purposes in the event of a wildfire occurring in the Boulder drainage. With input from scoping and numerous discussions among the interdisciplinary team, the "key issues", as well as other pertinent issues, were agreed upon by the team. Once these issues were identified, the team began the process of developing alternatives that would address the issues identified, while fulfilling the purpose and need of the project. The fuels specialist, with the help of the silviculturist, and other fire specialists, began running various fuels modeling programs (FEIS, Ch. 3-24) in an effort to determine how much fuel that would need to be removed and where in order to bring the likelihood of an uncontrollable crown fire to an acceptable level. Since the models are based on mathematical relationships, they tend to present a stark choice; either fuels will be treated to better provide for human safety or the current level of risk will be accepted indefinitely into the future. Several options were studied (See Ch 2-43). After numerous discussions among various specialists, the team came to the conclusion that the only alternative that fully addresses the issues, meets the purpose and need of the project, and complies with Forest Plan standards and guidelines is Alternative B, the proposed action. Alternative B fully complies with the legal and administrative constraints that combine to define how well any alternative can provide for greater public and firefighter safety.

The team was somewhat uncomfortable with only fully analyzing the no action and proposed action alternatives. However, none of the seven other alternatives considered, met all of the requirements to make them viable.

VIII. ALTERNATIVES CONSIDERED IN DETAILED STUDY

Each action alternative, to the extent possible, must fully or partially meet the purpose and need for which the project is proposed. Alternative A, the no action alternative, provides a baseline for comparing the effects of implementing the various action alternatives. It also shows the predicted effects of continuing the current management in the project area.

Alternative A – No Action

The National Environmental Policy Act (NEPA) requires the consideration of a no action alternative (40 CFR 1502.14d) where none of the proposed actions in Chapter I would occur. It provides a baseline of comparison to aid in determining the significance of issues and effects of the proposed action. Under this alternative no tree harvest, vegetation management, or fuels reduction would occur. Vertical and horizontal fuel continuity would remain a concern, with the continued potential for a fast running, intense fire to occur in the Main Boulder Corridor. Alternative A would have no effect on changing the probability of an uncontrollable crown fire from what currently exists in the Main Boulder Corridor (FEIS Ch. 3-26).

Under this alternative, no actions would be undertaken over the next few years to respond to the purpose and need identified in Ch.1-13. The opportunity to reduce fuel accumulations would be deferred. No treatments such as hand piling or grapple piling would be done on the existing ground fuels. No burning would be completed. No vegetative treatments would be undertaken to treat stands, which are susceptible to lethal fire and to insect and disease outbreaks. Trees would not be harvested to meet the objectives for fuels management. Meadows would continue to shrink due to in growth of conifers. Aspen stands would continue to decline with little new regeneration. There would not be any road construction or reconstruction in the project area. The actions identified in the Features Common to All Action Alternatives would also not be accomplished, including any resource improvement projects.

Those activities described as Reasonably Foreseeable Actions in the FEIS, Ch.3-2 would likely proceed. These activities could include such activities as noxious weed spraying, occasional small timber sales (primarily to salvage dead and dying trees), hazard tree reduction projects, and campground maintenance. Developments on private land would continue, including construction of additional residences. Fuel reduction projects would also likely occur on several of the private inholdings, however would likely be less than what would occur if the proposed action were implemented because much of the future grant money available to private residents is dependent upon the Forest Service simultaneously treating National Forest lands. Fuels treatments on private land but would be less effective when adjacent National Forest lands are not treated.

Of the alternatives, Alternative A responds best to the key issues of scenic integrity and peoples differing sensitivities to change. No short-term effects would occur to visuals although there would continue to be vegetative changes (insect and disease mortality, encroachment, undergrowth) through time. No additional impacts would occur to residents and visitors resulting from activities included in the proposed action including any impacts to recreation activities.

Alternative B – Proposed Action

Alternative B (proposed action) was designed to meet the purpose and need for the project. All elements of the purpose and need have been addressed. This alternative was developed considering the areas of high fuel hazard, high risk of human-caused ignition, and high social values. Considering the hazard, risk, and value, stands that have a high potential for lethal fire to affect lives and property in this wildland/urban interface were included for treatment in Alternative B. The proposed action emphasizes for treatment those stands where the reintroduction of fire would maintain and/or improve wildlife habitat, and those having existing insect and disease outbreaks. Treatment in these stands is expected to reduce existing and future fuel hazards. Alternative B, the proposed action, would contribute to society's need for wood products and be consistent with the management direction of the GNF Forest Plan. All treatments would be consistent with Scenic Management guidelines as outlined in the Forest Plan.

Maps 2-1 through 2-4 on Ch. 2-23 through 2-26 display the areas of treatment proposed with Alternative B (proposed action).

The proposed action includes fuel reduction treatments on up to approximately 2500 acres in fifty-one separate units. Stand density reduction, utilizing ground-based harvest equipment, would occur on up to approximately 1060 acres on slopes up to 35%, harvesting both large and small diameter trees. Up to 1040 acres on slopes greater than 35% and/or areas not operable by conventional ground-based equipment would be treated with other methods. These treatments could utilize specialized equipment, as well as horse logging on slopes less than 20%, cable logging, aerial systems, hand thinning, hand piling, and burning. Approximately 200 of these acres on slopes >35% may be inoperable due to the terrain. See Maps 2-1 through 2-4 in Ch 2-23 through 2-26.

Leave tree spacing would be variable and, consist of patches of multi-storied trees as well as open spaced individual trees. This irregular stand structure would break the continuity of vertical and horizontal fuels among individual trees. Prescriptions would vary between adjacent stands to disrupt the continuity of fuel conditions among stands. Conifers would be slashed and controlled burning activities would occur on approximately 400 acres of meadow type areas.

Detailed descriptions of the proposed treatment groups to be implemented as a part of the proposed action can be found on Ch. 2-15 through 2-18. Table 2-1 on Ch. 2-21 through 2-22 displays individual unit information (acres, treatment group, forest type, management area, slope %, fuel model). Some units have Park Electrical lines through them and the Forest Service will coordinate with Park Electric Power Company for safety reasons and to protect these improvements during treatment (see Table 2-1). Design criteria and mitigation measures that are

applicable to all units can be found on Ch. 2-31 through 2-41. Table B-1 displays unit-specific mitigations and can be found in Appendix B.

Harvest, skidding, log hauling, and mechanical slash piling would generally occur from November 1 to April 30. These activities could occur outside of this season in some cases, but must include use of slash mats or other, similar techniques to protect soils and limit ground disturbance. Harvest and skidding activities must be completed on a given unit within one year, unless extreme weather conditions prohibit completion. If this were to occur, work in the unit could be finished the following year, but no new units would be released for cutting until harvest and skidding were complete and accepted.

Mechanized equipment would not be allowed within Streamside Management Zones or wet areas in conformance with the State of Montana Best Management Practices (BMP's).

Direct treatment of activity-related and natural down fuels would be constrained to maintain 5-10 tons of coarse, down woody material per acre. Burning would only occur during the spring (April/May) and fall (late September to December) seasons. Conifers would be slashed, followed by prescribed burning on approximately 400 acres of meadow type areas. Prescribed burning, as well as understory burning in some of the thinned units, would occur in spring (May/June) or fall (late September to November).

No new permanent road construction is being proposed. Commercial harvest operations are expected to require temporary road construction. A maximum of 7.4 miles of temporary road may be needed to access the areas proposed for mechanical fuels treatment using conventional ground-based logging systems. Of this total, approximately 4.8 miles will be re-examined on the ground prior to project implementation to determine whether opportunities exist to reduce the length of newly constructed temporary road by using existing roads on private or National Forest land. One of the key factors in determining the use of existing roads on private land is whether permission to use the roads can be obtained. Existing roads on either ownership may require reconstruction to support safe and efficient use, consistent with project design criteria and mitigations. Options to use existing roads will be examined to assure that the environmental effects of using roads on private and public land do not exceed what has been disclosed in this document. See Maps 2-5 through 2-8 on Ch. 2-27 through 2-30.

Actual temporary road locations are determined through agreement by the Forest Service during timber sale contract administration. Temporary roads would be constructed to provide access to the interior of harvest units to facilitate ground-based harvest systems. These roads would be built on relatively flat slopes (less than 20%) and would be constructed to the lowest possible standard capable of supporting log haul in order to minimize ground disturbance. Temporary road construction, including right-of-way clearing and removing wood products, would occur July 1- October 30. All newly constructed temporary roads would be closed to the public during harvest activities and permanently closed and rehabilitated within one year of completion of harvest related activities within that portion of the project area. Rehabilitation will include making the temporary roads on National Forest System lands impassable for any motorized travel, as well as necessary other resource protection practices. Temporary Roads that are seen from key observation areas would be recontoured (the road prism removed) in order meet visual concerns and other resource needs.

All of the treatments have been designed to mitigate effects to the visual integrity of the river corridor.

The entire project is projected to take 5-7 years to complete. Implementation could occur as early as winter, 2005. The project will be divided into logical subdivisions for implementation purposes.

Detailed Design Criteria (DC) common to all Stand Treatment Groups:

A) Aspen – Remove all conifers within and around aspen clones (individual trees sharing a common root system). This treatment would not occur where conflicts arise between design criteria and stand structure objectives. Design criteria would have priority over treating aspen within 15 feet of stream channels and within 100 feet of developed campgrounds or heavily used campsites, including campsites at Box Canyon and Four-mile Trailheads, Lower Four-mile, Shipping Corrals Picnic Area and dispersed campsite, the two dispersed campsites between Aspen and Chippy Park Campgrounds and the fishing access site above Hillary Bridge (Armour Access site). If a conflict occurs, the clones would receive the treatment called for by the prescription group that applies to adjacent stands. Fuels resulting from the surrounding area and in the standing aspen would be burned.

B) Fuels – Trees would be skidded to landings. Submerchantable material and slash from the logging operation would be piled or removed from the unit and disposed of. Approximately 5-10 tons/acre of down woody material would be left on the ground for nutrient recycling, favoring larger diameter pieces. Coarse woody material not needed to meet residual fuel needs would be skidded to a landing, piled and burned, piled and burned on the harvest site, or otherwise removed from the Main Boulder River corridor.

C) Burning – Activity fuels would be treated and burned following harvest. Burning methods would include prescribed burning in meadow type areas, burning hand or mechanical piles, jackpot burning (treatment of concentrated fuels), and underburning. These actions would reduce ladder and activity fuels within the treated units.

D) Tree retention – The following pertains to Stand Treatment Groups 1, 2, 4 and 5. Existing stand densities are highly variable within the four prescription groups. The number of existing trees per acre varies greatly for each stand and ranges from 100 to 3000 stems per acre. On the average approximately 300-500 trees per acre will be left with a minimum of 15 to 20 percent of the area of each treatment unit being left in a natural appearing condition (may be left untreated) to meet a variety of resource objectives. Outside of these clumps, the average trees per acre left after treatment would be approximately 200 trees/acre (in other words, the clumps will make up the difference in trees/acre between the approximately 200 left individually and the 300-500 total trees per acre). These remaining trees will vary in size from seedlings to mature trees (six inches tall to 80-100 feet tall).

The untreated or minimally treated 15 to 20 percent area of each stand, would be left in a natural appearing condition and the trees in the groups would contribute to the total number of trees left per acre. Given these clumps, more then 500 established trees/acre would be left in some units. However, 500 trees/acre is the high-end for fuels objectives for the majority of the units.

Detailed Stand Treatments

The primary objective for all treatment groups is to:

1) Provide for public and firefighter safety by minimizing the probability and effects of future human-caused fire starts and/or helping to reduce the intensity of a potential wildland fire leaving the wilderness and entering the wildland/urban interface of the Main Boulder River Corridor.

2) Extend the potential time available for evacuation in the event of a wildfire by reducing the fire hazard along the Main Boulder Road.

3) Reduce fuel loadings and break up the composition of vertical and horizontal fuels in the river corridor.

Treatment are designed to reduce ladder fuels (small to mid-story trees and shrubs), thin the overstory to increase the space between crowns, reduce accumulations of down woody material and create stand conditions less hospitable for insect attack.

The primary objective for prescription treatments is to reduce the risk to the public and increase fire fighter safety in the event of a human caused or wildland fire starts in the urban interface of the Main Boulder river corridor or the adjacent wilderness area.

Prescription treatments are designed to meet six secondary goals:

1) Improve wildlife habitat/forage by enhancing winter range and meadows.
2) Rejuvenate aspen stands.
3) Improve fire protection in the wildland/urban interface.
4) Increase vigor at the stand level, making trees less susceptible to future insect and disease predation.
5) Encourage adjacent private property owners and local groups to implement similar hazardous fuel reduction plans thus maximizing effectiveness by increasing the amount of contiguous acres treated.
6) Maintain and protect values for river segments that were identified as eligible for consideration and inclusion into the “Scenic and Recreational” classification of the National Wild and Scenic River System.

Stand Treatments have been roughly grouped and units have been associated with particular Stand Treatment Groups for descriptive purposes. See Table 2-1, Ch 2-21. The treatment group descriptions are fairly generic. Unit specific prescriptions will be developed to specify the actions needed to realize the vegetative condition envisioned for the associated treatment group.

Stand Treatment Group 1 – Multi-Storied type Mixed Conifer Stands

The current condition of these stands is a mixture of mature overstory Douglas fir, spruce, alpine fir, and lodgepole with variable dense midstories and/or understories consisting of each of these species. Some of the mature overstory and midstory lodgepole are mistletoe infected. Mountain pine beetle is present in the lodgepole pine stands in this group. Epidemic numbers of Douglas-fir beetle can be attributed to overstocking, age of trees, elevation, and species composition within affected stands.

The objective for this treatment group is to reduce the ladder fuels (small to midstory trees and shrubs), reduce the basal area (thinning) of the overstory, and reduce the excessive

accumulations of ground fuel. Stand basal area ranges widely from 23 to over 320 square feet and would be reduced to an average of 60-80 square feet in each stand.

Harvest would emphasize removing small and intermediate sized Douglas fir, and lodgepole (between 3 inches and 9 inches in diameter). Varying amounts of overstory Douglas-fir, spruce, alpine fir and lodgepole would be removed. Harvest from the overstory would remove trees between 6.6 inches and 20 plus inches in diameter, while still fully meeting the snag and green tree retention requirements. The objective is to retain a multi-storied stand with between 2 and 22 trees/acre of large diameter trees (20" DBH plus) provided these trees are present in the stand before treatment. The overstory would consist of Douglas-fir, spruce, alpine fir and lodgepole.

Understory trees would be thinned to a variable spacing in order to retain a more natural appearing stand. For instance, 3-5 groups of trees may be left in a particular size class to achieve this objective. Harvest units would retain a mixture of species on any given acres (if they were present before treatment). Slash would be piled, burned or otherwise treated. Understory burning may be used to obtain desired downed woody fuel levels.

The breakdowns by species and size class below indicate the approximate percentage of the basal area that would be treated. These will vary depending on the composition of the unit to be treated:

a) Reduce Douglas-fir basal area in trees greater than 8" diameter 60-80%

b) Reduce Lodgepole pine basal area in trees greater than 8" diameter 70-90%

c) Reduce Spruce and Alpine fir basal area in trees greater than 8" diameter 40-60%

d) Reduce Douglas-fir trees per acre in trees less than 8" diameter 60-80%

e) Reduce Lodgepole pine trees per acre in trees less than 8" diameter 70-90%

f) Reduce Spruce and Alpine fir trees per acre in trees less than 8" diameter 70-90%

With only a light understory, low amounts of surface fuel present, and an increased crown base height, there would be a decrease in fire severity. Trees retained would be all aged.

Stand Treatment Group 2 - Lodgepole stands/ Douglas-fir stands

This treatment type includes densely stocked stands having varying amounts of patchy understory dominating along with some scattered 9" plus diameter trees. This treatment would be similar to an intermediate harvest, designed to remove the slower-growing trees from a stand to create additional space for the remaining trees and improve stand health. However, for these stands, a variable spacing tree marking guideline would be used with the objective of leaving approximately 300-500 trees per acre (including the 15-20 percent/stand areas left in leave clumps). Harvest within the stands would include trees between 3.0 inches and 20 plus inches, while fully complying with the snag and green tree retention requirements. Including the leave areas, the residual stand would be thinned to an average of 300-500 trees per acre of a mixture of sizes from seedling to mature trees.

Slash would be piled, burned, or otherwise treated. Understory burning may be utilized in order to obtain desired downed woody fuel levels.

With only a light understory, low amounts of surface fuel present, and an increased crown base height, there would be a decrease in fire severity. Trees retained would be all aged.

Stand Treatment Group 3 – Meadow community types

Grass and brush communities with instances of encroaching conifers characterize the stands within this treatment group. Many of these meadow types lie adjacent to transition, forested landscapes that are key habitat for big game. The objectives of the treatments within these communities are to reintroduce fire in the ecosystem, to rejuvenate the grass, forb, and brush communities for wildlife browse enhancement, to enhance aspen regeneration, to maintain open space, and to reduce present fuel volume. Merchantable/submerchantable conifers that are not essential to providing habitat for big game wildlife species would be slashed and burned within each unit. Merchantable trees that lie within the transition zone between meadow and forested types would be harvested. Fuel prescriptions would reduce the duff layer by 30-50% across the units. In places where aspen is present, aspen enhancement will be featured in these treatments.

Leaving 15%-20% of the total stand acres in leave clumps does not pertain to Treatment Group 3.

Stand Treatment Group 4 –Lodgepole Pine with mixed conifer

Proposed Unit 25 is dominated by a densely stocked midstory of intermediate sized, mixed species conifers (lodgepole, Douglas-fir, subalpine fir, and spruce) with a mature/overmature mixed species conifer (lodgepole, Douglas-fir, subalpine fir, and spruce) overstory. This treatment would remove the majority of the overstory trees from the areas where there is a manageable understory. There is scattered mistletoe in the overstory lodgepole, which has the potential to infect the understory trees. Much of the stand consists of overstocked, intermediate sized lodgepole. Treatments would thin the lodgepole pine (between 1 inches and 9 inches in diameter), and remove a majority of the mid-sized Douglas-fir, spruce, and alpine fir as well. A majority of the overstory trees would be removed, while meeting the snag and green tree retention requirements. After treatment the stand would be stocked, with the overstory consisting of a few scattered mature/overmature mixed species conifers and a majority of the stand comprised of intermediate sized mixed species conifers. Treatment activities would include thinning to an average spacing ranging from 10’ x 10’ to 17’ x 17’.

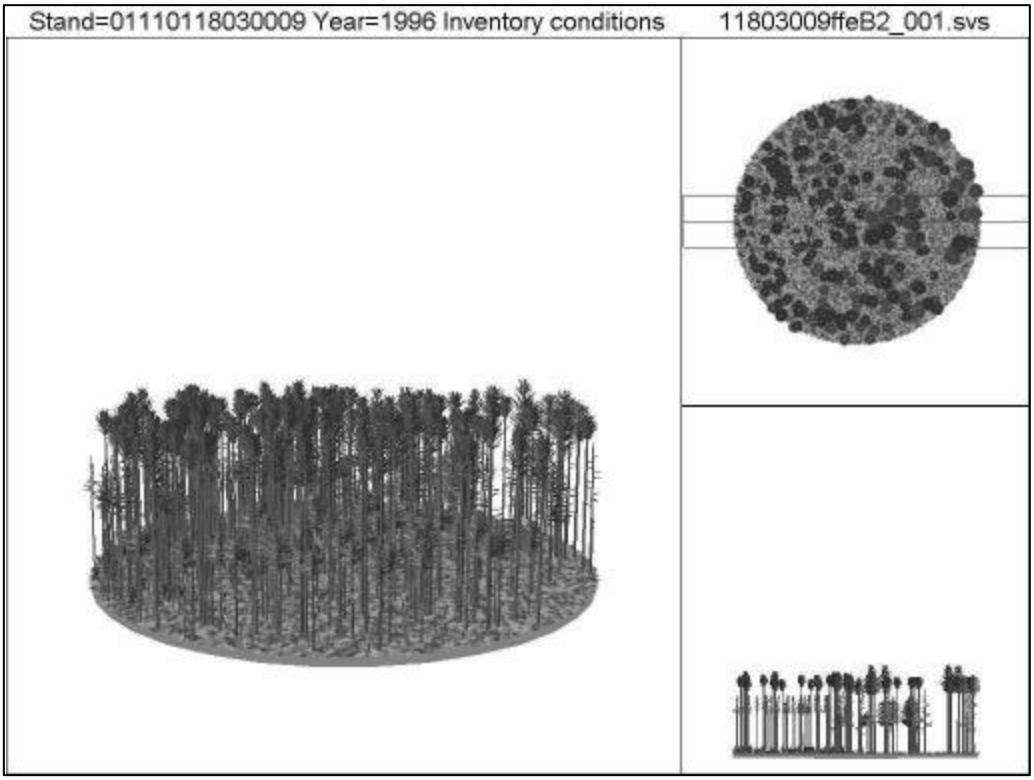
It is important to note that spacing would be varied to retain a more natural appearing stand. For instance, 3-5 groups of trees may be left in a particular size classes to achieve this objective. Including the leave areas, the residual stand would be thinned to an average of 300-500 trees per acre. Slash would be piled, burned or otherwise treated.

Stand Treatment Group 5 – Sanitation Salvage of Multi-Storied Type Douglas-fir Stands

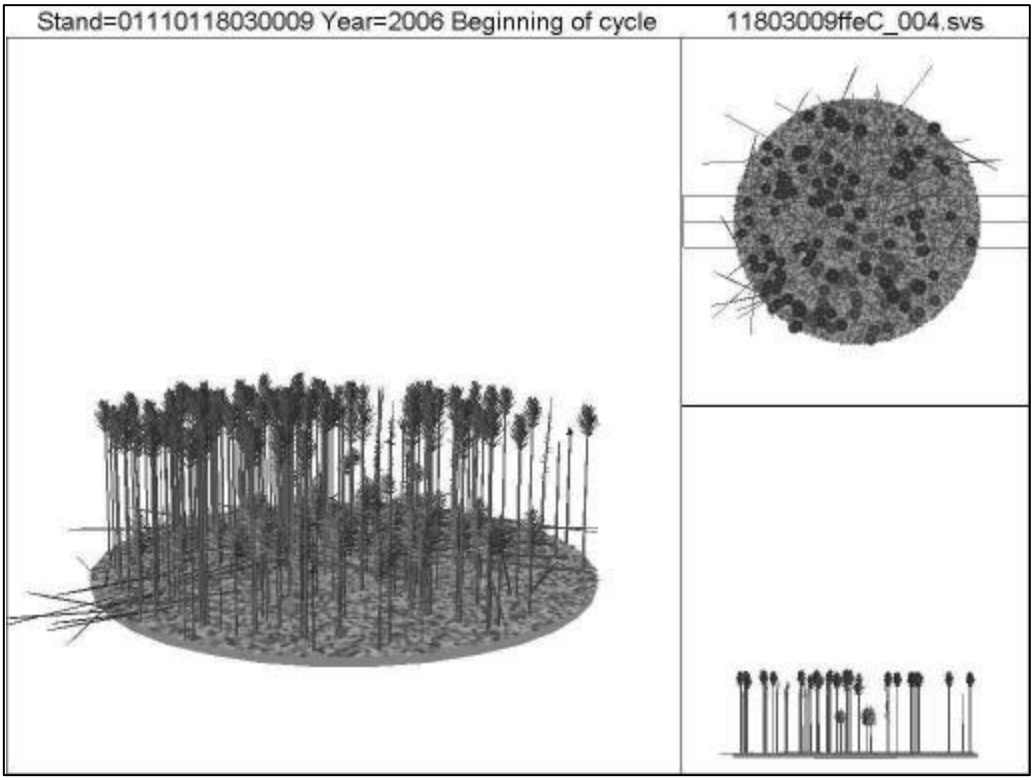
The purpose of this treatment is to remove dead, dying, or damaged trees and ladder fuels. The proposed Unit 14A would look very open with scattered reserve trees, due to the high incidence of standing dead trees, recently killed by the Douglas-fir beetle. Treating this stand to remove the existing surface fuels and dead trees would result in a short-term reduction in potential fire intensity. Due to the high amount of existing mortality, accumulations of additional fuel would be expected in the future without treatment. Removing the existing surface fuels would reduce the amount of fuel as well. A portion of the older dead (3-5 years) Douglas-fir would be left to meet snag requirements. Recent dead/new attacks would be removed as they contain Douglas-fir beetle brood and could further spread the epidemic. If available, 15 to 20 percent of the stand would be left in a natural condition (untreated clumps) including dead standing and down trees, to meet a variety of resource objectives. Slash would be piled, burned or otherwise treated.

Stand Treatment Group 6 – Dry limber pine/blue bunch grass habitat types within Roadless Boundary

Stand Treatment Group 6 applies to the Main Boulder Station Unit. A portion of this unit lies within the inventoried roadless boundary. In this portion, treatment would consist of slashing and burning conifers and aspen less than 8" in diameter. All work in this area would be done by hand. Treating the area around the Main Boulder Station would maintain the area in a fire regime condition class one. Douglas fir stands are starting to encroach into the limber pine/blue bunch habitat and aspen stands. Around the Main Boulder Ranger Station, hazard trees would be removed and defensible space would be created following Firesmart/Firewise guidelines. Prescribed fire would be used to return or maintain the fire interval consistent with the habitat type. The area would be burned sufficiently hot in order to kill 70-90% of the remaining conifers and 50-60% of aspen over 6" in diameter. Prescribed fire objectives are to reduce the duff layer by 30-50%.



Unit #25 Pre-Treatment (Stand Treatment Group # 1)



Unit #25 Post-Treatment (Stand Treatment Group # 1)

Fuel Model Descriptions

Following are the descriptions of the various fuel models that are currently found in the project area. Table 2-1 on Ch. 2-21 displays the pre-treatment Fuel Models within the various units associated with the proposed action.

Fuel Model C– This model was designed using "the two fuel model concept" for BEHAVE Surface fire model to more accurately describe expected fire behavior. The Custom Fuel Model shares many of the same fuels characteristics of the Anderson Fuel Model 10. Field observations in the upper portion of Main Boulder noted that the existing conditions exceeded some of the Fuel Model 10 characteristics. The Custom Fuel Model generally contains an increased fuel loading in fine and dead-down materials, with greater amounts of fuel than the standard Fuel Model 10 description. The Custom Model exhibits a significant unnatural buildup in the amount of small diameter trees in the understory due to a lack of stand maintenance fires. These small diameter trees produce a closed canopy understory component, which will aid in increasing fire intensity and rate of spread through the live and dead woody material, which support and sustain a continuous crown fire. The fuel-bed created by the small diameter trees consists of a nearly continuous understory canopy.

Fuel Model 2 – Fire spread is primarily through fine herbaceous fuels, which are mostly either cured or dead. Fuel Model 2 sustains surface fires with herbaceous material as well as litter and dead/down small diameter debris from the shrub component or the timber overstory contributing to the fire intensity. Open shrub lands and pine stands that cover one-third to two-thirds of the area may generally fit this model; such stands may include clumps of fuels that generate higher intensities and that may produce firebrands.

Fuel Model 8– Slow burning ground fires with low flame lengths are generally the case in Fuel Model 8. Although fires may encounter an occasional "jackpot" or heavy fuel concentration that can flare up, only under severe weather conditions involving high temperatures, low humidity, and high winds do the fuels pose significant fire hazards. Closed canopy stands of short-needled conifers or hardwoods that have leafed out support fire in the compact litter layer. This layer consists mostly of needles, leaves, and occasionally twigs with little undergrowth present in the stand. Representative conifer types are lodgepole pine, spruce, alpine fir and Douglas-fir.

Fuel Model 10– Fires burn in surface and ground fuels with greater intensity than the other timber fuel models. Dead-down fuels include quantities of 3-inch or larger limbs, resulting from a mature timber canopy or natural events that create large fuel loadings of dead material on the forest floor. Crowning out, spotting, and torching of individual trees is more frequent in this fuel situation, leading to potential fire control difficulties. Any forest type may apply if heavy down material is present; examples are insect or disease ridden stands, windthrow areas, overmature timber with associated deadfall, and aged thinning slash.

Table 2-1 Proposed Action- Individual Unit Descriptions

Unit ID	Stand Treatment Group	Forest Type	Acres	Mgmt Area	Slope Range %	Fuel Mode	Remarks
MBS	3/6	DF/ Limber Pine	155	6,12,17	2-66	2/8	Cut only up to 8” dbh in roadless area w/hand treatment
1	1	DF/LP	19	3, 11	14-68	8	
2	1	DF/LP	19	11	13-68	8/10	Exclude any knapweed areas
3	2	DF/LP	49	5	13-34	8	Rehabilitate old ATV trails Park Electric powerline
3B	1	DF/LP	10	5	1-22	8	Park Electric powerline
3C	1	DF/LP	25	5	13-54	8	
4	1	DF	26	5	0-43	2/8	Weeds concern use old access road in center of unit Park Electric powerline
5	1	DF/LP	16	5	10-70	8	
5A	1	DF/LP	10	5	7-66	8	
5B	3	Non-Forest	46	5	3-47	8	
5C	3	Non-Forest	19	5	3-13	8	
6	1	DF/LP	17	5	7-21	8/10	
7	1	DF/LP Aspen	126	5	6-66	8/10	Park Electric powerline Use existing trails to minimize weeds
7A	3	Non-Forest	11	5	1-23	8/10	
7B	3	Non-Forest	31	5	6-27	8/10	Old burn bay on South end of unit
8	1	DF/LP	56	5	10-64	8	
8A	3	Non-Forest	35	5	0-28	8	
9	1	DF/LP	40	5	1-53	8/10	
10	1	DF/LP	24	5	13-33	10	
11	1	DF/LP	30	5	7-61	8/10	
12	1	DF/LP	71	5	10-43	8	
13	2	LP	59	5	0-28	8	Park Electric powerline
14	1	LP/DF	11	5	11-18	8	Park Electric powerline
14A	5	LP/DF	41	5	6-26	8	
15	3	Aspen	4	5	2-28	8	
16	1	DF	47	5	17-69	2/8	Park Electric powerline
16A	3	Non-Forest	22	5	17-45	2/8	
17	1	DF	29	5	8-41	10	Park Electric powerline
17A	3	Non-Forest	27	5	8-45	10	Park Electric powerline
18	1	DF/LP	75	5	2-71	10/C	Park Electric powerline
18A	1	DF/LP	105	5	1-59	10/C	

Unit ID	Stand Treatment Group	Forest Type	Acres	Mgmt Area	Slope Range %	Fuel Mode	Remarks
19	1	DF/LP	37	5	11-58	10/C	
19A	3/1	DF/LP Aspen	15	5	1-29	10/C	
19B	3/1	Non-forest	10	5	0-29	10/C	
20	1	DF/LP Aspen	8	5	9-48	8	
20A	3	Non-Forest	3	5	13-27	8	
21	1	DF Aspen	54	5	0-38	8	
22	1	LP/S/DF	39	5	5-42	C	
22A	3/1	Non-Forest	17	5	0-42	C	
23	1	DF/LP Aspen	30	5	1-63	C	
24	1	S/LP/DF	218	5	0-86	10/C	
25	4	S/LP/DF	104	5	5-68	C	
25A	1	S/LP	51	5	0-28	C	
26	1	DF/LP	50	5	5-41	C	
26A	1	DF/LP	30	5	2-38	C	
27	1	DF/LP	146	5	3-83	C	
28	1	S/DF/LP	25	5	0-39	C	
29	1	DF/S/LP	36	5	4-40	C	
30	1	LP/S/DF Aspen	215	15	1-99	C	
31	1	LP/S/DF	79	5	1-47	C	
32	1	LP/S/DF	65	5	0-40	C	
Total			**2487**				

***Brush disposal and/or burning of slash will occur for all units. Underburning will occur in some units as needed to reach resource objectives.**

***Park Electric powerline intersects a number of treatment units. Coordination with Park Electric Power Company prior to treatments will be necessary.**

***Riparian MA7 are too fine to map within the Main Boulder corridor. Treatments in some of the units will continue into the riparian zone and will follow all riparian and MA7 guidelines.**

MAP 2-1 PROPOSED ACTION (1)

MAP 2-2 PROPOSED ACTION (2)

MAP 2-3 PROPOSED ACTION (3)

MAP 2-4 PROPOSED ACTION (4)

MAP 2-5 Temporary Road Locations (4)

MAP 2-6 Temporary Road Locations (4)

MAP 2-7 Temporary Road Locations

MAP 2-8 Temporary Road Locations

IX. DESIGN CRITERIA AND MITIGATIONS SPECIFIC TO THE PROPOSED ACTION

This section describes project design features, mitigation measures, and monitoring activities that are specific to the proposed action. Unit-specific mitigation is discussed in Appendix B-1 of this document.

A. Water Quality

1) Best Management Practices (BMP's) will be used to mitigate the impact of ground disturbing activities and minimize erosion and sedimentation to streams and watercourses (FP p. II-1, II-5 and II-23). The State of Montana requires that BMP's be used on all activities to comply with State water quality standards. The BMP's for the proposed actions are provided in Appendix C, BMP's.

2) State water quality standards would be met for the proposed action alternative by applying the State of Montana Forestry BMP's (2002) and where harvesting is done with Gallatin NF timber contracts with standard B and C water quality protection clauses and other BMP's. A detailed description of the Montana Forestry BMP's is in Appendix C.

3) The 1991 Streamside Management Zone law and 1993 SMZ Rules of Montana applies to all commercial timber harvest treatments.

4) Wetlands are protected under the Wetland Executive Order 11990 and would not be disturbed.

5) A no-burn buffer will be retained for a distance of 50' for burn treatment areas adjacent to the Boulder River and perennial tributaries.

6) Apply standard BT timber sale protection clauses to the commercial harvest activities to protect against soil erosion and sedimentation. Include standard BMP's for all activities including Montana SMZ compliance rules.

7) Follow the applicable BMP's for Forestry in Montana (DNRC, 2002). These are incorporated into Appendix C.

Effectiveness: No Gallatin NF timber sale-related BMP violations have been documented in implementation monitoring reviews since 1990 (GNF 1997 Annual Monitoring Report). Improved harvest methods, SMZ rules of 1993, and more complete BMP direction incorporated in NEPA documents and timber sale contracts have worked to virtually eliminate BMP problems (e.g., skidding across streams, insufficient sediment filtering, inadequate skid trail rehabilitation) of the past. Additional water quality mitigations are found in Appendix C.

B. Fisheries

Protect riparian vegetation and soil in a manner that maintains an effective sediment filter, protects the integrity of the stream channel and its banks, maintains an effective source of large woody debris (LWD) recruitment for fish habitat, ensures floodplain stability and maintains diverse habitats (e.g., maximizing LWD), which is critical to the long-term persistence of fish populations and their survival following catastrophic events:

8) Follow a functional definition of riparian zone consistent with GNF Plan and FSM direction, and consider riparian vegetation in relation to stability, integrity, and meeting the needs of riparian zone dependent species, including fish and their habitat. Unit specific mitigations are described in Appendix B-1.

9) Follow Streamside Management Zone (SMZ) rules and Gallatin FP in operation of wheeled or tracked equipment in riparian zones. This type of equipment is not permitted within 50 feet on either side of a stream course.

10) Favor retention of large diameter (>20") spruce trees in the riparian corridors

11) In SMZ areas retain a minimum of 50% of the trees greater than or equal to 8" diameter

12) Follow a functional approach to the SMZ rules. This approach will augment the Montana SMZ rules with additional functional riparian definitions. It also incorporates SMZ harvest guidelines relative to fish habitat needs.

- No harvest will be allowed within 15 feet of any stream segment. This is more restrictive than the Montana SMZ rules. This "no harvest" mitigation is designed to protect thermal regulation, overhead cover, and immediate bank protection. It also maintains age class diversity of overstory vegetation along the stream corridor.
- Minimize the harvest of large (20"+) spruce trees within the riparian corridor. These trees are most likely to provide anchored and stable large woody debris (LWD) when it is recruited to the channel.
- Within the riparian corridor, leave species and sizes of trees that represent the original stand per Montana SMZ retention guidance.
- Retain trees that are leaning toward the stream channel and favor harvest of trees that are leaning away from the channel.
- Regardless of tree size, retain trees identified by a hydrologist or fisheries biologist that could provide riparian, floodplain, or bank stability.
- In addition to the criteria above, for trees in the riparian areas (both within and outside of the 50 ft SMZ boundary), use the following procedure to determine leave and harvest trees: Using standard tree height measuring procedures, determine the height of the tree where the stem diameter is 8 inches. Favor leaving the tree if that height is $\geq$ to the perpendicular distance from the tree bole to the bankfull edge of the channel.

13) Fisheries Biologist will assist in marking units with prescribed riparian treatments.

14) No harvest on steep slopes (>35%) that drain directly into the Boulder River, where there is no floodplain filter. In other words, where there is no active floodplain and a steep side slope, do not harvest on side slope. (Applies primarily to north end of Unit 31 for the Main Boulder and East Fork confluence).

C. Air Quality

Burning piles of slash and other woody debris and prescribed burning would be constrained to prevent wildfire initiating from the burn projects. Specific design features include:

16) Pile burning would be done in the fall (late September to December) or spring (April/May) when the potential for an escaped fire is low. Note: These are the normal operating windows. Burning could occur during other months, if conditions are favorable.

17) Broadcast burning would be attempted springtime (May/June) or fall (late September/November) when north slopes are moist and the potential for an escaped fire is low. Note: These are the normal operating windows. Burning could occur during other months, if conditions are favorable

18) Limit understory and pile burning acres and piles/day to keep smoke emissions within the National Air Quality Standard (NAAQS) for particulate matter: $PM_{2.5}$ 24 hour average concentration of 65 ug/m^3. See unit specific mitigations in Appendix B. All understory burns have a minimum ambient distance of 0.1 miles. The pile burns have minimum ambient distances of 0.1 to 0.7 miles. Within the minimum ambient distances the public will be warned about high smoke concentrations and advised not to travel outside of a vehicle. Most of the pile burn areas with the highest minimum ambient distances are in the southern part of the project. This area is not heavily used when pile burning would be done (generally November and December or in April or May). Pile burn units would only be burned one unit at a time to avoid cumulative smoke effects between units.

19) All Boulder Fuels prescribed fire and pile burns will be coordinated with the Montana/Idaho State Airshed Group (http://www.smoke.org). The operations of the Montana/Idaho State Airshed Group are critical to minimize cumulative smoke/$PM_{2.5}$ air quality impacts. The State Airshed Group, Monitoring Unit in Missoula, evaluates forecast meteorology and existing air quality statewide by individual airshed and specifies restrictions when smoke accumulation is probable due to inadequate dispersion. Pile burning would be done in coordination with the Montana/Idaho Airshed group on days of good-excellent stability.

Effectiveness: Monitoring air quality particulates with Data Rams have not yet been done on the Gallatin NF. Monitoring has been conducted extensively on the Bitterroot NF to check calibration with the SIS model and compliance with NAAQS. The Montana/Idaho State Airshed group cooperates with the Montana DEQ and member agencies with an extensive network of TEOM's and Data Rams which are used in scheduling prescribed burns and pile burns along with developing and managing burning restrictions. The program has been very effective in minimizing adverse smoke impacts from open burning for the last 15 years in Montana and Idaho.

D. Soils

20) The BMP's described in Appendix C are to be applied to all treatments having ground-disturbing operations such as mechanical vegetation removal. The BMP's require the concentration of disturbance to prevent excessive area-wide soil impacts.

21) Operating period for mechanical harvest and skidding would be November 1- April 30. Operations should be on frozen ground or over 8" of snow. Any mechanical harvest operations outside of this period would require a slash mat or similar technique to limit soil disturbance.

22) On slopes greater than 35% only specialized or non-mechanized equipment would be allowed including hand piling, cable yarding, and hand thinning with chainsaws.

23) Coarse woody debris and organic matter in cutting units would be maintained at 5 to 10 tons/acre to provide for nutrient recycling. (FSM 2500 – Watershed and Air Management, R-1 Supplement No. 2500-99-1, "Managing Coarse Woody Debris in Forests of the Rocky Mountains". Research Paper INT-RP-477, Russell T. Graham)

Effectiveness: Monitoring of timber sales indicates that these protection measures have minimized soil disturbance and will maintain soil productivity. (Keunnen, L, et.al., May 2000; Shovic H. 1999). The guidelines for protection of soil productivity on the Gallatin National Forest apply where harvest practices include tractors or other ground disturbing equipment. 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.

E. Noxious Weeds

Noxious weed prevention and control procedures are described in Forest Service Region 1 Supplement to Forest Service Manual 2080. This Supplement outlines responsibilities and methods to manage noxious weeds at Forest and District levels. The supplement includes numerous best management practices to be followed during activities associated with the Main Boulder Sale. The Manual implements an integrated approach of education, prevention, suppression, and monitoring. While all manual direction would be followed, mitigations specific to individual units can be found in Appendix B-1.

Follow Zero Code 2080- Noxious Weed Management Guidelines

24) Remove the seed source that could be picked up by passing vehicles and limit seed transport into new areas.
    a. Spray the Main Boulder Road Corridor for noxious weeds prior to seed production each year during harvest and follow-up operations. Treating the road corridor may require coordination with Sweet Grass County (Park County).
    b. Remove all mud, dirt, and plant parts from all off-road equipment before moving into project area. Cleaning must occur off National Forest Lands. This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.
    c. Any gravel or other surfacing/fill materials brought or moved on-site for project related activities must be from a weed seed free source. Any straw used for road stabilization and erosion control must be free of weed seeds.
    d. Temporary roads and trails used during harvest would be closed to the public until harvest and reclamation operations are complete.

25) Minimize the creation of sites suitable for weed establishment. Designate all skid trails. Minimize road building and road cut and fill areas. Revegetate bare and disturbed soil, except on surfaced roads, in a manner that optimizes plant establishment. Use native plant seed where appropriate.

    a) Certified, blue-tagged seed shall be used where a name variety or cultivar is specified. Blue tags, which are removed to mix the seed, shall be provided to the Forest. All seed purchased will be certified to be free of the noxious weed seeds from weeds listed on the current "All States Noxious Weeds List." Test results from a certified seed analyst and seed analysis labels attached to the bags will be provided to the Forest Service. Lab testing for noxious weeds will be conducted prior to seed mixing. Only after a finding and documentation in writing

of no weeds on the current "All States Noxious Weeds List" will the seed be accepted and used.

b) Limit harvest and skidding duration by unit or group of units to one year with reclamation, road restoration, and other ground disturbing activities, etc. to be completed during the following year. Harvest operations could be extended for an additional year if extreme weather conditions were to occur, however, harvest and skidding must be completed before beginning a new unit.

c) Monitor and evaluate the success of revegetation in relation to project plan.

26) Monitor and treat harvest units and associated activity areas for new weed infestations for seven years following harvest and reclamation.

27) Drop portions of units infested with knapweed, leafy spurge or sulfur cinquefoil or include in retention area clumps where they are left undisturbed.

28) Avoid the use of meadow areas for temporary roads, slash or landing piles, decking, parking, camping by loggers and mechanized equipment use.

Effectiveness: Mitigation measures have proven effective on the Forest and throughout the Region as a precautionary measure to reduce or minimize the spread of noxious weed species from one area to another (1992 Monitoring Report, pages 254 to 260, and 1997 Monitoring Report, pages 58 to 60).

F. Wildlife; Threatened, Endangered, Sensitive, and MIS Species

Proposed fuel reduction activities in the Main Boulder Drainage have the potential to negatively affect big game winter range, snag dependent species and lynx and grizzly bear habitat. There is established elk winter range included in the treatment area, and Forest Plan amendments establish minimum snag retention requirements (Amendment 15), big game cover definitions (Amendment 14) and grizzly bear access within recovery zones (Amendment 19). In addition, species recovery planning and conservation assessment and agreements for lynx and grizzly bears, in cooperation with the U.S. Fish and Wildlife Service, have specific direction that must be incorporated into the project.

29) The Forest plan provides both direction and definitions for big game hiding, thermal and security cover. In order to meet the intent and requirements for big game, treatments within the harvest units should be designed to maintain 15 - 20% of forested cover in clumps that exhibit cover characteristics (i.e. trees 40 feet or taller with 70% canopy closure). These clumps should be left undisturbed, but only need to be large enough to conceal and provide thermal cover for individual animals or small groups (minimum of 30-50 feet in diameter where practical).

30) The Forest Plan provides specific direction for snag retention within harvest areas prescribed for regeneration. Specifically, 3 snag trees or potential snag trees (18' in height and 10" DBH) should be retained per acre or 30 snags per 10 acres. We would meet these guidelines for all harvest units where it is safe to do so and potential snag source trees are present.

31) The Forest Plan provides specific definitions and direction for road density within grizzly bear recovery areas. In addition, recovery plans and cooperative agreements for both grizzly bear and lynx dictate acceptable disturbance levels within grizzly bear recovery units and lynx analysis units. In order to meet the intent of both the plan and our cooperative agreements, specific guidelines would be designed that will limit the use of existing roads, construction of new roads, or reopening existing roads to access or remove forest products and reduce fuels.

a) Harvest and skidding activity will not occur within two adjacent units at the same time.
b) Harvest and skidding activity will be completed within an established treatment unit within a 12 month period (unless extreme weather conditions make it impossible to do so).
c) No more than 10 miles of new road construction.
d) All new roads and reopened existing roads will be closed and rehabilitated or recontoured after completion of harvest related activities.

32) Grizzly bear and migratory birds are highly susceptible to disturbance from forest management practices and human presence within their preferred habitats during important annual stress periods (e.g. Grizzly bear emergence in spring and nesting for migratory birds). In order to meet the needs of these species and limit potential impacts during project implementation the following standard should be followed.

a) Limit harvest and skidding activity above the confluence of the Main Boulder River and Four-mile Creek (Units 22 – 32) to a total acreage of 250 acres annually and not more than two adjacent units in any year to limit impacts to grizzly bear, lynx and gray wolf.
b) Harvest and skidding operations should be avoided during the growing season from 4/30 thru 10/31 in order to limit potential impacts to grizzly bear, nesting migratory birds, and other sensitive species. Most harvest and skidding activities would occur from November 1- April 30. However, harvest operations within specific units, on a limited basis, could occur within the restricted period, after a survey by the District Biologist or other qualified personnel determining that no adverse effects would occur. Operations associated with piling, slashing, weed spraying, road building, or pile burning would be acceptable within this restricted period.

33) The Northern goshawk and other raptor species that may nest in the project area are susceptible to direct effect to nest trees and are generally intolerant of human presence and timber management activities in the vicinity of nest trees. In order to limit direct impacts to goshawk and management indicator species along with other nesting raptors, the following standards should be observed.

a) No harvest of trees with goshawk nests or nests of other large raptors, whether they are occupied or inactive.
b) For raptors other than goshawk, leave a minimum 50-foot buffer around trees with nests.
c) For goshawk, no activity would be permitted within one-quarter mile of any active nest between March 1 and June 31 and a 100-foot buffer would be retained around the nest trees thereafter.

Effectiveness: The Forest Plan was amended in 1993 in order to define big-gamer cover, hiding cover, thermal cover and security cover (Amendment 14). Pertinent literature was reviewed and contacts were made with Montana Fish Wildlife and Parks biologists to discuss potential impacts to big-game cover and possible mitigation solutions. The mitigation measures illustrated above were designed to minimize impacts to big-game species in relation to the retention and availability of appropriate types of cover. The project is affecting a narrow corridor of big-game habitat that currently receives abundant use by deer, but more limited use by elk and moose because of the proximity to the county road bisecting the analysis area. This road receives relatively heavy traffic seasonally between May and October from forest users. This activity along with regular seasonal migration to higher elevations limits the presence of elk and moose in the units proposed for treatment. Following treatment, the resulting big–game cover and habitat should provide more foraging opportunity, while retention of clumps in the silvicultural design will provide

sufficient cover requirements. In addition, because of the linear nature of the proposed treatments there will be abundant cover of all types remaining within less than one-quarter mile of all proposed treatments.

The Forest Plan was also amended in 1993 to address issues related to the management of snags and down woody debris (Amendment No. 15). For Amendment 15, pertinent literature was reviewed, and contacts were made to individuals with expertise in wildlife and timber management. Information gathered was used to develop prescribed retention standards for snags and down woody debris listed in wildlife design feature number (30). These measures have been deemed adequate to provide the *minimum* amounts of standing and down dead, woody materials required to sustain suitable habitat for wildlife species that depend on these habitat components.

The Forest Plan was again amended in 1996 to address concerns about motorized access in Grizzly Bear recovery zones (Amendment 19). This amendment sets a standard of "no net increase" in motorized road density within any Bear Management Units (BMU) in the recovery zone. All pertinent literature was reviewed and consultations were conducted with the U.S. Fish and Wildlife Service in order to identify and mitigate any potential impacts to bears from the proposed treatments. In addition, Habitat Effectiveness Indices (HEI) was calculated for the analysis area in order to determine the potential impact of additional temporary roads from the proposed treatments. The analysis area provides abundant grizzly bear habitat, however the project area itself receives very limited use by grizzly bears. The HEI calculations indicated that habitat effectiveness in the recovery area would remain well above (85% - 95%) the standard of 70 percent. Furthermore, the road density will remain very low in comparison to other BMU's and should not have any temporary or lasting impact to grizzly bears or their habitat. Although the analysis revealed that little to no impact to grizzly bears or their habitat is expected, the mitigation measures listed above were proposed to further limit any potential impacts to bears.

Sensitive Plants

Sensitive plant surveys were conducted in July and August 2002 for the project area and the report is documented in the Project File. No sensitive plants were located.

34) In the event that sensitive plant species are found in any affected area, measures will be taken to protect them. If these measures are not adequate to provide protection, the Forest Service may cancel or modify units within the fuel reduction project.

Effectiveness: Sensitive plants species have been monitored since 1988. Monitoring has included basic inventories to determine a species' distribution across the forest. Surveys occur on all activities that involve ground disturbance or burning. Qualified individuals conduct the surveys.

G. Scenery and Wild & Scenic River System Eligibility of the Boulder River

By incorporating the following mitigation in this project, the proposed treatments will meet the Forest Plan standards for Visual Quality and assure continued eligibility for study of the potential classification of the Main Boulder River for designation as a Scenic and Recreational River.

For these mitigations and this entire document, the abbreviation "SAs" refers to "Seen Areas" that comprise the viewshed critical to the Forest Plan Standard for Visual Quality (Partial Retention). SAs are viewed from the following key observation areas:

- The Main Boulder Road
- Recreation sites on National Forest land which include campgrounds, trailheads, picnic areas, heavily used dispersed sites, permitted recreation residences and Camp Mimanagish.
- The Main Boulder River,

To meet the Forest Plan Standard for Visual Quality (Partial Retention), all of the landscape modifications due to fuels treatment must no longer be visually dominant within the Seen Areas one year after the treatments and associated project activities are complete. Seen Areas, for the purpose of these mitigations, include areas that are currently visible as well as areas that become visible following treatment.

35) The edges of all units would be irregularly shaped or feathered to be predominantly natural appearing. This ensures that there unnatural appearing straight vegetative edge lines will not be introduced to the landscape, especially in units adjacent to private land or the Wilderness. Administrative and legal boundaries are mostly straight lines. In existing SAs and in areas that will become visible following treatment, feathering (gradating the percent of the standing trees removed from untreated areas into full prescription) will be needed to meet Partial Retention.

36) Where units abut the Main Boulder Road, unit prescriptions and treatment would, wherever possible, continue on either side of the road to avoid abrupt visual transitions.

37) Within one year following harvest activities and fuel treatments, corresponding unit boundary signs, markers, flagging, paint, etc. should not be discernible from "key" observation areas. This mitigation should also be applied to areas seen from Forest Service system trails.

38) Slash piles, decks, and landings should be located out of sight of key observation areas. If this is not possible within an SA, they must be rehabilitated so as to not visually dominate the seen area. Follow-up work within SAs, such as slash treatment and site cleanup, should be completed within one year following harvest activities. This mitigation should also be applied to areas seen from Forest Service system trails.

39) Within all units, a variety of individual trees and vegetation clumps of varying sizes would be left. This is necessary to ensure that the areas treated in this project, especially within the SAs, provide screening that appears natural in terms of vegetation patterns, spacing, age class, and stand diversity. A minimum of 15-20% of each unit's acreage would be left untreated in clumps that are spatially distributed to accomplish these purposes. This does not pertain to units with Treatment Group 3 consisting of meadows and aspen stands

    a.) Leave individual trees that have larger crown ratios and crown diameters. Large, fully crowned trees appear naturally open-grown in the post-harvest stand. Avoid leaving spindly, small crowned, individual trees.

    b.) Leave spindly trees with smaller crown ratios and diameters in clumps to retain some of the visual integrity of the canopy.

    c.) Spacing between clumps and individual trees would be irregular and varied in size and shape.

    d.) On slopes facing the viewer, especially in areas that are predominantly "doghair" lodgepole pine and the slopes are viewed from the road or a stationary viewing area (i.e. a recreation site), clumps should be more closely spaced.

    e.) In some clumps, all of the dead, down, and leaning trees would be left to maintain natural randomness, thus contributing visually to the sense of place in the Main Boulder.

    f.) Clumps would have irregular edges and interior configurations in order to appear as natural as possible.

40) Within SAs, clumps of vegetation and individual trees would be retained to screen constructed features or other developments and prevent these features from becoming visually dominant to viewers in the "key" observation areas.

41) Within 100 feet from sensitive, key observation areas, depending upon the angle of the slope, the viewing situation, and the amount of residual vegetation and rocks, stumps would be cut to a maximum height of six (6) inches. Sawn surfaces would parallel the slope where possible.

42) Skid trails and roads constructed for this project within key observation areas would be recontoured (restored to natural slope, drained, seeded, and/or slashed to be minimally discernible) within one year following completion of fuels work. Where feasible north of the MS2 boundary, units utilizing the same road system would be treated in the same year.

43) There would be no treatment within (approximately 100 feet of) developed campgrounds or heavily used campsites, including campsites at Box Canyon and Four-mile Trailheads, Lower Four-mile, Shipping Corrals Picnic Area and dispersed campsite, the two dispersed campsites between Aspen and Chippy Park Campgrounds and the fishing access site above Hillary Bridge (Armour Access site). The objective is to maintain visual screening for recreationists.

44) Clumping and/or feathering for visual screening would be used in the vicinity of recreation residences to prevent the structures from becoming visually dominant, as viewed from the road or from adjacent National Forest recreation sites.

Certain fisheries mitigation (see Fisheries sections) would also assure no change in the eligibility for study of possible inclusion of the Main Boulder River into the Scenic and Recreational system.

Effectiveness: Results of monitoring, when performed by qualified individuals (see also the Monitoring section for Visuals and Wild & Scenic and Recreation, Ch. 2-41), from past timber sales on the Gallatin as well as other fuel reduction projects in the region demonstrate that the mitigations described above have been effective.

H. Roadless (the North Absaroka Roadless Area) and the Absaroka Beartooth Wilderness

Proposed fuels management activities have the potential of infringing on the Inventoried North Absaroka Roadless Area No. 1-371 and the Absaroka-Beartooth Wilderness. Incorporate the following mitigation measures to prevent encroachment into the Wilderness and to avoid activities in the roadless area that might compromise its eligibility for inclusion into the Wilderness system.

45) This project does not propose any treatment in Wilderness or on private property. However, to avoid any unintentional treatment within those areas, wilderness and private property boundaries adjacent to proposed units have been or are currently being surveyed and monumented. These lines should be established before treatments begin.

46) No commercial timber harvest would occur and no trees greater than 8 inches in diameter would be cut in the roadless area.

Some of the mitigation listed for Scenery and Wild and Scenic River eligibility would also secure Wilderness and roadless area integrity.

Effectiveness: Surveying and monumenting would effectively establish wilderness boundaries. The contracting officer and /or sale administrator would monitor timber harvest activities to ensure that harvest is not occurring outside of the established unit boundaries.

I. Recreation, Safety and Special Uses

Proposed fuels management activities in the Main Boulder have the potential to negatively affect recreation opportunities by changing the area's "sense of place", displacing recreationists and/or creating conflicts and hazards at recreation sites or on the Main Boulder Road. Incorporate the following mitigation in this project to protect recreation values, improvements and maintain public safety.

47) No treatment would occur as part of this project within one tree length (approximately 100 feet) around any buildings associated with recreation residences on National Forest land. All structures and improvements would be protected from damage due to project activities.

48) Warning signs notifying Forest users of potential hazards would be used when fuel treatment activities are occurring adjacent to campgrounds, heavily used dispersed campsites (as noted in Chapter 3), trailheads and Forest Service trails (including snowmobile trails), recreation residences, Four-mile and Box Canyon Guard Stations. Signs would be posted in both directions on roads and trails. If necessary, special orders would be drafted to temporarily close some areas or recreation sites to protect the public.

49) Harvest, skidding, and hauling activities are scheduled to occur during the period from November 1 to April 30. However, in some cases, it may be necessary to treat some stands within the corridor from May to October, to better coordinate treatments with private property owners.

50) Contracts written to implement the decision would contain provisions requiring development of a traffic control plan, including signing that would be agreed upon prior to beginning activities. Because the Main Boulder Road is a county road, the plan would be developed in coordination with Sweet Grass and Park County Road Departments.

51) No equipment use, staging, or storage, nor the decking or piling of slash would occur within campgrounds, heavily used dispersed campsites (as noted in Chapter 3), at trailheads, or on Forest Service system trails (including snowmobile trails), within recreation residence lot boundaries, or in the immediate vicinity of the Main Boulder Ranger Station, Four-mile and Box Canyon Guard Stations unless specifically approved by the District Ranger.

Effectiveness: Results from past timber sales on the Gallatin as well as on other fuel reduction projects in the region have shown that these general design criteria and mitigations, combined with site specific signing, have been effective in protecting recreation facilities. Forest protection officers routinely monitor campgrounds, trails, signs, as well as other types of activities and/or restrictions on the Gallatin National Forest. Although there are always exceptions, restrictions have been effective on the Big Timber Ranger District. The traveling public has come to recognize several components of traffic control plans by virtue of their past and continual use in timber sale contracts. Sweetgrass County has a history of assisting in providing adequate signage and media coverage regarding the timing of project related activities occurring in the Main Boulder River Corridor. Additionally, these provisions are monitored and enforced by the sale administrator, contracting officer's representative and Forest Service Law Enforcement assigned on a project basis.

J. Heritage Resources

There were two previously recorded prehistoric sites, 24PA0675 and 24PA1000 in the analysis area and four historic sites, 24PA0635 / Main Boulder Station, 24PA0724 / Four Mile Station, 24PA0725 / Box Canyon Station, and 24PA1088.

Four new historic sites, 24PA1188, 24SW0348, 24SW0350, and 24SW0351, were recorded. A historic isolate was also recorded. No new prehistoric sites were discovered during the fieldwork.

52) The historic sites would be avoided during operations.

53) In units slated for prescribed burns, combustible features would be protected.

54) Prehistoric sites would be monitored during operations.

Effectiveness: Following these mitigation measures would protect all known sites and allow for modification of the project should new sites be found.

K. Road Maintenance/Rehabilitation

The Main Boulder Road is a county road that is maintained through a joint effort between Sweetgrass and Park Counties. Road maintenance costs are paid through payment in lieu of taxes to the county on an annual basis.

55) Up to 7.4 miles of temporary roads will be constructed to support harvest operations using conventional, ground-based logging systems. Temporary roads will be closed and rehabilitated within one year after completion of harvest activities. Temporary roads that can be seen from key observation areas will be recontoured to protect visual integrity.

Effectiveness: Routine road maintenance of the Main Boulder Road is the county's responsibility at no added cost to the Forest Service. Rehabilitating and recontouring are well used and proven method of closing and restoring temporary roads to conditions as close as possible to pre-harvest conditions

X. PROJECT MONITORING

Project Implementation

The Gallatin Forest Plan Monitoring Report for the years 1998 - 2003 is included in the Project File. The report includes the results of the monitoring procedures that Gallatin National Forest specialists have used to measure the effectiveness of various mitigation measures and design criteria associated with recent projects. The Main Boulder Fuel Reduction project incorporates mitigation and design criteria that have been monitored for effectiveness for the past several years.

Forest Service personnel are responsible for general implementation of the project (design, contract preparation, contract administration, and assurance that mitigation measures are being followed) subject to review by the District Ranger and staff. Fuels Reduction contract administration will be conducted on a regular basis to assure acceptable contractor performance. The responsible official and, as appropriate, an interdisciplinary team will review changes in contract requirements or provisions. Contract violations will be addressed promptly and will be resolved prior to further fuel reduction actions occurring. All contract activities and correspondence will be documented and filed in the fuels reduction contract records.

Fuels

The project area will be monitored following the Gallatin National Forest fire/fuels monitoring protocol. This includes taking fuel plots and photo points in years 1, 3, and 5 following treatment.

Roadless (the North Absaroka Roadless Area) and the Absaroka Beartooth Wilderness

Enforcement of the terms of the contract would be administered by contracting officer's representatives and/or sale administrators ensuring that harvest activities occur only within designated unit boundaries.

Recreation, Safety and Special Uses

Regular field visits by contracting officer's representatives/sale administrators and by other district personnel will be done to verify proper installation and maintenance of warning signs in accordance with a traffic control plan and/or public involvement plan.

The District Ranger will contact owners of adjacent properties to attempt to coordinate the fuel reduction projects on the National Forest lands with those on adjacent private land.

Noxious Weed Occurrence

Monitor and treat harvest units and associated activity areas for new weed infestations for seven years following harvest and reclamation. Since some seeds remain viable for many years in the soil, the number of years for monitoring the site may be adjusted according to the species to be treated (Sheley and Petroff).

Monitor and evaluate the success of revegetation in relation to project plan.

Wildlife

The district wildlife biologist will conduct surveys within individual treatment units prior to beginning harvest activities. As described in the wildlife mitigation section, identification of any threatened, endangered or sensitive species, raptor nests, or other species of concern, may result in additional restrictions

Treatment units will be monitored during fuels reduction activities and for two years following project completion to determine whether the wildlife mitigation and snag retention prescriptions were effective in maintaining sufficient habitat for threatened, endangered and sensitive species, big game cover, habitat use patterns, and snag-dependent wildlife species.

Water Quality/BMP's/Fisheries

A BMP review will be conducted for some of the larger harvest units that have temporary road construction and/or stream area harvesting. The BMP review team will use the Montana BMP audit forms augmented by the additional BMP's for the Main Boulder Fuels Reduction Project. The objective of the BMP review is to document BMP and SMZ rule compliance and to validate the erosion and water quality effects predicted by examining soil erosion, runoff and water quality response, and re-vegetation of understory burns. A BMP review report, including observations and recommendations, will be prepared by the Gallatin NF Hydrologist and submitted to the Big Timber District Ranger upon completion of the reviews.

Soils

Soils will be monitored during the BMP reviews conducted for some of the larger harvest units. The BMP review team will use the Montana BMP audit forms augmented by the additional BMP's for the Main Boulder Fuels Reduction Project. The objective of the soils portion of the BMP review is to document compliance with the soils BMP and to validate soil effects related to maintaining soil productivity. A review report will be prepared by the Gallatin NF Soil Scientist and submitted to the Big Timber Ranger District upon completion of the review.

Visuals

Photo points will be established to represent a wide sampling of critical observation points from the road, the river, and recreation sites. Photos will be taken before and one year following completion of all activities related to this project. These photos, combined with on-site field observations, will be used to determine the effectiveness of the mitigation and design elements.

Air Quality/Smoke

Understory and pile burning associated with this project will provide an excellent opportunity to validate the particulate ($PM_{2.5}$) effects predicted by actually measuring $PM_{2.5}$ levels in sensitive areas. $PM_{2.5}$ will be monitored with a Data RAM, taking measurements at 15-minute intervals. Observations will be averaged for 1, 8, and 24 hour periods to compare to the SIS model predictions and the National Ambient Air Quality Standards. Appropriate units to monitor include MBS and Units 1-4. Pre-burn particulate background will be measured for approximately 6 hours before the burn and continued for a 24-hour period to include the burn, smoldering, any down valley drift, and post burn emissions.

Heritage Resources

Operations will be monitored in units Main Boulder Station, 5C, 6, 8A, 21, 22, 22A, 29, 30, and 31. Following burning, surveys for monitoring as required under the R1-PMOA (GNF SIS-Appendix A) will be conducted at units Main Boulder Station, 5C, 6, and 8A.

XI. ALTERNATIVES ELIMINATED FROM DETAILED STUDY

Seven other alternatives were considered. However, during the preliminary analysis, the interdisciplinary team concluded that these alternatives did not warrant detailed analysis as they did not fully meet the purpose and need or failed to comply with Federal or State laws, or Standards and Guidelines set forth in the Forest Plan or other administrative plans. Following are descriptions of these alternatives and the reasoning for dismissal from detailed study.

Alternative C – Proposed Action with some burning into the Wilderness

This alternative would allow prescribed fire to spread into the Wilderness following natural control boundaries and features, rather than taking control measures to contain the fire before it entered the Wilderness.

While the Absaroka Beartooth Fire Management Guidebook (1993) provides an opportunity to consider management-ignited fire in the wilderness to reduce unnatural buildups of fuels, it also specifies that all four of the following conditions must be met (Absaroka-Beartooth Fire Management Guidelines, page 49).

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
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.

This alternative was dropped from further consideration because Conditions 1 and 4 were not satisfied. Fire management goals for this project can be met outside the wilderness without allowing prescribed or management ignited fire to spread into the Absaroka-Beartooth wilderness. With this alternative, additional fuels could be treated on less than 50 acres in the wilderness and would mostly consist of fairly open areas with natural barriers. These are the only places that assure a prescribed fire could be stopped without modifying the vegetation prior to burning. Very few of the heavy fuels (thousand hours) would be treated, too little to enhance the prescribed natural fire program in the wilderness or significantly reduce the fire risk in the Wildland Urban Interface.

Alternative D. - No Riparian Harvest

This alternative is similar to Alternative B (the proposed action) with the exception that no stand density reduction, fuel removal activities, or controlled burning would take place in any riparian areas. Alternative D removes any concern that harvesting trees within the riparian area could jeopardize large woody debris recruitment into streams or rivers. Harvesting trees within riparian areas could introduce sediment into surface water. Additional sediment could reduce the quality of fisheries habitat and interfere with fish spawning. With Alternative D these adverse changes would not occur due to timber harvest.

Alternative D does not account for other causes of adverse effects on in-stream habitat and water quality. Heavy fuel loadings are present in many of the riparian areas. In the event of a wildfire these fuels would likely burn very intensely, consuming all or most of the vegetation to the edge of tributary streams and/or the Main Boulder River. Eliminating activity in the riparian areas does not address the possible consequences (loss of shade, rise in water temperature, loss of future woody recruitment, and/or sediment introduction into the streams and river from the lack of vegetative cover), if a wildfire were to occur. This scenario is described in Ch 3-54 in the direct and indirect effects of the no action alternative. In riparian areas, Alternative D does not differ from Alternative A, the no action alternative. The contributing fuels (ladder fuels, large and small diameter trees) would not be removed to break up the continuity of fuels.

This alternative was considered but dropped from further analysis because it does not adequately address riparian concerns associated with the purpose and need for fuel reduction in the Main Boulder River Corridor.

Alternative E.- No Prescribed Burning

Alternative E would be similar to the proposed action with the exception that there would be no underburning within the units or prescribed burning in the meadow areas. Permitted treatments include a combination of mechanical treatment and hand piling. These treatments would be very

labor intensive. The additional mechanical treatment needed to avoid burning would more heavily impact soils and increase the potential for noxious weed invasion. This alternative was dropped because it was determined not to be feasible for minimizing fuel loadings in all of the units to acceptable levels (5-10 tons/acre) without the assistance of prescribed burning. In addition, the ID Team saw no advantage to adopting the more costly and potentially more environmental impacting approach advocated in Alternative E since manual and mechanical methods have not been shown to be as effective in reducing fuels as the planned re-introduction of fire.

Alternative F – Scenery Alternative

Alternative F would be identical to Alternative B, the proposed action, except that prescriptions would call for flush cutting (to the mineral soil level) all stumps for a distance of 50 ft. from all key observation points and corridors (the Main Boulder Road, recreation sites, the Main Boulder River). In addition, a 6-inch stump height would be required in the area from 50' to 150' from seen areas in order to ensure that the natural look of the river corridor will be maintained. All stumps would either be painted or covered with dirt to ensure that the fresh cuts would not be evident. Minimizing stump height would reduce the visible legacy of stand treatments occurring within the foreground of key observation points and corridors.

The interdisciplinary team determined that flush-cutting all stumps within 50' of key observation points and corridors on the rocky terrain in the Main Boulder was neither practical nor safe. Also, the generally rocky and uneven topography in the project area increases the capacity of the ground surface to visually absorb some of the stumps, making them less visually dominant and partially mitigating the need to implement this practice as a general, area-wide requirement.

Alternative G – Fuels Prescription Alternative

Alternative G would include the same units as Alternative B, the proposed action. Treatments would remove greater amounts of trees and ladder fuels. Stands would be thinned, and fuels removed to levels identified through Farsite Modeling as sufficient to keep a potential wildfire on the ground. Clumps of trees would not be left untreated so a greater percentage of the total area would be modified from the current condition.

The team felt that intensive fuel modification practiced on a large scale would be inconsistent with retaining the "Sense of Place" in the Main Boulder River Corridor, which is a key concern voiced from the public through scoping comments. Alternative G would not be consistent with the visual quality objectives (VQO's) for the Main Boulder River Corridor of "partial retention". Partial retention is required to preserve the Scenic and Recreational qualities of portions of the Boulder River that may be suited for inclusion in the National Wild and Scenic Rivers System. Leaving fewer trees and shrubs would likely have negative effects on wildlife species. Since no clumps of trees would be left, the contributions of the clumps to thermal and hiding cover would be foregone. Within riparian areas, the additional tree removal needed to meet optimal fuel modeling conditions conflicts with Best Management Practice guidelines which call for a minimum of 50% of the trees over 8" diameter, by size class, to be retained within a Stream Management Zone. For these reasons, Alternative G was dropped from further consideration.

Alternative H – Defensible Space Alternative

Alternative H would create defensible space in areas adjacent to structures or developments. Concerns for the intensity and scale of changes to the current condition resulting from treatments in the Main Boulder corridor would be fully satisfied with Alternative H. Vegetation would be modified within roughly 300 feet of existing structures. If implemented throughout the corridor,

treatments would occur on less than ten percent of the area proposed with Alternative B. Treatments would be continuous where developments happen to be clustered.

Alternative H is too limited in scale to satisfy the purpose and need of the project, which is to provide for public and firefighter safety and extend the potential time available for evacuation in the event of a wildfire. As stated on Ch. 1-6 of the FEIS, the Intermountain Fire Sciences Laboratory concluded that, following 90 years of successful fire suppression efforts and the resulting increases in vegetation and fuels, the Boulder River corridor is potentially hazardous during periods of severe fire weather. There are no natural safety zones. Fire behavior specialists concluded that an ignition during severe fire weather would seriously threaten life and property. Treating only areas adjacent to structures and developments would neither break fuel continuity nor reduce fuel volumes sufficiently to buy time to evacuate or increase personal safety within the corridor.

The objective of the project is not to protect private structures. However, treatments that reduce the likelihood of an uncontrollable wildfire will, in turn, aid in protecting structures. Alternative B encompasses the benefit of Alternative H and much more. For this reason, Alternative H was dropped from further study.

Alternative I. – Remove Only Dead and Dying Trees From the Riparian Areas

This alternative would be similar to Alternative B (the proposed action) with the exception that only dead and dying trees would be removed from riparian areas. Alternative I would remove fewer trees from riparian areas than Alternative B. There would be less likelihood that harvest within riparian areas would negatively impact riparian vegetation, introduce sediment into streams or contribute to increased water temperatures by reducing shade over the stream. Although dead trees are a common source of large woody debris in streams, the fact that more live trees would remain following harvest within riparian areas would better assure a long-term source of down material from windthrown live trees and future mortality.

Heavy fuel loadings are present in many of the riparian areas. In the event of a wildfire these fuels would likely burn very intensely, consuming all or most of the vegetation to the edge of tributary streams and/or the Main Boulder River. Constraining removals from riparian areas to trees that are dead or dying at the time of harvest does not address the possible consequences (loss of shade, rise in water temperature, loss of future woody recruitment, and/or sediment introduction into the streams and river from the lack of vegetative cover), if a wildfire were to occur. This scenario is described in Ch 3-54 in the direct and indirect effects of the no action alternative. Alternative I would be an improvement over the no action alternative. However not enough of the contributing fuels (ladder fuels, large and small diameter trees) would be removed to break up fuel continuity in the riparian areas. In addition, the mitigation measures identified to direct harvest in riparian areas specifically exclude from harvest, live and dead trees that would fall into a stream along with those that are integral to the bank. These measures, supplemented by State Best Management Practices which limit tree removal to 50 percent of the standing trees by size class, are adequate to assure a future source of large woody debris and they are expected to result in sufficient trees being left along streams to provide continued shading. Alternative I would forego nearly all of the benefits of Alternative B with no compensating advantage in environmental effect. For this reason Alternative I was dismissed from further study.