

CHAPTER 2

Issues and Alternatives

2.1 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 p.1-5. Alternative 1 (no action), Alternative 2 (proposed action), and Alternative 3 are described and considered in detail on pp. 2-18 through 2-29 and displayed on Maps, M-3 & M-4. There are also five other action alternatives that were considered, but were dismissed from detailed analysis. These alternatives are described in Chapter 2, pp. 2-43 through 2-45, including the rationale for dismissal.

The purpose and need for action and the desired future condition provide the framework for alternative development along with the significant issues identified internally and from public scoping. The alternatives reflect different responses 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 alternatives in terms of the “significant” 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, a comparison of the alternatives, and alternatives considered but not studied in detail.

2.2 PUBLIC INVOLVEMENT AND SCOPING PROCESS

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 significant 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.

Collaboration with the public, private landowners, recreationists, and other interested parties has been and will continue to be important in the development of the Smith Creek Vegetation Treatment Project. The proposal was developed with input from adjacent private homeowners, as well as state, county, and local officials. Public meetings and field trips have been held with the Forest Service providing information and updates regarding the proposed project on National Forest System lands.

The initial scoping letter for the Smith Creek Vegetation Treatment Project was sent to interested parties on February 22, 2006 (Mailing List, Project File). More than 100 letters were mailed to private individuals, organizations, groups, businesses, media and elected officials. This scoping letter was fairly broad in scale, identifying the potential project area, the purpose and need for the project, and types of treatments that were likely to occur. Individual treatment units were not identified at that time. Seventeen comment letters were received. These comments were considered in determining potential issues and developing actual treatment units associated with the proposed action.

A public meeting regarding the project was held at the Wilsall Community Center on June 29, 2006. The meeting, facilitated by the District Ranger and IDT members, was attended by approximately 25 people, including local landowners, and representatives from the Park County Environmental Council, the Park County Fire Department, the Rocky Mountain Resource and Development Council (R,C&D), and Senator's Rehberg's office. A public field trip to the project area led by the District Ranger was scheduled for July 9th to look at potential treatment areas and to look at additional areas that should be considered for treatment. The intention of this field trip was to get as much public input as possible to be able to add, eliminate, or modify treatment areas in order to determine the scope of the project and come up with a proposed action. Approximately twelve local landowners attended the public field trip on July 9th giving additional input and ideas to be used for project development.

A public meeting/workshop sponsored by the Northern Rocky Mountain Resource and Conservation Development Center (RC&D) in conjunction with the Gallatin National Forest was held on July 19th, 2006 at the Wilsall Community Center. This meeting was an informational meeting concerning how landowners can protect their homes from potential threats of wildfire. Jack Cohen, a research scientist with the Fire lab in Missoula, MT. gave an in-depth presentation on how a home ignites when in the path of a wildfire. Building materials, landscaping, maintenance and placement of your home was discussed in regards to structure protection. J.T. Smith, the Economic Development Coordinator for the RC&D, spoke about grant opportunities for WUI communities to do hazard fuel reduction projects on private land. Around 12-14 homeowners from the Smith Creek area attended.

Following the original February scoping, the Forest Service met with private landowners in the Smith Creek area, Park County, and other interested parties to come up with actual proposed treatment units. Forest Service specialists attended IDT meetings and conducted field reconnaissance to ground truth the proposed units in order to further refine the proposed action. A second scoping letter was sent to interested individuals on September 29, 2006 as a follow-up to the original scoping letter that sought public comments on the preliminary proposed action. This refined scoping letter was mailed to approximately seventy five local landowners and other interested parties with ten comment letters being received concerning the proposal.

Another public meeting was held at the Clyde Park Community Center on November 6th. This meeting was scheduled for the public to discuss, relay concerns, and clarify questions related to the proposed action as identified in the September scoping letter. Approximately 20 local landowners and small business people attended this meeting, and gave their input regarding the proposal.

A public field trip was held in July 2007 to review the road maintenance work that will be completed in the project area the summer/fall of 2007 with special funding as well as to review the potential thinning units and road maintenance treatments associated with this project. This field trip was held to provide the public with an on the ground opportunity to comment on various aspects of the proposed project before the EA was released.

The environmental issues addressed in this document were identified through the processes described. Significant issues were used to develop alternatives to the proposed action and to focus the scope of the analysis on the issues that are significant to the decision to be made. Documentation of the review of scoping, comments, and potential issues can be found in Project File.

Once the scoping process was completed, the interdisciplinary team (ID Team) developed alternatives to the proposed action with specific features designed to address the significant issues. For the Smith Creek project area, the No Action Alternative, the Proposed Action Alternative, and one additional action alternative were developed for detailed consideration.

The Smith Creek Project was identified on the Gallatin National Forest NEPA Quarterly Project Listings for winter, spring, summer, and fall 2006 and winter, spring, summer 2007.

The purpose of this Environmental Assessment (EA) is to disclose the foreseeable effects and consequences of the alternatives being considered in detail and to solicit further public input regarding this project. This EA is being issued after consideration and analysis of comments received regarding the February and September scoping letters and from the public meetings and field trips. This document will provide information to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). The Livingston District Ranger is the responsible official.

2.3 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 consideration in the analysis process:

- 1) Has the concern been addressed in a previous site-specific analysis such as in a previous project analysis or through 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, six issues were found to be "significant" to the decision and achievement of the purpose and need. These are discussed in the issues section of this chapter and also in Chapter 3, pp. 3-18 through 3-91. These are the issues that the interdisciplinary team and decision-maker concluded were the primary factors to be considered while developing the alternatives and helping to guide the decision.

2.4 SIGNIFICANT ISSUES

The purpose of scoping is not only to identify a list of issues and concerns over a proposal, but to determine the significant issues to be analyzed in depth and to eliminate from detailed study those which are not key (40 CFR 1501.7). Significant issues become the focus of interdisciplinary interaction, public involvement, and alternative development. Significant 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 significant 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 "significant" or were outside the scope of this proposal. There are eleven 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 below with a further analysis included in Appendix A. A complete list of pertinent comments received during scoping and how they were addressed by the interdisciplinary team is contained in the Project File at the Livingston District Office. Design Criteria and mitigation for all resources are described in Chapter 2, pp. 2-30 through 2-39.

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

Issue 1 - Water Quality: Proposed vegetative treatments, along with the cumulative effects of existing roads and recreation and private land development could have an adverse effect on water quality by potentially introducing additional sediment to Smith Creek and East Fork Smith Creek and tributaries. Conversely, without treatment, a catastrophic wildfire could also adversely affect water quality in these streams.

Concern: Increased sediment delivery could have adverse effects on stream channel conditions, water quality, aquatic habitat and/or downstream beneficial uses.

Indicator: Sediment yield as measured in tons/year and percent over natural modeled sediment in Smith Creek and primary tributaries using the R1/R4 sediment model. The R1/R4 model forms the basis of the sediment component of the WATSED model and is the most widely used watershed sediment model in USFS R1 in that it is the best developed and available science. Sediment yield levels for each alternative were evaluated using the R1R4 sediment model (Cline et.al., 1981) and adjusting sediment coefficients based on existing road and timber harvest unit conditions. The sediment model was run in a cumulative fashion accounting for all existing roads, timber harvesting, and residential, and recreational developments in the Smith Creek watershed to the confluence with the Shields River. The key sub-watersheds (Upper Smith Creek and East Fork Smith Creek) were also modeled.

The R1R4 model used in the sediment analysis is designed to address the cumulative effects of timber harvest operations, road construction, and fire. The model does not attempt to analyze the effects of grazing and mining activities (other than vegetation removal and road construction) or individual episodic storm events. The model is designed to compare relative differences among alternatives rather than to predict precise sediment and water yields that are likely to occur upon project implementation. Because the R1R4 model relies on climatic conditions averaged over long periods, the models' accuracy is best when averaged over several years. The model is less reflective of individual drought or flood years. The R1/R4 sediment model focuses on slope processes and estimates the water and sediment delivered to the main channel by forest management within the watershed, including the headwater stream channels. However, the routing of sediment and water through the main channel is limited to broad-based regional curves, as no main channel hydrologic or hydraulic processes are modeled directly.

Issue 2 – Fisheries: Vegetation treatment (including timber harvest), maintenance of roads and construction of log landings could disturb soils and increase potential for erosion, sediment transport, and sediment deposition in streams.

Concern: Increased fine sediment in streams has been shown to reduce habitat quality and cause adverse effects to aquatic biota, including macroinvertebrate communities and fish populations. Harvest activities along stream corridors could reduce riparian integrity and bank stability. Fuel reduction treatments along riparian corridors could 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. There are three primary concerns:

- 1) Fuel reduction and harvest activities could increase sediment delivery to stream channels and degrade water quality and fish habitat.
- 2) Timber harvest could influence riparian integrity and streambank stability.
- 3) Riparian harvest could degrade fish habitat by reducing the amount of LWD available for recruitment to stream channels.

Indicator: Evaluate existing fine sediment deposition in project area streams using sediment core data and compare to Forest Plan standards and guidelines. Measured fine sediment concentrations are also used to validate modeled R1/R4 sediment yield estimates. Evaluate existing biotic community health using the Rapid Bioassessment Procedure, a macroinvertebrate community structure analysis with specific emphasis on metrics designed to detect sediment related impacts. Estimate the relative magnitude and direction of change in sediment yield from the proposed project using the R1/R4 sediment yield model (see Water Quality Report). Base sediment affects analysis on both modeled results, existing fine sediment concentrations, and peer reviewed literature. A comprehensive literature review is provided in this report. Determine potential for riparian, streambank stability and LWD related effects using channel sensitivity analysis and accounting for aquatic mitigation measures.

Issue 3 – Fuels: Lack of treatment to the currently heavy fuel conditions in the Smith Creek WUI would not address the high potential for a catastrophic fire event that could threaten public and firefighter safety.

Concern: Years of successful fire suppression and subsequent lack of low intensity stand maintenance fires within the project area have resulted in changes to forest structure, including increased tree densities and associated fuel characteristics.

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. Fire risk analysis involves the use of the following models to help predict fire behavior and rate of spread: All modeling considers typical seasonal weather conditions for a day in August, such as: Temperature 84 degrees; relative humidity 10%; mid-flame windspeed 8 mph. These are conditions represent a typical fire growth day from recent wildland fire events.

Forest Vegetation Simulation (Fire/Fuel Effects extension) (FVS-FFE) - This model is used to determine changes to fire behavior comparing the current condition (with no treatment) against the proposed treatments. It simulates fuel dynamics and potential fire behavior over time, in the context of 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 a stand alone computer model that links surface and crown fire prediction models. Using inputs from FVS-FFE simulations for the no treatment and proposed treatment alternatives, it is used: a) to 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 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.

It is important to note that the models used to represent the effects of the different treatment alternatives rely on several assumptions and limitations. Both Nexus and Behave assume a constant state of weather and topography. They also assume that fuels are both vertically and horizontally arranged continuously over the project area. In addition fire predictions were only predicted at the flaming front. As it pertains to weather, weather forecasts extrapolated out of KCFast have no known quality control factors. It is assumed that historical weather patterns would persist and changes to climate, associated to global warming factors, were not considered as part of this analysis. It was also assumed that grasslands within the project area would not likely be adversely affected by fire events, so only areas where forest structures exist were examined.

Issue 4 – Wildlife Habitat Diversity: No action could lead to the further reduction of those habitat groups that depend on disturbance to maintain the extent of distribution, age class, and structure (grass/ wet meadow, shrub, aspen, and Douglas fir). Aspen and willow and other types of shrublands would not be represented as historic, or at all, in the long-term due to the lack of disturbance.

Concern: Past timber harvest and fire suppression activities have altered the natural fire regime and diversity of habitats and their age classes across the landscape. Aspen stands have declined in vigor and distribution where capable of being expressed as compared to historic conditions. Meadows and other grassland openings that historically have been non-forested are now dominated or co-dominate with conifer species. Wildlife species that depend on these declining habitats are losing important areas used for nesting, foraging, or other life history needs. Some species would benefit directly from treatments that increase extent and distribution of certain habitats, while others may show a negative or indifferent effect.

Indicator: Quantitative measures of acreage increases would be taken for each habitat that has objectives identified.

Issue 5 - Insect and Disease Outbreaks: Without treatment, high levels of mountain pine beetle attacks (epidemics) on lodgepole pine are likely within the foreseeable future (over the next 50 years) on approximately 6,000 to 8,500 acres (based on the Shields River Watershed Risk Report (USDA 2005a)).

Concern: If such an epidemic occurs, large acreages of mostly dead trees (lodgepole pine) would further increase the possibility of high severity wildfires and reduce the chances of fighting these fires safely.

Indicator: Acres of lodgepole pine stands being killed by mountain pine beetle. Annual aerial detection surveys would be ground verified and combined with other data collected by field going Forest Service personnel to monitor levels of insect infestations. Aerial detection surveys have been widely used for many years throughout Region 1. They have proven to be a cost efficient method to track broad-scale trends in insect infestations. Used in conjunction with ground verification and field data collection, they also provide valuable information at the project level.

Issue 6 – Soils: Effects of proposed vegetative treatments, in combination with existing logging roads and skid trails, could cause additional detrimental soil disturbance in the project area.

Concern: Four units associated with the project currently have significant detrimental soil disturbance from logging that occurred prior to National Forest ownership of these areas. Many of these areas have re-vegetated and even contain small trees, however, the skid trail templates are still evident.

Indicator: The indicator for protecting soil quality is the degree of adherence to the Northern Region Soil Quality Standards (USDA, Forest Service, 1999). Soil monitoring would be conducted on all harvest units. Monitoring would utilize the Northern Region Soil Quality Monitoring Protocol and be completed within two years of completion of project related activities (See soils report in the Project File).

2.5 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 “significant” factors in the decision process for proposed fuel reduction activities in the Smith Creek 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 Smith Creek 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 “significant”.
4. The proposed action was modified to include mitigation, which is effective in alleviating any major impact.

Following are summaries of the issues analyzed, but not found to be “significant” factors in making the decision concerning this project. A further discussion/analysis of each issue can be found in Appendix A.

A. Noxious Weeds

A concern was raised that soil disturbance associated with harvest related activities would increase noxious weed infestations because populations of noxious weeds currently exist in some of the treatment units. These areas would be treated prior to implementation of project related activities. Ground-based harvest activities that utilize off-road equipment would occur when the area is snow covered or the ground is frozen to minimize ground disturbance. No new roads would be built. All off-road equipment would be power washed before entering the project area. Landings, slash pile areas, trails, and other disturbed areas would be re-vegetated to optimize establishment of desired ground cover. These types of mitigation have proven effective on Forests throughout Region 1 as precautionary measures to reduce or minimize the spread of noxious weeds and are described in further detail on pp. 2-33 & 2-34. See the noxious weeds discussion/analysis on pp. A-1 through A-10.

B. Livestock Grazing

A concern was raised that proposed vegetation treatments could affect livestock grazing patterns in project area allotments. The project area includes two grazing allotments, however, the Three Peaks Allotment is the only active grazing allotment that would contain treatment units. Although grazing patterns may change, adaptive management techniques from the Upper Shields Environmental Assessment (2006) would help protect the natural resources, while accommodating livestock grazing. Gates would be kept closed at all times. If livestock are found where they don't belong, the Livingston Ranger District Range Manager or range specialist would be immediately contacted and the situation resolved with the permittee. Mitigation and coordination with permittees (which has already been initiated) would minimize potential conflicts by limiting human/cattle encounters. Mitigation as outlined on p. 2-39 has been designed to minimize effects of livestock grazing. A complete livestock grazing discussion/analysis can be found on pp. A-11 through A-13.

C. Recreation (Includes Trails, Roadless and Unroaded)

Concerns were raised regarding how project related activities would affect recreational use in the Smith Creek area. All of the proposed treatment areas are in Roaded Natural areas in the summer and Semi Primitive Motorized areas in the winter. None of the proposed treatment areas are within the Box Canyon Roadless Area and are at least a mile outside of the Roadless Area boundary. Thus, the proposed actions would not alter the potential eligibility of the area for inclusion into the Wilderness system.

Most proposed treatment areas are bisected or are adjacent to existing roads and/or are interspersed within past cutting units or private property. The strips and chunks of "unroaded" lands are not of a sufficient size or configuration to allow the protection of the inherent characteristics associated with an "unroaded" condition and

therefore do not contain “unroaded” resource values. Furthermore, the current conditions of the “unroaded” portions of the proposed project area do not have the features that would make them suitable for wilderness recommendation in Forest planning.

Existing recreation opportunities would continue to be available in the area but in a modified visual setting. Vegetation treatments located near recreational facilities would occur during the winter and thus would not impact summer recreational use of the facilities. Short-term winter recreation would be disrupted in several areas, including the plowing of Smith Creek Road #991. The area’s long-term recreation opportunity is not expected to be affected. Mitigation (pp. 2-37 & 2-38) has been designed to protect recreation values, improvements, and public safety.

Results from past timber sales on the Gallatin as well as on other fuel reduction project in the Region have shown that these general design criteria and mitigations, combined with site specific marking have been effective in the protection of recreation facilities. A more detailed recreation discussion/analysis can be found on pp. A-14 through A-24.

D. Visuals

Questions were raised concerning how the proposed treatment units would affect the visual quality of the project area. To determine the effects of this proposal on visual resources, the proposed units were viewed from those most common observation points from where the recreating public and the local residents would be viewing the units. This included the Forest Service roads, the community roads, and the backyards of some of the residences

Units A1, A2, B, C, D, H, and I are located in areas that were assigned the VQO of Modification by the Gallatin National Forest Plan and would be visible, to varying degrees, from local public access roads or ATV routes. By implementing the mitigation listed on p. 2-36, these units would meet the Forest Plan Visual Quality Objective of Modification.

Unit G is located in an area that was assigned a VQO of Retention by the Forest Plan. Mitigation has been designed (See p. 2-36) to assure that this unit would continue meet the Forest Plan VQO of Retention.

Units E1, E2, and F are located in areas that were assigned the VQO of Modification by the Forest Plan. These units are proposed to be thinned using helicopters and would be on slopes tilted towards viewers traveling along Forest Road #6635. By incorporating the mitigation described on p. 2-36 and 2-37, these units would also meet the Forest Plan Standard of Modification for visual quality.

Unit J, proposed solely as a prescribed burn, is located in an area that was assigned the VQO of Retention by the Forest Plan. The visual effects of the proposed burning

in this unit would be more dependent upon natural factors, such as the location of moister or dryer fuel pockets, the presence of early or late season snow, denser underbrush, standing bug killed trees, and open grassy meadows. Thus, the visual patterns of the resulting prescribed burning and crown mortality would appear as natural elements of the landscape and would meet the Forest Plan standard for visual quality of Retention.

Results of monitoring similar past projects on the Gallatin NF, as well as the rest of the Region, demonstrate that the mitigation outlined on p. 2-36 and 2-37 have been effective. Visual quality was, therefore, not considered a significant issue. See the visual quality discussion/analysis on pp. A-24 through A-30.

E. Wildlife Issues (TES, Sensitive, MIS species)

Concerns were raised regarding impacts that the proposed actions would have on various wildlife species and their habitat. Impacts to wildlife species were first evaluated by assessing whether suitable habitat exists within the immediate project area to be affected. For the purpose of this project, threatened, endangered, and sensitive, as well as other identified species, were analyzed to represent those that utilize similar habitats. Relative to the requirements per the regulatory framework, the species that were considered are displayed in Table A-6 (pp. A-31 through A-34). Quantitative factors relative to habitat change; e.g. loss of denning/ nesting/ foraging habitat, loss of hiding/thermal cover, etc. were analyzed. Other qualitative factors such as potential for displacement were also considered. These factors and their relevance are also displayed in Table 6 by individual wildlife species.

Effects to wildlife, fish, birds, and/or amphibians including threatened, endangered and sensitive species; management indicator species; and migratory birds can be found on pp. A-30 through A-69. Removal of vegetation that supports a species life history (foraging, denning/ nesting, hiding cover) and results in changed habitat conditions can result in positive or negative effects depending on many variables. Disruptions associated with human activities can disturb and/or displace wildlife.

Mitigation designed to protect wildlife habitat is found on pp. 2-34 & 2-35. Similar mitigation has been successfully utilized for other projects across the Forest and Region. No species addressed would have significant impacts to their habitat or continued existence with implementation of the proposed actions. Therefore it was determined that wildlife issues associated with this proposed project were not significant.

F Sensitive Plants

Questions were raised whether vegetation treatments would affect any sensitive plant populations. There are currently nineteen plant species designated as sensitive on the Livingston Ranger District. No sensitive plants have been found in previous surveys in the Crazy Mountains.

Impacts of the proposed actions to sensitive plant species were first evaluated by assessing whether suitable habitat exists within the immediate project area to be affected. Previous surveys in the project area were reviewed and additional surveys were then conducted to determine presence. It was determined that there is potential habitat for 5 species in the project area: Small-flowered columbine (*Aquilegia brevistyla*), small yellow lady's slipper (*Cyroripedium calceolus* var. *parviflorum*), Northern rattlesnake plantain (*Goodyera repens*), Alpine meadowrue (*Thalictrum alpinum*), California false hellborine (*Veratrum californicum*). These species were targeted during field surveys.

No sensitive plants were found in any of the surveyed areas. It is unlikely that any of the vegetation treatments in the project area would affect any sensitive plant populations so this was not considered to be a significant issue. Mitigation outlined on p. 2-36 designed to protect sensitive plants, in the event that any are found during project implementation. Surveys and monitoring for sensitive plant species have occurred on the Gallatin NF since 1988 and include basic inventories conducted by qualified individuals to determine species distribution across the forest. Sensitive plant discussion/analysis can be found on pp. A-70 through A-74.

G. Old Growth/Vegetative Diversity

Questions were raised pertaining to how harvest activities would affect old growth populations and vegetative diversity of the area. The Forest-wide standard for vegetative diversity (FP standard 6.c., page II-19 and 20), states: “(1) Forest lands and other vegetative communities such as grassland, aspen, sagebrush and whitebark pine will be managed by prescribed fire and other methods to produce and maintain the desired vegetative conditions; (2) In order to achieve size and age diversity of vegetation, the Forest will strive to develop the following successional stages in timber compartments containing suitable timber: 10% grass-forb, 10% seedlings, 10% sapling, 10% pole, 10% mature and 10% old growth.

Currently, the project analysis area (Compartment 221, which includes both private and public lands includes 14,487 of forest acres) meets the Forest Plan standard for all of the following structural stages; sapling (17%), pole (17%), mature (35%) and old growth (21%). The present vegetative condition (shown in Table A-13, p. A-77) is below the standard for forest grasslands (1%) and seedlings (9%).

Alternatives 2 & 3 would only slightly change the overall forested vegetative structural composition in the project area (See Tables A-14 through A-17 for more details on specific effects to structural changes). As evident in these tables, a small amount of old growth (0.8% or 112 acres) would be affected with either of the action Alternatives 2 or 3. Forest grasslands would increase by 165 acres with Alternative 2 and 215 acres with Alternative 3 (1.1% to 1.5%, respectively). Even with the creation of additional forest grasslands, neither of the action alternatives would increase the forest grasslands to the level needed to meet the 10% level. Mature forest types would only decline by 0.4% (Alternative 2) to 0.7% (Alternative 3) or 53 to 103 acres respectively and remain well above 10%. None of the structural stages would change enough to make vegetation diversity a significant issue. See old growth/vegetation diversity discussion/analysis pp. A-75 through A-82.

H. Heritage Resources

Possible effects to historical, cultural, or archaeological sites must be considered. Prehistoric sites are rare in the lower elevations of the Crazy Mountains with most prehistoric sites occurring at high prominences. Several sites have been recorded around the project area but not in close proximity. There is potential for historic sites related to early shepherding, homesteading, and logging operations, but none have been documented. One archaeological site is located along FS Road #261 in Treatment Unit A1 that could possibly be impacted by the project.

However, the proposed actions can be completed without any direct or indirect effects to heritage resources if mitigation outlined on pp. 2-39 is implemented. Following this mitigation would allow for modification of the project, should any new sites be found, thus eliminating heritage resources as a potentially significant issue. See heritage discussion/analysis on pp. A-82 through A-84.

I. Smoke Emission

Questions were raised concerning potential air quality effects in the Smith Creek WUI during project related burning activities. Potential air quality effects were analyzed using USFS R1 NEPA evaluation procedures for prescribed fire projects (Story and Dzomba, 2005). Generally the project area does not develop temperature inversions, which trap smoke and reduce smoke dispersal. Dispersion of emissions within the project area is very high due to the mountainous terrain and high wind activity.

Pile burn units would be limited in any given day to avoid cumulative smoke effects between units. All burns would disperse to low concentrations beyond 5-10 miles. The pile burn smoke plume would likely also disperse to the north and east of the Smith Creek drainage. The PM_{2.5} from burns would not likely be measurable in Livingston since the smoke would tend to disperse to the NE. Some concentration of smoke could be occur near the Smith Creek residences, particularly near units C, H, and E and if pile

burn smoldering phase were trapped by nighttime inversions. There could be some localized visibility reduction from the plumes. Some obscurement of visibility for driving along the Smith Creek road could occur in narrow bands during the pile burning. Dispersion of the plumes would be expected to quickly mix the project smoke to insignificant visibility impact levels. The Meadow Creek broadcast burn would be expected to produce a centralized plume due to a concentrated burn area while pile burns commonly result in multiple plumes.

Mitigation designed to protect air quality is outlined on pp. 2-31 and 2-32. All pile burning and any prescribed burning associated with the project would be coordinated with the Montana/Idaho State Airshed Group, a critical resource used to minimize cumulative smoke and air quality impacts. This program has been very effective in minimizing adverse smoke impacts for the last 15 years in Montana and Idaho, thus dismissing air quality concerns as a significant issue. See the air quality discussion/analysis on pp. A-84 through A-90.

J. Economic Analysis

Concern was expressed as to whether the proposed project would be economically feasible. The economic efficiency analysis is specific to the timber harvest and other vegetation management activities associated with the proposal. The analysis area for the efficiency analysis is the project area. All costs and revenues associated with the proposed project activities were included.

The economic effects of the proposed alternatives were developed to provide decision-makers with an understanding about whether to proceed with project investments and in selecting the alternative that will achieve Forest Plan and land management objectives. The scope of the proposed actions identified relate to the revenues collected from the sale of stumpage (the value of trees that contain a merchantable product) and would be available to compensate for work done that contributes to meeting the purpose and need and either yields no marketable products or entails costs in excess of return.

Both of the action alternatives would show a positive value for the harvest of timber. Market benefits that could occur as a result of the proposed activities include increases in forest productivity and value for the remaining trees by eliminating competitive stress and reducing the risk of growth limiting insect attack. Positive timber revenues may be re-invested to complete restoration projects thus meeting the Purpose and Need for the project and achieving land management goals. Restoration items will be prioritized and accomplished as revenue is made available from the timber sale. Additional funds for ecosystem restoration projects may also be obtained from cooperators, other agencies, and local donations. Both alternatives would also support existing jobs through timber harvest activities and restoration projects. As Table A-23, p. A-96 indicates, the proposed action would support approximately 70 total jobs and would generate \$1.8 million in direct, indirect, and induced labor income resulting from the activities. Results of the economic analysis completed for

the project indicate that economic feasibility of the project is not a significant issue. See the Economics discussion/analysis on pp. A-90 through A-100.

K. Roads

Concerns were expressed by numerous individuals regarding the conditions of roads in the Smith Creek WUI. The Smith Creek area has in the past been extensively roaded, primarily for forest management and removal of forest products. Many roads are currently in-service and utilized for recreation, private land access, special use, administration of the national forest and forest management. Many are also out-of-service and currently closed and either revegetated or in the process of revegetating. Several sections within the project area were acquired in the 1990's and were heavily roaded at the time of acquisition. Most of the roads in the area are currently part of the Forest Road System.

Road treatment packages (See Table A-24, p. A-103 for specifics by road, Map M-6) associated with the proposed project have been designed to improve road conditions in the project area. Improvements include drainage and varying amounts of road surfacing depending on the dollars available. At a minimum, Treatment Package A would be completed as a part of the proposed project. Additional road maintenance, as described in Treatments B & C would also be completed as funding allows. Mitigation (pp. 2-37 & 2-39) has been designed for the project to address public safety regarding road use and to assure that there would be no significant adverse effects to roads in the project area. See the roads discussion/analysis on pp. A-100 through A-110.

2.6 ALTERNATIVE DEVELOPMENT PROCESS

The May 2005 Watershed Shields River Watershed Risk Assessment (USDA 2005a) was a multi-resource effort to identify the highest risks to resources in the Smith Creek drainage. The resources that were identified at highest risk include loss of aspen, encroachment of grass/ shrub communities, wildfire concerns in the WUI, encroachment of open Douglas-fir stands, current and future insect and disease epidemics, water quality (sediment concerns due to current road conditions).

Findings from the risk assessment were utilized in the development of the Smith Creek Vegetation Treatment Project. With input from scoping and numerous discussions among the interdisciplinary team, the "significant 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 fuel modeling programs in an effort to determine how much fuel 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 fuel 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 pp. 1-3 and 1-4).

In the summer of 2005, aspen surveys were completed and mapped for the Smith Creek drainage by a seasonal field crew. In the summer of 2006, the mapped areas were visited by the district wildlife biologist and other specialists and experts, assessing them for opportunities to enhance aspen regeneration. Douglas-fir and meadow stands were assessed for conifer encroachment and the area was also looked at for current and potential insect and disease epidemics. The annual Insect and Disease flights for the Gallatin National Forest were used to determine trends in the area as a basis to begin ground-truthing. It was discovered that mountain pine beetle infestations in lodgepole pine are increasing in the area.

Area roads, namely the Smith Creek and East Fork of Smith Creek Roads were analyzed to determine where sediment sources are occurring and what could be done to reduce sediment and improve surface conditions. Opportunities to rehabilitate user created ATV trails and un-needed logging and skid roads in the project area were assessed, as were opportunities to reduce fuel loadings along the primary evacuation routes in the Smith Creek WUI.

After numerous discussions among various specialists, the team determined that Alternative 2 and Alternative 3 fully address the issues, meet the purpose and need of the project, and comply with Forest Plan standards and guidelines. These alternatives comply with the legal and administrative constraints that combine to define how well any alternative can meet the purpose and need for the project.

2.7 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 1, 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 1 – 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 outlined in Chapter 1 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 vegetation treatments would occur. Vertical and horizontal fuel continuity of fuel arrangement would remain a concern in the Smith Creek WUI, threatening public and firefighter safety (pp. 3-51 through 3-61).

With Alternative 1, no actions would be undertaken over the next few years that respond to the purpose and need identified on p. 1-5. 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. Additional road maintenance in the Smith Creek area would be a low priority that would only likely be achieved if and when additional money became available from outside sources. Funding was recently obtained for the pre-activity maintenance on portions of the Smith Creek and East Fork of Smith Creek Roads to be completed by fall of 2007. Because the Smith Creek Project was in the planning stages, the priority for obtaining funding and timeline completing this work was elevated. Road maintenance (Treatments B & C) and other stewardship actions identified with the project would not be accomplished.

Those activities described as Reasonably Foreseeable Actions on pp. 3-5 & 3-6 would likely proceed.

Alternative 1 responds the least to the significant issues of public and firefighter safety and loss of aspen regeneration, meadow habitat, and open Douglas-fir stands. The current buildup of insect and disease epidemics adjacent to private land and dwellings would likely continue and probably increase. Additional road maintenance on the Smith Creek and East Fork of Smith Creek roads would be a low priority and would likely be deferred indefinitely unless additional outside funding could be obtained. There would continue to be natural vegetative changes (insect and disease

mortality, encroachment, undergrowth, and increased fuel loadings) through time. No direct impacts would occur to residents and visitors resulting from activities included in the action alternatives.

Alternative 2– Proposed Action

Alternative 2 (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. The proposed action emphasizes treating those stands where thinning and reduction of conifer encroachment would improve public and firefighter safety, maintain and/or improve wildlife habitat, enhance aspen regeneration, and those having existing insect and disease outbreaks. All units associated with the proposed action lie in Management Area 8 (timber) with some units having linear inclusions of Management Area 7 (riparian), both of which allow for commercial timber management in the Gallatin Forest Plan.

Pre-activity road maintenance treatments (not part of this proposal) to improve drainage and reduce sediment concerns on Smith Creek Road (#991), East Fork of Smith Creek Road (#6635), and Goat Mountain Road (#6636) have recently received special funding and will be completed in the project area in the summer/fall of 2007 prior to any project related activities. These treatments include improving stream crossings at perennial streams to meet BMP standards, adding armored drainage dips every 1000 ft, reshaping the road prism and ditches and adding additional drainage. The treatments have been designed to reduce runoff and introduction of sediment into waterways, but would not significantly upgrade the overall road surfaces or improve access. For further description, (See pp. 1-6 through 1-7 & Table A-24, pp. A-103 thru A-109, Map M-5).

Ecosystem restoration activities that would be completed with implementation of Alternative 2 include Road Treatment A, clean-up and blading of roads utilized for harvest activities (See Table A-24, A-103 through A-109, Map M-6), hand treatments (thinning and slash removal), treatment of non-merchantable fuels in units, aspen regeneration monitoring, noxious weed monitoring and treatments, and placement of woody debris on old skid roads and entrances to user-created ATV trails where they intersect system trails or roads.

If additional funds are available once the above-mentioned activities are completed, other ecosystem restoration activities associated with the project include some or all of Road Treatments B & C (See Table A-24, A-103 through A-109, Map M-6), aspen enclosures and/or fencing (if needed to protect regeneration), and a toilet facility at the ATV parking area.

Map M-3 displays the units of treatment associated with Alternative 2 (proposed action). The proposed action includes vegetation treatments on a maximum of approximately 810 acres in ten separate units. Stand density reduction utilizing ground-based harvest equipment would occur on a maximum of 435 acres on slopes

up to 35%, harvesting both large and small diameter trees. A maximum of 145 acres of thinning/density reduction on slopes >35% would involve helicopter logging, and approximately 230 acres would consist of hand-treatments (removal of ladder fuels, limbing of large diameter trees, and thinning of small diameter trees). Hand-treatments would occur in sensitive areas (riparian) or areas trees are too small for commercial harvest operations. Leave tree spacing would be highly variable between units and consist of a mixture 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 units to disrupt the continuity of fuel conditions among stands.

Prescriptions for aspen stands (Units A1, A2, & G) would remove of 85%-90% of conifers while leaving 10%-15% of the healthiest conifers in clumps or individually where wind-firm and greater than 100 feet from aspen clumps. Aspen clones would be retained to the extent possible. Small diameter trees and activity fuels would be slashed, piled and burned, or otherwise removed as forest products, with a maximum of 15 tons/acre of downed woody debris left on site.

Prescriptions for the proposed treatment units included in the proposed action can be found in Table 2-2 below: Table 2-2 displays individual unit information including approximate acres, objectives for the unit, proposed treatments, and mitigation needed to protect resources. Design criteria and mitigation measures for the units can be found in pp. 2-30 through 2-39.

Table 2-2 – Alternative 2 (proposed action) Treatment Unit Descriptions

UNIT	ACRES	OBJECTIVE	TREATMENT	REMARKS
A1	52	Promote aspen for wildlife/biodiversity. Reduce fire severity for public and firefighter safety	Remove 85%-90% of conifers, leave healthy conifers in clumps or individuals (if wind-firm) Remove all conifers within 100' of aspen clones. Leave tree species preference: 1)DF, 2)LPP, 3)SAF, 4)ES. Leave 10-15 tons/down woody material >3".	No cutting within 15' of creek. Protect ATV trail Ground based equipment in winter
A2	15	Promote aspen for wildlife/biodiversity. Reduce fire severity for public and firefighter safety	Within 15'-100' from creek remove 75% of conifers <=8" dbh. Hand pile and burn. Favor leaving conifers that lean towards creek space 15' to 20'' between crowns .	No cutting within 15' of creek. Retain older/larger clumps where available.

UNIT	ACRES	OBJECTIVE	TREATMENT	REMARKS
A2	15		Leave deciduous trees Limb branches 4' from the ground on remaining conifers.	Hand Treatment
B	165	Reduce risk of high severity fire for public/firefighter safety. Enhance aspen regeneration and meadow integrity. Lower risk of mtn. pine beetle attack.	Irregular thin, 20'-25' between boles. Favor leaving DF and ES over LPP. Leave approx. 10% of the larger, healthier conifers in clumps. Where aspen clones occur, remove all conifers within 100'. Post & pole areas, leave all conifers >6" dbh Pile and burn slash Leave 10-15 tons/down woody material >3".	Protect ATV trail Retain older/larger clumps of mostly uncut forest when encountered Ground-based equipment in winter
C	112	Improve evacuation route for public & firefighter safety. Enhance aspen regeneration/meadow integrity.	Thin/weed 20'-25' between trees >8" dbh. Trees <8" thin 10'-12' between crowns. Leave a no tree zone (3-5 acres) near Rd. V junction Where aspen clumps occur, remove all conifers within 100'.	Hand thinning
D	125	Reduce risk of high severity fire for public/firefighter safety. Enhance aspen regeneration and meadows. Lower risk of mtn. pine beetle.	Irregular thin, 20'-25' between boles. Favor leaving DF & ES over LPP. Leave approx. 10% of the larger, healthier conifers in clumps. Where aspen clones occur, remove all conifers within 100'. Pile and burn slash Leave 10-15 tons/down woody material >3".	Protect ATV trail Ground-based equipment in winter

UNIT	ACRES	OBJECTIVE	TREATMENT	REMARKS
E1	34	<p>Reduce risk of mtn. pine beetle attack.</p> <p>Restore to a park-like DF stand</p>	<p>Irregular thin, 35' to 50' between boles where large DF dominate.</p> <p>Irregular thin 20'-25' where LPP dominates. Leave tree preference: 1)DF, 2)ES, 3)SAF, 4)LPP.</p> <p>Remove LPP killed by mtn pine beetle. Retain dead DF and/or LP to meet snag guidelines. Feather thinning along private boundary. Leave 10-15 tons/acre woody debris >3" dbh</p>	<p>Buffer existing spring.</p> <p>Helicopter log</p>
E2	50	<p>Reduce risk of mtn. pine beetle attack.</p> <p>Reduce high severity fire for public/firefighter safety.</p>	<p>Irregular thin, 35' to 50' between boles where large DF dominate.</p> <p>Thin 20'-25' where LPP dominates. Leave tree preference: 1)DF, 2)ES, 3)SAF, 4)LPP.</p> <p>Remove LPP killed by mtn pine beetle. Retain dead DF and/or LP to meet snag guidelines. Feather thinning along private boundary. Leave 10-15 tons/acre woody debris >3" dbh</p>	<p>Helicopter log</p>
F	60	<p>Reduce risk of mtn pine beetle attack.</p> <p>Reduce spread of wildfire increasing firefighter safety.</p>	<p>Remove all LP in irregular shaped sub-units within larger unit. Feather edges of sub-units</p> <p>Leave species other than LP.</p>	<p>Helicopter log</p>

UNIT	ACRES	OBJECTIVE	TREATMENT	REMARKS
G	28	Reduce risk of high severity fire for public/firefighter safety. Enhance aspen regeneration for wildlife/biodiversity.	South half of unit, remove all conifers, Retain aspen & deciduous trees (leave the wet area outside of boundary). North portion of unit (where aspen clones occur, remove all conifers within 100'). Whole tree yard Leave 10-15 tons/down woody material >3''.	No cutting within 15' of creek. Ground-based Equipment in winter
H	103	Improve evacuation route for public & fire fighter safety.	Thin 20'-25' between boles. Leave species preference: 1)DF, 2)ES, 3)LPP, 4) SAF. Leave 10-15 tons/down woody material >3''. Remove most of <3'' dbh slash material . Thin large trees (>15-20''dbh) approx. 35' apart. Handpile and burn. All slash within 100' of road to be removed/burned/piled.	Hand Treatment
I	66	Reduce risk of high severity fire for public & firefighter safety. Reduce risk of mtn. pine beetle attack.	Irregular thin Post & pole areas, thin LP approx. 25' between boles Large trees (DF, LP,ES) thin approx. 35' between boles. Species preference: 1)DF, 2)ES, 3)LPP, 4)SAF. Machine pile and burn. Leave 10-15 tons/down woody material >3''.	Leave 100' no cut buffer around ponds Ground-based equipment in winter
Total	810			

Normal operating period for mechanical harvest, skidding, and mechanical slash piling would be from November 1 to April 30 over frozen ground and/or 8 inches of snow in units using ground-based equipment. Units utilizing helicopter harvesting and/or hand-treatment would not be restricted to the winter months (See design criteria and mitigation pp. 2-30 through 2-39). Hand or helicopter treatments would not be conducted in any of the proposed vegetation units during archery season (beginning 9/1 through 10/15) to accommodate the concentrated elk migration in the area. Exceptions to this restriction could only occur after consultation with Montana Fish, Wildlife, and Parks.

Harvest and skidding activities must be completed on a given unit within one season, unless extreme weather conditions prohibit completion. Log hauling for all units would occur over dry or frozen roads to minimize damage to roads and address sediment concerns. 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).

Treatment of activity-related and natural down fuels would maintain 10-15 tons of coarse, downed woody material per acre. Burning of piles would only occur during the spring (April/June) and fall (late September/November) seasons.

No new road construction is proposed (permanent or temporary) with the proposed action. Existing roads on both private and National Forest lands would be used to access the treatment units. One of the key factors in determining the use of existing roads on private lands is whether permission to use the roads can be obtained. Existing roads on either ownership would require maintenance to support safe and efficient use, consistent with project design criteria and mitigations. Existing project roads and trails (roads and trails that have been utilized for past logging activities) would also be utilized. Some of these project roads and trails would need to be reopened to provide access to treatment units.

Reopened Project Roads and trails that are located on National Forest System lands would be closed to the public during project related activities and those that are no longer needed following harvest activities would be permanently closed and rehabilitated. Rehabilitation would make these roads and/or trails impassable for future motorized travel and would include other necessary resource protection practices. See Table A-24 for detailed road information. Existing skid roads in Units A1, B, D, and I would have 5 tons/acre of coarse woody debris scattered along approximately 4.1 miles after harvest activities are completed to help improve soil quality and to deter ATV use on these trails. Designated ATV trails, listed in the 2006 Gallatin National Forest Travel Plan would not be included for woody debris treatment.

Alternative 3 – Proposed Action and Meadow Creek Burn

Alternative 3 (proposed action and Meadow Creek burn) includes all units and activities associated with the proposed action (Alternative 2) and adds Unit J, which consists of a 300 acre prescribed burn in the Meadow Creek area (See Map 4). Implementation of Unit J would improve wildlife habitat through the reduction of ladder fuels in open Douglas fir stands and reduce conifer encroachment, thus increasing the integrity of grassland/park structures. Through the application of prescribed fire, nutrients returned into the system would increase the forage-ability and palatability of grasses for ungulates. Table 2-3 below provides the draft prescription for Unit J.

Table 2-3 Alternative 3 (Proposed Action& Meadow Creek) Unit Descriptions

UNIT	ACRES	OBJECTIVE	TREATMENT	Remarks
J	300	Improve wildlife habitat (create open DF stand). Reduce ladder fuels.	Prescribe burn. Create a mosaic pattern of vegetation. Where DF dominates underburn and where LPP/SAF dominates burn passively (mixed severity fire). In openings, burn all conifers.	Leave 100' no burn zone next to Meadow Creek

The treatment in Unit J would consist of prescribed fire techniques to create a mosaic pattern within the unit. Utilizing existing surface fire potential, smaller trees would be targeted, specifically in the grassland/park structures and open Douglas fir stands. In areas that Lodgepole pine and Sub-alpine fir dominate, passive crown fire would be expected for a short duration to mimic a mixed severity fire effect.

The application of low intensity prescribed fire techniques would reduce the volume of standing and down material available to support a wildfire. Additionally, the ideal fire effects to the stands and their structure would act as a thinning agent, by both reducing the number of smaller trees and increasing the canopy base height. This reduction would greatly influence ladder fuels within the stand, while decreasing the likelihood that a crown fire could initiate. Ideally, prescribed fire techniques that are to be applied would more closely mimic fires natural role within the system.

Fuel treatment objectives for Unit J are to achieve a balance between leaving a moderate amount of material on the ground to provide nutrients for soil replenishment, but not so excessive as to add to an uncontrollable wildfire. A target range of approximately ten to fifteen tons per acre of materials would be left on the ground, which would likely only support a readily controllable, low-intensity ground fire.

Road Maintenance Treatments Associated With Action Alternatives 2 & 3

Road Treatment A, clean-up and blading of system roads utilized for project related activities (Discussed in detail in Table A-24, Map M-6), would occur after harvest-related activities have been completed. These road treatments must be completed if either of the action alternatives (Alternatives 2 or 3) were chosen.

All or portions of Road Treatments B and C would also be implemented and would provide benefits to fishery habitat if sufficient funding is available either from receipts generated from the harvested timber and other forest products or through other means. Road Treatments B and C would include improvements to Smith Creek Road #991, Goat Mountain Road # 6636, and East Fork Smith Creek Road #6635 to a three season standard including 6” surfacing on residential access roads and 4” spot surfacing on seasonally gated roads (See Table A-24, pp. A-103 through A-109, Map M-6). These options would improve the drivability of roads in the Smith Creek drainage, especially during the spring and fall seasons when the road surfaces are soft. Current conditions (only minor surfacing) make them subject to extreme rutting (See Map M-6).

Detailed Stand Treatments Common to All Units (Alternatives 2 & 3)

Described below are the stand treatments that are common to all units associated with the two action alternatives (Alternatives 2 & 3)

A) Aspen – Remove all conifers within and around aspen clones (individual trees sharing a common root system) for a distance of at least 100 feet. Existing aspen clones would be retained to the extent possible. Fishery mitigation to protect streams (pp. 2-30 & 2-31) would have priority over treating aspen within 15 feet of stream channels. Units A & G have large concentrations of aspen clones and would have the majority of the conifers removed leaving 10-15% of the best formed, healthiest conifers in clumps. Key areas for clump retention would include trailheads, along system roads and ATV trails, wet areas, and viewsheds from adjacent private lands. Fuels resulting from the treatments would be piled and burned at the landings or away from the root systems of the remaining aspen clones. Aspen regeneration monitoring would occur following treatments for several years to determine if measures such as fencing are needed to protect aspen sprouts.

B) Fuels – Merchantable trees would mostly be whole tree yarded and skidded to designated landings. Submerchantable material and slash from the logging operation would be piled or removed from the unit. Approximately 10-15 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 area.

C) Burning – Activity fuels would be treated and burned or otherwise removed following harvest. Burning methods would include burning hand or mechanical piles, landings, and/or jackpot burning (treatment of concentrated fuels). These actions would reduce ladder and activity fuels within the treated units.

D) Tree Densities –Existing stand densities are highly variable within the units. 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 irregularly spaced trees (of various sizes) per acre would be left. Portions of some of the units may be left untreated to meet a variety of resource objectives. The remaining trees will vary in size from seedlings to mature trees (six inches tall to 80 feet tall). Treatments 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 healthier stand conditions.

Untreated or minimally treated portions of some stands would be left in a natural appearing condition and the trees in these groups would contribute to the total number of trees left per acre. Given these clumps, more than 500 established trees/acre would be left in portions of some units. However, 500 trees/acre is the high-end for fuels objectives for the majority of the units.

2.8 COMPARISON OF ALTERNATIVES

Table 2-4 provides a comparison of the three alternatives considered in detailed study and how they address each of the significant issues.

Table 2-4 Comparison of Alternatives by Significant Issue

Significant Issue	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Proposed Action & Meadow Creek Burn)
Water Quality	Additional road maintenance & improvements would not likely occur. No increase in road sediment. No decrease in sediment due to road improvements (drainage, surfacing). Retains heavy fuel conditions in WUI.	Project activities & Road Treatment cause a very slight increase in sediment short term, but long-term sediment reductions. Road Treatments B&C have potential for significant decrease in sediment long-term.	Project Activities and Road Treatment A cause a slight increase in sediment short term, but long term sediment reduction. Meadow Creek burn would have minor sediment increases short-term. Road Treatments B & C would have potential for significant sediment decrease in long-term.

Significant Issue	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Proposed Action & Meadow Creek Burn)
Water Quality	Wildfire has potential to affect soil erosion, debris flows, and sediment loadings to Smith and Shields Rivers.	Reduced potential for sediment from potential wildfire.	Reduced potential for wildfire sediment.
Fisheries	No fuel reduction activities along riparian corridors. No fuel reduction related impacts to riparian areas, or fish habitat. Additional road maintenance and repairs uncertain (due to funding/priority).	Reduced sediment & improved spawning habitat. from Road Treatments B & C if funding is generated from the project. Mitigation ensures no adverse effects on riparian integrity or streambank stability	Reduced sediment & improved spawning habitat from Road Treatments B&C if funding is generated from the project. Mitigation ensures no adverse effects on riparian integrity or streambank stability
Fuels	Forested areas continue to follow natural rates of succession, becoming denser adjacent to private lands. Wind-driven wildfire expected to transition quickly from ground into forest canopy. Risks to public and firefighter safety from wildfire are high and continue to increase.	Modifies volume and arrangement of fuels Reduces ladder fuels and surface fuel loadings adjacent to private. Reduces likelihood of crown wildfire. Provides more time for public evacuation and greatly increases firefighting capabilities and safety in the WUI.	Modifies volume and arrangement of fuels. Reduces ladder fuels and surface fuel loadings adjacent to private. Reduces fire risk to adjacent private land in Section 17 w/Meadow Creek prescribed burn. Reduces likelihood of crown wildfire. Provides more time for public evacuation and increases firefighting capability & safety in the WUI.
Wildlife Habitat	Would not improve wildlife habitat by modifying forest structure. Meadow habitat, open DF stands, and aspen areas continue to decline or are lost.	Improves habitat for species dependent on non-forested habitat groups (grassland, wet meadow, aspen, willows).I Increases forage for big game & raptors, nesting habitat for snag dependent birds. Increases late seral, single story old growth DF.	Improves habitat for species dependent on non-forested habitat groups (grassland, wet meadow, aspen, willows).I Increases forage for big game & raptors, nesting habitat for snag dependent birds. Increases late seral, single story old growth DF.

Significant Issue	Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Proposed Action & Meadow Creek Burn)
Wildlife Habitat	Continues to have a large percentage of area represented by medium age class alpine fir.	Reduces the medium age class alpine fir structure. Creates a mosaic of non-forested and forested stand structural stages.	Reduces the medium age class alpine fir structure. Creates a mosaic of non-forested and forested stand structural stages. Meadow Creek burn restores additional open Douglas-fir forest.
Insect and Disease	Increases probability of a mountain pine beetle epidemic in WUI adjacent to private lands. Increases likelihood of numerous additional conifers to be killed increasing fuels build-up. DF Beetle likely to remain at current endemic levels unless an extended drought, large wildfire or wind event occurs.	Reduces the likelihood of significant mountain pine beetle mortality in WUI adjacent to private. Thinning increases health and vigor of remaining trees. DF Beetle likely to decrease slightly in compartment, moderately in project area due to increased vigor and open spacing of Douglas-fir.	Reduces the likelihood of significant mountain pine beetle mortality in WUI adjacent to private lands. Thinning increases health and vigor of remaining trees. Meadow Creek burn implementation timing and parameters are critical to prevent future DF beetle epidemics (prevent scorching of large DF).
Soils	No effect on soil productivity; no ground-disturbing treatments proposed	No effect on soil productivity; mitigation prescribed due to effective mitigation and restoration practices All ground-disturbing treatments adhere to Regional Soil Quality standards, including those with previous harvest.	No effect on soil productivity; mitigation prescribed due to effective mitigation and restoration practices. All ground-disturbing treatments adhere to Regional Soil Quality standards, including those with previous harvest.

2.9 DESIGN CRITERIA AND MITIGATIONS SPECIFIC TO THE ACTION ALTERNATIVES (2 & 3)

This section describes project design features, mitigation measures, and monitoring activities that are specific to the action alternatives.

A. Water Quality

- 1) Implement funded pre-activity road treatments (not part of the project) to bring perennial stream crossings to Best Management Practice (BMP) standards and adding armor drainage dips at least every 1000') prior to vegetation treatments in any of the units (A1, A2, B, C, D, E1, E2, F, G, H, I) or Meadow Creek prescribed burn, Unit J.
- 2) Retain a no-burn buffer of 100' for burn treatment areas (Unit J) adjacent to Meadow Creek and perennial tributaries.
- 3) 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 Streamside Management Zone (SMZ) compliance rules (Guide to the Streamside Management Zone Law and Rules, August 2002).
- 4) Implement BMP's for Forestry in Montana (DNRC, 2004) that apply to the Smith Creek Fuels Reduction Project. These are incorporated into Appendix B, BMPs.

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.

B. Fisheries

The underlying goal of protection measures for riparian and aquatic habitats is to 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 needs of riparian zone dependent species including fish and fish habitat. The following unit wide stream protection measures are included in the proposed action:

- 5) No riparian treatment up to 100 feet either side of streams in all units except Units A1, A2, and G where riparian harvest is necessary to meet a fuels treatment objective along critical reaches and where riparian harvest is necessary to meet a deciduous (e.g., aspen) regeneration objective.
- 6) For Units A1, A2 and G, no treatment will be allowed within 15 feet of any perennial stream segment. This is more restrictive than State SMZ rules. This

- “no harvest” mitigation protects thermal regulation, overhead cover, and protects banks. It also maintains age class diversity of trees along the stream corridor.
- 7) Follow all SMZ rules and Gallatin FP regarding operation of wheeled or tracked equipment in riparian zones.
 - 8) For Units A1, A2 and G, favor leaving the largest diameter trees along riparian corridors. Purpose is to protect those trees most likely to provide anchored and stable large woody debris (LWD) when it is recruited to the channel.
 - 9) For Units A1, A2 and G, follow SMZ rules relative to tree retention guidelines. At least 50% of trees ≥ 8 in dbh should be retained within a 50' distance to the stream edge.
 - 10) Favor leaving trees that are leaning towards the stream channels and favor taking trees leaning away from the stream channel. Purpose is to protect those trees most likely to provide anchored and stable LWD when it is recruited to the channel.
 - 11) Do not harvest trees that, if they fell perpendicular to the channel, the diameter of the fallen tree at the high water mark of the channel would be greater than 8 inch diameter (This includes trees leaning towards the channel and those with no lean). Purpose is to protect those trees most likely to provide anchored and stable LWD when it is recruited to the channel. It ensures that LWD recruitment to the channel is sufficient for instream habitat. It allows for harvest of smaller diameter trees that contribute to high fuel loads, but maintains larger masses that will be more stable instream LWD.
 - 12) To the extent possible, but still meeting fuels objective, leave species and size classes representative of original stand.
 - 13) Fisheries biologist will assist in tree marking along all riparian corridors.
 - 14) No riparian treatments on steep slopes $>35\%$ that drain directly into a stream with no floodplain filter.
 - 15) No harvest in active floodplains (inundated on 1.5 – 2 year recurrence interval). Fisheries biologist will assist in identifying these areas.
 - 16) No new roads will be constructed.
 - 17) All ground based harvest using tractors or skidders will be done over snow or frozen ground.
 - 18) Follow all BMP's (Appendix B) and other mitigation measures outlined in the water quality section of the EA.

C. Air Quality

The primary focus of the Smith Creek pile and prescribed burning would be to prevent wildfire initiating from the burn projects. Specific mitigation includes:

- 19) Pile burning would be done in the spring (March/June) or fall (late September to November) when wildfire potential is low.
- 20) Broadcast burning would be attempted in the spring (May/June) or fall (late September/November) when north slopes are moist and wildfire potential is

very low.

- 21) Understory and pile burning are constrained by 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 35 ug/m³. The Meadow Creek prescribed burn has a minimum ambient distance of 0.5 miles. The pile burns have minimum ambient distances of 0.4 to 0.6 miles. Within the minimum ambient distances the public will be warned about high smoke concentrations and advised not to travel outside of a vehicle or be outside of residences.
- 22) All Smith Creek 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 has 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

Specific mitigation incorporated into the project design to protect soils include:

- 23) The soils BMP's described in Appendix B would be applied to treatments having ground-disturbing operations. The BMP's are designed to prevent excessive area-wide soil impacts.
- 24) Ground-based mechanical harvest operations must be on frozen ground or over 8" of snow. Mechanical harvest operations outside of this period would require a slash mat or similar technique to limit soil disturbance. Normal operating period for mechanical harvest and skidding would be November 1-March 31.
- 25) Approximately 4.1 miles of old skid roads within Units A1, B, D, and I would have 5 tons/acre of coarse woody debris distributed over length of the roads.

Effectiveness: Monitoring of timber sales indicates that these protection measures have minimized soil disturbance and will maintain soil productivity. 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.

Use of these mitigation practices should protect soil productivity by meeting the Regional Soil Quality standards (USDA Forest Service, 1999). See the soils effects section in Chapter 3 for details regarding each unit. See Soils reports in the project file for more detail on the Best Management Practices and their effectiveness.

E. Noxious Weeds

The following list of mitigations would help to reduce the effects of this project on the spread of noxious weeds for Alternatives 2 and 3:

- 26) Spray all weeds with herbicide that are adjacent to roads prior to the treatment activities (including road work). This mitigation helps to prevent weeds from spreading along roads.
- 27) For hand-treatment and helicopter units that would be treated when ground is not frozen, avoid driving any equipment through patches of weeds. Patches would be identified and flagged on the ground. This is a very effective way to prevent spreading these weeds (seeds and roots) to other areas.
- 28) Power-wash and inspect all off-road vehicles before entering the project area. For hand-treatment and helicopter units that would be treated while the ground is not frozen, power-wash and inspect all off-road vehicles before entering *each* unit. This mitigation helps to prevent new infestations of noxious weeds. Washing equipment is a highly effective mitigation and has been used effectively on timber sales for the last ten years
- 29) Re-vegetate bare and disturbed soil by seeding landings, hand pile areas, and trails in a manner that optimizes native plant establishment. Use native plant seed where appropriate.

Noxious weed prevention and control procedures are described in Forest Service Region 1 Supplement to Forest Service Manual 2080 and the Final Environmental Impact Statement and Record of Decision for the Gallatin National Forest Noxious and Invasive Weed Treatment Project (June 2005). These guidelines outline responsibilities and methods to manage noxious weeds at Forest and District levels. They include numerous best management practices to be followed during activities associated with the Smith Creek Vegetation Project. The Manual implements an integrated approach of education, prevention, suppression, and monitoring.

Follow Zero Code 2080- Noxious Weed Management Guidelines

- 30) Remove the seed source that could be picked up by passing vehicles and limit seed transport into new areas.

- a. 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.
 - b. Any gravel or other surfacing/fill materials brought or moved on-site for project related activities must be from a weed seed free source. .
 - c. Temporary roads and trails used during harvest would be closed to the public until harvest operations are complete in the area.
- 31) Minimize the creation of sites suitable for weed establishment. There will be no new road building. Revegetate by seeding bare and disturbed soil on landings, hand pile areas, and trails in a manner that optimizes plant establishment. Use native plant seed where appropriate.
- 32) Monitor units and associated activity areas for new weed infestations both pre and post-activity and treat infested areas.

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

- 33) The District wildlife biologist will conduct further surveys within individual treatment units prior to beginning harvest activities. Identification of any species of concern may result in additional restrictions.
- 34) Follow Snag management direction, Forest Plan Amendment #15 and/ or Northern Region Snag Management Protocol. Retain snags in clumps rather than uniformly distributing them throughout harvest units. Standards for down woody material will follow recommendations of 10-15 tons/acre as per Forest Plan direction.
- 35) Snags, particularly Douglas fir snags and spruce with cavities or broken tops, will be avoided and retained on site when possible and when retention does not cause a safety concern for the operator.
- 36) Clumps to be retained in Unit B and D will be healthy, late successional trees to create greater diversity of structure and age classes across the landscape.
- 37) Hand or machine treatments (including helicopter) would not be conducted in any of the proposed vegetation units during from September 1 through October 15 to accommodate the concentrated elk migration in the area. Exceptions to this restriction may occur only after consultation with Montana Fish, Wildlife, and Parks.
- 38) Rehabilitate skid trails within units to discourage any future use of prism and restore full productivity to wildlife habitat. Revegetate all disturbed areas with native vegetation.
- 39) Buffer existing springs and other areas exhibiting riparian characteristics and do not allow equipment use within the area of influence.
- 40) Clumps in Units A1, B, D, and G would be designed to retain nesting

structure and opportunities for great gray owl. Patch clumps would not be treated and would be at least ½ acre.

- 41) If a great grey owl is found to be actively nesting in any of the vegetation treatment units, the nesting territory would be buffered.
- 42) Create drumming logs for ruffed grouse in retention areas of Unit A1 and G and adjacent to treated aspen stands in Units B and D. Some conifer species or aspen with a minimum of 8" diameter and 20-40' in length would be dropped and left on the ground.
- 43) If goshawks are found in the vicinity or an active nest is located, project activity will be delayed or modified to avoid adverse impacts to the species. Nest sites would be buffered and no ground disturbing activities or vegetation manipulation inside buffered nest stands would occur. No treatment activities would be allowed from April 15 to August 15 within post-fledgling areas (PFAs) surrounding active nest sites or within PFAs surrounding nest sites. Monitoring will continue until post-fledging.
- 44) If monitoring indicates that desired conditions for aspen are not met, strategies for protecting regeneration through fencing to discourage ungulate browsing or further treatment will be employed. After treatment, measure stand stocking density (number of sprouts per acre) of each of the following size classes using nonrandom circular plots: 1) # seedlings <1'; 2) # seedlings 1'-4½'; 3) # 4½' – 1" dbh; # seedlings > 1" dbh. Successful treatment typically results in initial stem densities of approximately 5,000 sprouts per acre with natural mortality occurring during self-pruning from year 1-10 post-treatment.

Effectiveness: The Forest Plan was amended in 1993 in order to define big-game 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 wildlife.

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 (33). 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.

G Sensitive Plants

Sensitive plant surveys were conducted in July and August 2006 for the project area and are documented in the Project File. No sensitive plants were located.

- 45) 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.

H. Visuals

By incorporating the following mitigation in this project, the proposed treatments will meet the Forest Plan standards for Visual Quality.

- 46) Unit A1 (east edge) avoid creating a discernible straight line on the private/NF boundary that is visible from the houses.
- 47) Along the west side of Unit G, and where possible in Unit A1 along its east edge, cut stumps to approximately 6" from the surrounding ground where they are evident above normal grass height when viewed from the residences.
- 48) Along the west side of Unit G, and where possible in Unit A1 along the east edge, leave individual trees and clumps in varying sizes and shapes, that have full crowns and the appearance of being open-grown.
- 49) Leave clumps and/or individual conifer trees with full crowns around trailheads for setting, shade and parking area containment and definition.
- 50) Clean up as much as possible, slash left that is visible within the first 100 ft of the public access roads and from residential areas especially in Unit G, and where possible in Units A, B, and D.
- 51) Especially in Unit G, and where possible in Units A, B, and D, rehabilitate any landings, staging areas, or old project roads (roads that were used for past logging) used to access units that are within 100' of public access roads.
- 52) Avoid even spacing of leave trees and vary sizes of tree clumps.
- 53) In units E1 and E2, avoid a straight upper edge near the ridgeline. Where possible, replicate the line of the upper edge of the existing natural openings.
- 54) Along the western edges of Units E1 and E2, transition into somewhat less thinning to provide a buffer near the private houses (however thinning should still occur to achieve the purpose and need of the project
- 55) Avoid creating units that are shaped with straight lines, square corners or other configurations that are not naturally occurring in the area. This applies to all units, especially where NF land abuts private land boundaries.

- 56) Transition the edges of units into the surrounding area, either by reducing the percent removal into adjacent dense forest, or increasing the percent removal adjacent to natural openings.
- 57) Within one year following harvest activities and fuel treatments, unit boundary signs, markers, flagging, etc. should be removed so as to not be discernible from the public access roads, trailheads and residential areas.

Effectiveness: Results of monitoring, when performed by qualified individuals 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.

I. Recreation, Public Safety and Special Uses

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

- 58) A snowmobile/private resident's parking area would be found for use when the Smith Creek Road #991 is plowed for winter harvesting.
- 59) Warning signs at key entrances and exits during the time of the activity and removed or covered during times of inactivity. Warning signs posted in both directions adjacent to dispersed campsites, trailheads and Forest Service trails. If necessary, special orders would be drafted to temporarily close some areas or recreation sites to protect the public.
- 60) Main roads (Smith Creek, East Fork of Smith Creek) where significant increases of traffic are anticipated should have temporary speed limit signs installed.
- 61) Normal Timber Sale restriction clauses should be utilized on roads considered for closures during weekends and holiday and should contain provisions for public safety by the development of a traffic control plan, including signing that would be agreed upon prior to commencement of activities.
- 62) Decking or piling of slash would not occur within dispersed campsites, at trailheads, or on Forest Service system trails, unless specifically approved by the District Ranger.
- 63) Designate use of old skid trails and minimize creation of new skid trails in order to avoid creating new trails for unauthorized recreational use.
- 64) All skid trails would be slashed heavily for at least the first 100 yards off roads and trails to discourage vehicular access.
- 65) Minimize disturbance to signs, culverts and bridges on Scab Rock Trail #261 and Lower Scab Rock Trail #262. Protect these structures from crushing by heavy equipment.
- 65) Feather edges of harvest units along roads and trails. Leave groups of trees along roads and trails in unit A1 where possible.

- 66) In Unit J, leave a 100 foot no ignition buffer between burned area and roads in southern portion of Section 9 in order to reduce possible unauthorized use by ATVs.

Effectiveness: Results from past timber sales on the Gallatin as well as on other fuel reduction project in the Region have shown that these general design criteria and mitigations, combined with site specific marking have been effective in the protection of 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 Livingston 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. Additionally, these provisions are monitored and enforced by the sale administrator and Forest Service Law Enforcement assigned to the area.

J. Livestock Grazing

The Three Peaks Grazing Allotment lies within the immediate project area, with the Smith Creek Allotment to the north, and the currently vacant Meadow Creek Allotment in the area of the proposed Meadow Creek burn. A recent Decision Notice was issued for these allotments allowing for adaptive management techniques to be utilized in managing these allotments.

- 67) The allotment permittee will be notified when and where activities will commence. Also the permittee will be informed when activities are finished.
- 68) Gates will be kept closed at all times. If livestock are found where they don't belong, contact the Livingston Ranger District Rangeland Manager or range specialist immediately.
- 69) Manage grazing to protect aspen regeneration. The area of Units A1, A2, and G should be rested from livestock grazing for a minimum of 1 year following harvest. After 1 year of rest, monitoring will determine the level of browsing to be allowed (timing and numbers). On subsequent years, monitoring will determine the appropriate adaptive management techniques to limit aspen browsing.

Effectiveness: These mitigation measures minimize potential disturbance to cattle by limiting human/cattle encounters and excessive annoyances that may stress cattle. Similar coordination with permittees has been effective in the past.

K. Heritage Resources

The following mitigation should be incorporated to protect the heritage resource:

- 70) An archaeologist and the sale administrator should flag off the known site when work would be in the site vicinity such that the site would be avoided by any disturbing activities. The fuel reduction actions can easily be completed and still avoid the site as long as the operators and sale administrator know where the site is located.
- 71) If any additional heritage sites should be encountered during the project then disturbing actions should be halted immediately and an archaeologist contacted.

Effectiveness: Following these mitigation measures would allow for modification of the project should sites be found.

L. Road Maintenance/Rehabilitation

- 72) No new permanent or temporary roads will be constructed for the project.
Access to units will be on existing roads
- 73) System roads in Unit B will be taken out of service following the project, making no permanent road management objectives to the road system.
- 74) All re-opened project roads (previously used for logging) should be signed or gated as “closed to the public” during periods of harvest activity.
- 75) Following use, project roads (previously used for logging) that are re-opened for harvest activities should be permanently closed and rehabilitated to meet adjacent land management objectives with no regard to future access.
- 76) All Forest roads utilized by this project are vulnerable to spring break damage and should be restricted between March 30 and June 1.

Effectiveness: By adhering to the above mitigation measures, no adverse environmental impacts are anticipated related to roads.

2.10 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 Smith Creek Vegetation Treatment 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. Results of monitoring will be evaluated and utilized to determine follow up treatments that may be necessary.

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.

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 Weeds

Monitor units and associated activity areas for new weed infestations both pre and post-activity. Treat infested areas within the project area until controlled.

Monitor and evaluate the success of revegetation of landings and burn pile area in relation to project plan.

Wildlife

The District wildlife biologist will monitor implementation of conifer clump, snag, and down woody debris retention during implementation of prescribed treatments and two years following project completion to determine whether the wildlife mitigation and snag retention prescriptions were effective in maintaining sufficient habitat.

The District wildlife biologist will monitor aspen regeneration success and need for further protection or treatment using the method outlined in USDA 2004. Photo points, along with a vegetative description and plant species list, will be established within the aspen stands. A photo should be retaken every other year and before and after any implementation of adaptive management actions.

Water Quality/BMP's/Fisheries

A BMP review will be conducted for some of the larger treatment units as well as road treatments. The BMP review team will use the Montana BMP audit forms augmented by the additional BMP's and EA required mitigation for the Smith Creek Vegetation Treatment 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 examination 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 Livingston District Ranger.

Soils

Pre-project monitoring will be undertaken on all units having previous harvest. Post-harvest monitoring will be undertaken on all units, will use the Northern Region Soil Quality Monitoring Protocol (version current at the time), and be completed within two years of Activity Area (unit) completion. In addition, soils will be monitored during the BMP reviews that would be conducted for some of the larger harvest units. The BMP review team would use the Montana BMP audit forms augmented by the additional BMP's for the Smith Creek Vegetation Treatment 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 Livingston 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. 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.

Insect and Disease Infestations

Aerial detection surveys will continue to be conducted yearly by the Regional Forest Health and Protection and made available to the Forest in January of the following year. Ground observations will also occur at least every five years to determine if any non-lethal mountain pine beetle attacks are beginning or are in progress.

Roads

No monitoring of the roadwork would be required beyond administration of the project contract, including restoration of the forest trail on the Bear Mountain View Road.

Livestock Grazing

The portions of the Three Peaks Allotment that lie within the aspen treatment units (A1, A2, and G) would be rested for a minimum of one year following treatment to enhance aspen regeneration. The recently completed Upper Shields EA decision allows for implementation of Adaptive Management Techniques if monitoring indicates that livestock use is incurring damage or preventing successful regeneration. Aspen regeneration will be monitored for browsing and appropriate measures will be taken including timing, distribution, and numbers of livestock to be allowed in the area. Fencing may be needed to provide additional protection for the regeneration. Means of monitoring would include:

- *End of Season Indicator:* Amount of browse on leaders and terminal stems. These measurements would be taken annually at the end of the season. The trigger point for desired future condition for aspen regeneration is at least 200 sprouts per acre with less than 10% annual browsing of the terminal stems.
- *Successful Regeneration Post-Treatment:* If monitoring indicates that desired conditions for aspen regeneration are not being met, then Adaptive Management Strategies would be employed.
- *Long-Term Health:* Photo points, along with a vegetation description would be established within these aspen units.

2.11 ALTERNATIVES ELIMINATED FROM DETAILED STUDY

In addition to Alternatives 1-3, five other alternatives were considered by the interdisciplinary team. 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 analysis.

Alternative 4. - No Riparian Harvest

Alternative 4 is similar to Alternative 2 (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 4 would remove 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 4, these adverse changes would not occur due to timber harvest.

This alternative was not analyzed in detail because it did not meet the purpose and need relative to safety (egress) along some roads, and because it would forfeit the opportunity for vegetation management where the deciduous component is the desired future condition. Mitigation is already in place that would ensure that the minimal amount of riparian harvest that is associated with Alternatives 2 & 3 would not reduce the quality of fishery habitat. For these reasons Alternative 4 was dropped from detailed analysis.

Alternative 5 – Defensible Space Alternative (300 foot buffer)

Alternative 5 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 Smith Creek WUI would be fully satisfied with Alternative 5. Vegetation would be modified within roughly 300 feet of existing structures. If implemented throughout the WUI, treatments would occur on less than ten percent of the area proposed with Alternative 2. Treatments would be continuous where developments happen to be clustered.

This alternative is too limited in scale to satisfy the purpose and needs of the project, which are to increase public and firefighter safety and extend the potential time available for evacuation in the event of a wildfire. By limiting the scale to 300 feet from structures, aspen stands, meadow habitat, Douglas-fir stands, and insect and disease outbreaks, also part of the purpose and need would not be effectively treated. The Park County Community Wildfire Plan concluded that, following numerous years of successful fire suppression efforts and the resulting increases in vegetation and fuels, the Smith Creek WUI is potentially hazardous during periods of severe fire

weather. 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 WUI.

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 2 encompasses the benefit of Alternative 5 and much more. For this reason, Alternative 5 was dropped from further study.

Alternative 6 – No Harvest in Old Growth

There was concern about harvest occurring in old growth forests. Alternative 6 would not include harvest activities that would alter any coniferous old growth forest (either by burning, harvesting or both) in the Smith Creek project area. This alternative was dismissed from further analysis due the amount of old growth that is currently present at the Forest level, mountain range level and Compartment level. Presently, mean old growth amounts are: 1) Gallatin National Forest-28%, 2) Crazy Mountain Range-13% and 3) Compartment 221 (the compartment in which the Smith Creek Vegetation project is located)-21%. At all three geographic scales (from broad to fine scale) old growth amounts exceed the Forest Plan Standard of 10%. Only small amounts of old growth would be affected by either of the action Alternatives 2 or 3, causing a slight drop in old growth by 0.8% or 112 acres with either of the action alternatives, leaving old growth levels well above the amount required by the Forest Plan.. See the old growth discussion on pp. A-75 through A-82. For these reasons, Alternative 6 was dropped from further study.

Alternative 7 – Increase Conifer Retention in Aspen Units A & G

There were comments indicating a concern about the removal of conifers within the aspen units (A1 and G) and suggestions for a high level of conifer retention. The Smith/ Shields Watershed Risk Assessment Report (WRA) found that aspen was decadent and declining with limited surviving reproduction in this area due to conifer encroachment. In addition, the WRA approximated that the ratio of non-forested to forested habitats is inverse to what occurred historically, i.e. there is twice as much forest (pole size and larger) than non-forested habitat groups now than what occurred historically. Conifers have invaded forage-producing openings, out competed aspen, and created multi-storied forested stands which now lack a shrub and herbaceous understory.

Aspen thrive when competition from conifers is reduced so that subsequent light and heat are added to the soil. The WRA concluded that this habitat group would most likely continue to decline in health, vigor, and distribution if succession was allowed to continue unaltered. The objective of Units A1 and G includes promoting aspen for wildlife habitat and biodiversity. Alternatives 2 and 3 propose retention of 10-15% of the area in conifer clumps (Unit A1) or removing conifers from portions of the area

(Unit G). This provides some visual screening and also provides for successful regeneration to meet the unit objective. Retention of additional conifers would not promote aspen to the extent possible and would limit the opportunity to reverse the trend in this critical declining habitat type. Therefore, this alternative was dropped from further consideration.

Alternative 8 – No Mechanical Ground-based Harvest in Units Currently Exceeding Regional Soils Standards for Detrimental Disturbance.

The majority of the detrimental disturbance found in the project area consists of old logging roads and skid trails, the majority of which have re-vegetated. Ground-based harvest associated with the project would occur in the winter over frozen ground and/or 8 inches of snow and is projected to create only minor amounts of additional detrimental disturbance (3.5% average), if any. Mitigation has been identified to scatter coarse woody debris along 4.1 miles of old skid roads in located in mechanical harvest Units A1, B, D and I. This mitigation is intended to deter user created ATV trail use and provide benefits to restore soil productivity. Unit A1 contains the majority of the aspen treatments and Units B, D and I are necessary to meet public and firefighter safety/fuel reduction objectives. Helicopter logging over this large of an area would be economically prohibitive, especially in areas that have gentle terrain and existing access to roads. With the elimination of these four units, the purpose and need for the project would no longer be met. Therefore, this alternative was dropped from further consideration.