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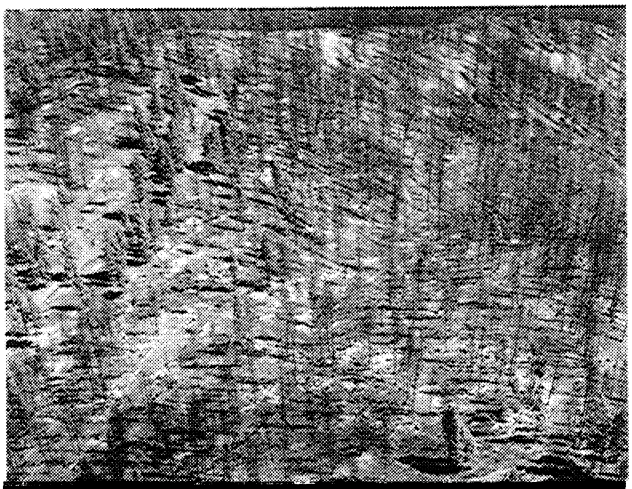
Burned Area Recovery

Final Environmental Impact Statement

Summary

Reduce Fuels

Improve Watershed Conditions



Reforest Burned Lands

BURNED AREA RECOVERY
FINAL ENVIRONMENTAL IMPACT STATEMENT
SUMMARY

Introduction

This document is a summary of the Burned Area Recovery Final Environmental Impact Statement (FEIS). The FEIS considers the effects of various alternatives to manage portions of the Bitterroot National Forest that were burned by the fires of 2000. The full FEIS, appendices, and maps are available on request.

Background

The 2000 Fire Event

The Bitterroot Valley and the Bitterroot National Forest experienced an historic wildland fire event in 2000. Results of these fires included:

- 356,000 total acres burned; 307,000 acres of National Forest and 49,000 acres of State and private land.
- 70 homes burned; over 1700 homes were threatened and almost 24 percent of Bitterroot Valley residents were either evacuated or prepared to evacuate (University of Montana, 2001).
- 170 other buildings burned.
- 95 vehicles burned.

The Forest Service and the Bitterroot Interagency Recovery Team (BIRT) spent last fall accomplishing emergency recovery work. The work focused on stabilizing soils and preventing erosion in areas most severely burned and preparing for increased stream flows.

The Project Area

The project area is located in the middle and southerly areas of the Montana portion of the Bitterroot National Forest. The project area includes portions of the Stevensville, Darby, Sula, and West Fork Ranger Districts in Ravalli County, Montana. The project area is further broken down into four Geographic Areas, defined by fire, watershed, and community boundaries, as described in Table S-1 (acreages are total in Geographic Areas, not only the acres that burned). The Geographic Areas were established to provide a consistent reporting format and to facilitate review for readers who have particular interest in a certain area of the Forest. Maps are found at the back of this summary document.

Table S-1 – Geographic Areas in the Burned Area Recovery Project

Geographic Area	Acres	Acres of NF Land	Major Drainages
Blodgett	78,866	54,062	Canyon, Blodgett and Mill Creeks
Skalkaho-Rye	203,086	144,005	Skalkaho, Sleeping Child and Rye Creeks
East Fork	281,079	223,369	East Fork Bitterroot River
West Fork	195,783	206,379	West Fork Bitterroot River
Total	758,814	627,815	

Purposes and Needs for Action and Proposed Action

The project proposed in this EIS applies the strategies and priorities established through public involvement and the Bitterroot Fires 2000 Post-Fire Assessment. The purposes of this project are to:

1. Reduce fuels in portions of the burned areas.
2. Improve watershed and aquatic conditions in heavily impacted burned drainages.
3. Restore forested conditions in some areas.
4. Accomplish fuel reduction more cost efficiently by harvesting forest products, and provide jobs and income.

The needs for the proposed action are derived from the differences between current conditions and desired resource conditions. Desired conditions are based on Forest Plan direction and management objectives. The proposed action is designed to move resource conditions closer to the desired conditions.

The proposed action is described in this Final EIS as Alternative B. Additional information is provided in the alternative descriptions, found later in this summary.

Purpose and Need: Reduce Fuels In Portions Of The Burned Areas

Fire-killed trees now occur across thousands of acres of the burned landscape and will lead to heavy fuel accumulations in years to come. Fuels need to be reduced in certain areas, based on management objectives and desired conditions, to decrease the risks future fires will pose to human health and safety, property and improvements, and resources. An important concept in the fuel reduction purpose and need is that concerns about future fire severity and extent in areas burned in 2000 are directed more toward fires in decades to come, rather than fires in the immediate future.

The purposes, needs, and proposed actions for fuel reduction are discussed in more detail below for the following specific areas of concern; wildland/urban interface, dry forest types, suitable timberlands needing reforestation, large expanses of heavy fuels, and forest stands with increased risk of bark beetle mortality.

Forest Plan Direction and Desired Conditions

The Forest Plan assigned Management Areas to regions of the Forest to guide management. Where the Forest Plan establishes timber and reforestation goals and standards, it specifies the need to secure tree establishment and provide protection for new stands. The Forest Plan standards for Management Areas 1, 2, 3a, 3b, and 3c (areas suitable for timber management) include, "Fuel treatments and site preparation will be coordinated to minimize fire danger and insect and disease problems, and secure establishment and protection of new stands." Appendix M of the Forest Plan provides direction for Fire Management.

Desired fuel and forest conditions are established using the priority topics identified in the Bitterroot's Post-Fire Assessment. Specific desired conditions for each of these priorities are described in following sections. The desired fuel condition is to reduce future severity and hazards in some areas, while retaining sufficient coarse woody debris to maintain soil productivity, provide site protection, and to provide wildlife benefits. Minimum coarse woody debris retention objectives range between 5 and 25 tons per acre and vary by VRU and fire severity. At fuel loads above 30 tons per acre, fire resistance to control becomes high and large fuels above this level increase the potential for severe burning and extreme fire behavior (Brown, et al, 2001). In general, areas proposed for fuel reduction treatment have the desired condition of less than 30 tons per acre of large fuel and always greater than specified minimum coarse woody debris levels following treatment. Specific fuel reduction prescriptions consider values at risk, fuel conditions in adjoining areas, and costs and may exceed the 30 tons per acre level based on these factors.

Current Fuel Conditions

Forest stands that burned at moderate and high severity during the fires of 2000 have resulted in continuous heavy fuel conditions over large areas, ranging from less than 20 tons per acre to over 100 tons per acre. Current fuel load estimates have been made for areas where fuel reduction activities are considered.

Researchers have determined that fire suppression has altered the ecosystem compared to historic conditions (Covington, et al 1994; Quigley, et al 1997). Forested landscapes in the Inland Northwest now generally have increased tree densities, more shade tolerant tree species, heavier fuel loads, increased plant competition for water and nutrients, and increased insect and disease levels (Quigley, et. al, 1997).

Wildland-Urban Interface Fuels

The wildland urban interface (WUI) includes those areas of resident human populations at imminent risk from wildland fires and human developments having special significance. These areas include the resident areas and human development sites, and also the continuous slopes and fuels that lead directly to these, regardless of the distance involved. Much of the wildland-urban interface on the Bitterroot National Forest occurs within the dry forest type (discussed below). Desired conditions in burned wildland/urban interface areas are to:

- Maintain fuel levels that provide an increased likelihood of safe and effective fire protection, firefighter safety, and public safety.
- Maintain fuel levels that allow the successful application of low-intensity prescribed fire in the future.
- Maintain course woody debris sufficient to protect soil productivity and other resource values.
- Provide green, forested conditions, and environments that people enjoy living near.

Dry Forests Desired Conditions

Another high priority for fuel reduction is in the dry forest types (VRU2) beyond the interface. Dry forests are forested areas that support ponderosa pine at lower elevations and Douglas fir at mid- to upper-elevations. Desired conditions in burned dry forest types are to:

- Maintain fuel levels that provide an increased likelihood of safe and effective fire protection, firefighter safety, and public safety.
- Maintain fuel levels that allow the successful application of low-intensity prescribed fire in the future.
- Maintain fuel levels that more closely approximating historic fuel conditions and fire regimes.
- Maintain adequate woody debris levels for soil productivity and other resource values.
- Maintain stand structure and species composition that more closely approximate historic conditions. Maintain overstories that are relatively open and park-like and stands with sparse understory ladder fuels.

Suitable Timber Lands To Be Reforested Desired Conditions

Suitable timberlands are those lands designated by the Forest Plan as "suitable for timber production" (36CFR 219.14). They include Forest Plan Management areas 1, 2, 3a, 3b, and 3c. The Forest Plan directs that reforestation occur within the portions of these Management Areas suited to support trees and that fuels be managed to protect the new stands. Desired conditions in burned suitable timberlands, where reforestation investments occur, are to:

- Maintain fuel levels that provide an increased likelihood of safe and effective fire protection, firefighter safety, and public safety.
- Maintain fuel levels that provide an increased likelihood of protecting investments from significant losses caused by future fires.
- Maintain fuel levels that allow the success fuel application of low intensity prescribed fire in the future.
- Maintain adequate levels of course woody debris sufficient to protect soil productivity and other resource values.

Landscape Level Desired Fuel Conditions

Breaking up fuel continuity is an objective in some burned portions of the Forest where large expanses of heavy ground fuels will accumulate over the next several decades. The following desired conditions apply:

- Reduce the potential for extreme fire behavior over extensive areas.
- Provide a higher degree of defensible conditions with increased levels of firefighter safety.

Bark Beetle Risks Desired Conditions

Desired conditions in certain stands that burned at low severity are:

- Reduce some of the fuels created by the fire and also the fuels expected to result from bark beetle mortality in moderate and high risk stands.
- Reduce bark beetle populations at the local level (stands in which beetles are active and adjacent stands at risk) where bark beetle mortality risk is moderate or high.

Purpose and Need: Improve Watershed and Aquatic Habitat Conditions

Forest Plan Direction and Desired Conditions

The Forest Plan gives direction to:

- Plan and conduct land management activities so that reductions of soil productivity potential caused by detrimental compaction, displacement, puddling, and severe burning are minimized (FP, p II-25).
- Plan and conduct land management activities so that soil loss, accelerated surface erosion, and mass wasting, caused by these activities, will not result in unacceptable reductions in soil productivity and water quality (FP, p II-25).
- Actively reduce sediment from existing roads (FP, p II-25).
- Maintain or enhance fish habitat (FP, p II-5).

The Inland Native Fish Strategy (INFISH) amendment to the Forest Plan provides direction to minimize sediment delivery to streams, remove fish migration barriers, close and stabilize or obliterate roads not needed for future management activities, and improve existing stream crossings to accommodate a 100-year flood (USDA, 1995).

Desired conditions for soil, water and aquatic resources in burned areas are:

- Protect soil productivity and maintain land stability.
- Meet state water quality standards by applying soil and water conservation practices.
- Protect water for non-consumptive uses including fish habitat, recreational uses, stream channel maintenance, and aesthetics.
- Maintain high quality water in domestic-use watersheds.
- Protect riparian areas to prevent adverse effects on stream channel stability and fish habitat.
- Reduce sediment from existing open roads by applying appropriate Best Management Practices (BMP). Improve water infiltration and hydrologic function on closed roads where prudent.
- Reconnect native trout populations by removing, replacing, or repositioning culverts that are barriers to fish passage.
- Add woody debris to certain severely burned stream segments to improve fish hiding cover and increase habitat complexity.
- Plant appropriate tree species in certain burned riparian areas to improve aquatic and riparian habitat.

Purpose and Need: Restore Forested Conditions

Forest Plan Direction and Desired Conditions

The Bitterroot Forest Plan includes the following Forest-wide standard, “A variety of tree species will be planted where habitats and conditions permit, to prevent creation of monocultures that are susceptible to insect and disease epidemics” (FP, p II-22). Forest Plan standards for suitable timberlands (MAs 1,2, and 3) include direction to reforest with trees in a timely manner and with species that help achieve Management Area goals. A related protection standard for these same Management Areas directs “Treat fuels in coordination with site preparation to minimize fire danger and insect and disease problems, and assure establishment and protection of new stands.”

Reforestation is desired in certain areas to accelerate recovery of forested conditions. Some of the burned area needs to be planted with tree seedlings where natural regeneration would not provide the desired stocking and/or species composition. Warm, dry sites (VRU2) should be dominated by ponderosa pine.

Purpose and Need: Economic Opportunities

Forest Plan Direction and Desired Conditions

The Forest Plan has Forest-wide management goals regarding economic values: "Provide sawtimber and other wood products to help sustain a viable local economy" and "strive for economically efficient management" (FP p. II-4).

Desired economic outcomes for this project are:

- Accomplish fuel reduction objectives more cost efficiently by removing forest products in some areas.
- To reduce the costs of the fuel reduction work to taxpayers, maximize fuel reduction cost efficiency by proceeding as quickly as possible before the value of dead trees degrades further.
- Provide jobs and income to local and regional communities through timber harvest and other fuel reduction work, watershed improvement activities, and reforestation work.
- Apply the revenue from of products to help fund some of the costs of fuels reduction, watershed improvement, and reforestation work.

Other Features of the Proposed Action

Proposed Site-specific Forest Plan Amendment

Implementing portions of the Burned Area Recovery proposed actions described above would require a site-specific amendment to the Bitterroot Forest Plan (1987). Therefore, the proposed action includes an amendment that would modify the following Forest Plan standards:

- Forest-wide snag retention standard.
- Forest-wide elk habitat effectiveness standard in three third order drainages.
- Forest-wide thermal cover standard in one Geographic Area.
- The coarse woody debris standards for several Management Areas.

The proposed amendment would only apply to the Burned Area Recovery Project. The Burned Area Recovery Project and the proposed amendment are designed to meet the Forest-wide and Management Area goals and objectives as described in the Plan.

Current Law and Forest Plan Direction

Development of this Environmental Impact Statement follows implementing regulations of the National Forest Management Act (NFMA), Title 36, Code of Federal Regulations, Part 219 (36 CFR 219); Council of Environmental Quality, Title 40; CFR, Parts 1500-1508, National Environmental Policy Act (NEPA), and is tiered to the Bitterroot Forest Plan Environmental Impact Statement (1987). This analysis incorporates direction provided in the Forest Plan EIS, Record of Decision, and Forest Plan (1987).

Many federal and State laws, including the Forest and Rangeland Renewable Resources Planning Act (RPA), Endangered Species Act, Clean Air Act, and Clean Water Act also guide this analysis. The Rescission Bill of 1995 (HR 1944) established a schedule for grazing allotment NEPA compliance and direction for re-issuance of grazing permits pending NEPA compliance.

General management direction for the Bitterroot National Forest is found in the Bitterroot Forest Plan and amendments. The Forest Plan specifies Forest-wide and Management Area goals, objectives, and standards that provide for land uses and resource outputs. Activities in this project would only occur in MAs 1, 2, 3a, and 3c. The Inland Native Fish Strategy (INFISH) was prepared in August 1995 and amended the Forest Plan. The Off-Highway Vehicle decision for National Forests and BLM units in Montana, North Dakota and parts of South Dakota restricts wheeled motorized cross-country travel yearlong, where it was not already restricted. This decision also amended the Bitterroot Forest Plan.

Scope of the Project, Analysis, and Decision Framework

The scope of the project and the decision to be made are limited to the fuel reduction, reforestation, road maintenance and reconditioning, watershed improvement, travel management, mitigation, and monitoring within areas burned by the fires of 2000. The project is limited to National Forest System lands within drainages that burned during the fires of 2000.

The three primary management activities considered in this EIS (fuel reduction, watershed improvement, and reforestation) are addressed in one analysis for burned areas Forest-wide. The analysis of effects in this document includes cumulative effects of other activities (past, present, and reasonably foreseeable future).

The Responsible Official for this proposal is the Forest Supervisor. Based on the analysis in the Final EIS, the Responsible Official will make the following decisions and document them in a Record of Decision:

- The extent, if any, of fuel reduction, watershed improvement, and reforestation to be implemented. If implemented, where and how these activities would be conducted.
- Management requirements and mitigation measures.
- Appropriate monitoring requirements to evaluate project implementation.
- Whether a site-specific Forest Plan amendment is required for implementation, the nature of the amendment, and whether the amendment would be a significant change to the Forest Plan.

Scoping and Public Involvement

The proposals discussed in this analysis evolved from the issues, concerns, and recommendations identified in the Bitterroot NF's Post-Fire Assessment. A series of 12 public meetings were held in various locations in Ravalli County during fall, 2000. These meetings provided the opportunity for citizens and the Bitterroot NF to share post-fire information and collect input on post-fire recovery needs.

"Scoping" is the term used to describe how the Forest Service collects public input early in the environmental analysis process. Once a specific set of management activities was formulated into a proposed action, public scoping was initiated. Community scoping meetings were held in several locations in February 2001. These meetings introduced the proposed actions, summarized purposes and needs, and provided participants with the opportunity to ask questions and submit comments.

During the winter of 2000/2001, the University of Montana, Bureau of Business and Economic Research was commissioned by the Bitterroot National Forest to conduct a public survey (University of Montana, 2001). One purpose of the poll was to systematically gather information from Ravalli County residents about what post-fire management activities people believe should be priorities for the Bitterroot National Forest. The results of the survey show a majority of survey respondents strongly favor active resource management in the burned areas.

Comments (letters or electronic mail) on proposed fire recovery actions were received from individuals, agencies, businesses, and organizations during scoping. Tribal consultation has been initiated with interested American Indian tribes and will be ongoing throughout the analysis and implementation.

The DEIS was made available to the public on May 24, 2001. Information about the DEIS was made available in a variety of formats. During the 60 day DEIS comment period, extensive public outreach occurred. Public meetings were held in conjunction with field trips. The comment period for the DEIS ended on July 31, 2001. Over 2,400 comments from individuals, organizations, businesses, and other agencies were received during the comment period.

DEIS comments were read by the ID Team, other staff, and the Responsible Official. The comments were compiled and categorized in order to capture the full range of public viewpoints and concerns. Summary comment and responses can be found in the complete FEIS. Major issues raised in comments are summarized in this document.

Issues

The alternatives respond to the following key issues identified during scoping and from DEIS comments. Indicators for each issue will help to evaluate how each of the alternatives addresses issues. Indicator evaluations are provided later in this summary.

Key Issue: Need for and Method of Fuel Hazard Reduction

Some commenters questioned the need to reduce fuels. At the core of this issue are comments questioning the scientific evidence that using salvage harvest (removing fire-killed trees by logging) is an effective way to reduce fuels, or that reducing fuels reduces the potential effects of future fires. Many of these commenters advocate a passive approach to fuels management in burned areas and recommend natural processes can best manage fuels.

Some commenters suggest that only prescribed fire or manual methods should be used to reduce fuel and should be limited to the lower elevation dry forest type (VRU2) outside of unroaded lands.

Some commenters suggest that fuel hazard reduction work should be limited to within 40 meters of homes based on research by Cohen (Cohen, 2000). They recommend that the Forest Service should increase programs to assist homeowners with defensible space improvements.

In mid- and upper-elevation forest types, fires historically burned at higher severity and less frequently compared to lower elevation lands. Comments were submitted stating there is no need to reduce fuels in these areas or that it would be ineffective in reducing fire severity. Some comments suggest that fuels should be managed naturally in burned areas by allowing lightning-caused fires to play their ecological role.

The proposed action would thin thickets of green trees in low severity burned areas in the wildland-urban interface and low elevation, warm, dry forests (Vegetative Response Unit 2 or VRU2, as described in Chapter 1). Some commenters stated that trees that survived the fire are now more valuable, given the extent of tree mortality caused by the fires, and should not be thinned.

Key Issue: Effects on Soils, Watersheds, and Aquatic Habitat

Concern has been expressed that using mechanized equipment to reduce fuels through either timber sales or stewardship contracts would increase soil erosion, decrease soil productivity and decrease water quality. Concerns also exist regarding impacts to aquatic habitat and sensitive or threatened fish species. Water yield could be increased in drainages where intermediate harvest occurs. The impacts of temporary roads on soils and water quality are also an issue.

Concern has also been expressed regarding the proposed use of excavators to pile fuels following harvest. Multiple entries with heavy equipment could increase the likelihood of undesirable levels of soil impacts.

Some commenters suggest that stream buffers are not wide enough to prevent sediment from reaching streams in burned areas.

Some commenters suggest that grazing be suspended in all grazing allotments that were burned during the fires of 2000. They recommend that grazing should only be allowed to continue after National Environmental Policy Act (NEPA) planning requirements are completed for all burned grazing allotments.

Some respondents believe the Forest Service should be more proactive in improving watershed conditions by obliterating more roads. They suggest that any road that encroaches on streams should be decommissioned or relocated to keep sediment out of streams and to reduce impacts to riparian areas. They also suggest that all culverts on remaining roads be upgraded to meet INFISH specifications.

Some commenters suggest that more soil stabilization work should be conducted in burned areas, particularly in high hazard areas in the wildland-urban interface or that were heavily roaded and managed prior to the fires. They request that more of these areas have stabilization work conducted.

Key Issue: Changes in Motorized and Non-Motorized Access

There is concern that the road rehabilitation activities proposed to improve watershed conditions would reduce current motorized and non-motorized access for recreation or management. Some people expressed opposition to any loss of motorized travel opportunities. Others are concerned that the proposed road surface decompaction activity, and the resulting rough road surfaces, limit the opportunity for hiking or stock animal riding on the treated road surfaces. Some suggest that watershed improvement can be achieved by limiting roadwork to only maintenance and storage. They recommend that road decommissioning be minimized in order to maintain future management options and access for fire suppression. Conversely, some commenters believe that the Forest Service should more aggressively close and decommission roads and restrict motorized access in order to protect watershed and wildlife resources.

Key Issue: Bark Beetle Risk

The Bitterroot had a Douglas-fir bark beetle epidemic prior to the fires. Bark beetle populations and beetle-caused tree mortality are expected to increase due to the extensive areas of fire-stressed trees. These weakened trees provide ideal habitat for bark beetle populations to grow dramatically, and it is likely that epidemic populations will continue and possibly expand to the unburned forest (Gibson, 2001). Some people believe that the Forest Service should be more proactive in preventing a bark beetle epidemic before it spreads onto unburned portions of the Forest and private property. Other commenters question the need for and effectiveness of thinning to reduce bark beetle susceptibility. Some suggest that bark beetle risk reduction activities are inappropriate because bark beetle-caused tree mortality is natural, and natural processes are preferable.

Key Issue: Economic Opportunities

Many people want the Forest Service to maximize economic opportunities by timely salvage of fire-killed trees. They see the fire-killed trees as a “waste of good resources” and want to maximize the amount of salvage. There are concerns regarding the costs of logging using conventional systems vs. helicopter. Should temporary roads be built to decrease logging costs? The fires of 2000 burned two pre-existing timber sale areas. Between Draft and Final EIS the Forest received requests from two timber sale purchasers for “catastrophic modification” of their sale contracts, allowing them to salvage burned trees within their sale areas.

Some commenters suggest that ground-based skidding should be allowed to occur during the summer and should not be limited to only snow covered or frozen ground conditions. They believe that soils can be adequately protected without limiting ground-based skidding to the winter and thereby increasing the operating period in which harvest can be conducted. Expanding the operating season would provide more flexibility and reduce costs.

Some commenters believe that the proposed actions would not benefit the local economy enough and that economic benefits would be realized by people in other states and by large corporations.

Key Issue: Forest Plan Amendments

All activities need to be consistent with Forest Plan standards. If some component of an alternative is not consistent with the Forest Plan, then a site-specific Forest Plan amendment is necessary. Some people recommend that existing Forest Plan direction should not be amended for this project. The treatments proposed in each alternative would determine the need for a Forest Plan amendment.

Key Issue: Effects on Unroaded Lands

“Unroaded” lands are defined as “areas without the presence of a classified road, of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. Unroaded areas do not overlap with Inventoried Roadless Areas” (FSH 7710 and USDA 2000r).

Some commenters believe that no reforestation, fuel reduction work, or active management other than trail maintenance or perhaps weed control should occur in these lands. A map of unroaded lands on the Bitterroot National Forest, as defined by local environmental groups, was provided and used in this analysis.

Key Issue: Effects on Old growth and Flammulated Owl Habitat

The fires of 2000 reduced old growth habitat. Some people believe that fuel reduction activities are not appropriate in old growth habitat because it may reduce the quality of the remaining habitat. Similarly, concern for protecting prime habitat for Flammulated Owls, a sensitive wildlife species, has been expressed. Protecting burned areas where Flammulated Owls have been found in greater abundance in the past has been suggested.

Alternatives

The following alternatives were developed based on the key issues discussed above, with design features and mitigation requirements related to the issues and public concerns. The major features (fuel reduction, watershed improvement, reforestation, and Forest Plan amendment) are discussed and tables provide a summary of activities considered in each alternative.

A comparison of all the alternatives is provided later in this summary.

Alternative A - (No Action)

Alternative A is the No Action alternative. This alternative is required and serves as a baseline for comparison of the effects of all of the alternatives. This alternative responds to the following key issues: the need for and method of fuel hazard reduction, effects on soil and watersheds, changes in motorized and non-motorized access, Forest Plan amendments, effects on unroaded areas and effects on old growth and Flammulated Owl habitat.

Under this alternative there would be no change in current management direction or in the level of ongoing management activities within the project area. Work previously planned within the project area would still occur under this alternative.

No fuel reduction would occur – all fuels, both live and dead trees, would be left, as they exist.

There would be no changes to soil and watershed conditions due to activities considered in this analysis. Temporary roads would not be built for timber harvest. Motorized and non-motorized access would not be changed from the current conditions.

The burned areas would be left to reforest naturally - no trees would be planted.

A project specific amendment to the Forest Plan would not be needed.

Alternative B

This alternative was presented to the public during scoping as the Proposed Action. It was formed based on the purposes and needs described in previously. Scoping and DEIS comments on this alternative generated the key issues used to develop the other action alternatives.

Maps included at the back of this summary show locations of proposed actions. Management Requirements and Mitigation Measures that apply to Alternative B are described in the complete FEIS.

Fuel Reduction

All fuel reduction activities are limited to Forest Plan MAs 1, 2, 3a, and 3c. INFISH interim buffer widths would be used.

Reducing fuel to accomplish the previously stated objectives in certain areas would be achieved in part by harvesting some of the merchantable fire-killed trees (trees greater than 10 inches diameter breast height (DBH)). In some areas, post-harvest activities would be needed to reach fuel reduction objectives. Treatment units where no harvest is proposed would only have non-harvest fuel reduction activities conducted in them, such as piling and prescribed burning (described below). Fuel reduction objectives could be achieved using service contracts, firewood permits, stewardship contracts, or Forest Service crews.

Three prescriptions would be applied in areas where harvest is proposed to reduce fuels: intermediate harvest, salvage harvest, and salvage/regeneration harvest, as described below.

Fuel Reduction Using Intermediate Harvest

Where the fires killed 10 to 75 percent of the trees, but the stand is still considered adequately stocked, an intermediate fuel reduction treatment would be applied. Intermediate harvests are commonly referred to as "thinning". Dead and dying trees would be removed to reduce fuels and bark beetle infested trees. This treatment would include removing green trees to thin densely stocked stands, improve growth and vigor of remaining trees, provide the opportunity to select for desired characteristics and species, and to increase resiliency from insects and diseases. Following harvest, additional fuel reduction would occur on some sites as described below in the "Manual/Rx Fire Fuels Reduction Methods" section.

Fuel Reduction Using Salvage Treatments

This prescription would be applied where a low to mixed severity fire occurred. The focus of the salvage treatment would be removing dead and dying trees affected by the fires in order to address fuel reduction needs. Bark beetle infested trees would also be removed. Following harvest, additional fuel reduction would occur on some sites as described in the "Manual/Rx Fire Fuels Reduction Methods" section later in this summary.

Fuel Reduction Using Salvage/Regeneration Treatment

In moderate and high intensity fire areas where few or no living trees remain, this treatment is intended to reduce fuels and to establish new stands of trees quickly. This treatment is designed to retain live trees where they exist, as well as trees that provide good seed sources or provide shelter for planted or natural seedlings. Coarse woody debris and snags would be retained at prescribed levels.

Standing snags and live trees would be irregularly distributed across the treated areas. Following harvest, additional fuel reduction would occur on some sites as described in the "Manual/Rx Fire Fuels Reduction Methods" section below. After the fuel reduction is complete, these areas would be reforested using planting or natural regeneration.

This treatment would result in the removal (of up to 80% percent) of the dead trees greater than 10 inches in diameter that are surplus to the snag and coarse woody debris retention requirements. All live trees would be retained if any exist. Tree regeneration by planting and prescribed natural regeneration reforestation methods is discussed later in this summary.

Other Fuel Reduction Methods

The following treatments would occur following harvesting to reduce activity fuels, or be applied singly in some areas where harvest opportunities are limited but where fuel loads are higher than desired.

Slashing consists of felling and cutting limbs off small diameter trees to increase fuel consumption during burning or to facilitate piling.

Underburning (UB) involves igniting surface fuels under specified weather and fuel moisture conditions, so surface fuels are consumed but overstory trees are protected.

Jackpot Burning (JP) consists of burning scattered accumulations of fuel within treatment units.

Piling fuels following slashing and/or harvesting activities. Depending on fuel conditions, terrain or soil protection requirements, piling may be accomplished by **hand, walking excavator,** or **excavator.** All use of ground-based mechanized equipment in Alternative B is limited to frozen or snow-covered soil conditions.

Whole tree yard means logs are skidded with tops and limbs attached.

Yard tops is a fuel reduction treatment in which tops from harvested trees are skidded to the landing for later treatment or utilization.

Yard unmerchantable material is a fuel reduction treatment in which unmerchantable material is skidded to the landing for later disposal or utilization.

No permanent roads would be constructed. Landings would be used along existing roads whenever possible. Where existing landings are not available, new landings would be constructed close to existing roads. In that case, short (generally less than 300 feet) temporary roads, totaling about 1200 feet (.22 miles) project-wide, would be constructed to access environmentally preferable and/or safer landing areas.

Proposed logging systems include ground-based systems, skyline systems and helicopters. Ground-based systems would be used on gentler slopes and include wheeled or tracked skidders that raise the forward end of logs when skidding. All ground-based equipment in this Alternative is limited to snow covered or frozen ground conditions to protect soils. Skyline systems are used on steeper slopes where roads are available. Helicopter logging is used where lack of roads limit the use of either ground-based or skyline yarding systems.

Watershed and Aquatic Habitat Improvement

Every road within the burned drainages was analyzed for existing risks to watersheds during the development of this alternative. Where risks were identified, improvement projects are proposed to eliminate or reduce these risks. These road treatments include the following activities:

Maintenance: Roads that are currently open year long, open seasonally, or closed yearlong that are needed for access would be maintained as needed to reduce the amount of area that contributes sediment to streams and to reduce erosion from forest roads. This includes installing ditch relief culverts, reducing erosion from the cut and fill slopes, and gravelling and shaping road surfaces. The roads on the Watershed Improvement Maps in this summary that would receive these types of treatment are included in the categories "Open yearlong-Maintain in Good Condition," "Closed yearlong-Maintain in good condition", "Closed Seasonally-Maintain in Good Condition" and "Open-Light Maintenance, Drainage Improvement".

Pull Culverts, Stabilize, and Place in Storage: This type of treatment would occur mostly on roads that are currently closed seasonally or yearlong but are not necessary for access in the foreseeable future. These roads would be "placed in storage" until such time that they are needed again. They would remain on the Forest's transportation system and would be available for use in the long term. Culverts would be pulled from stream crossings, fill removed, streambanks reshaped, and disturbed areas stabilized with erosion control blankets or vegetation. Road surfaces would be decompacted by equipment mounted with ripping teeth. Where soils are disturbed, they would be revegetated using grass seed. These roads are identified on the Watershed Improvement Maps in the category "Closed yearlong-Pull Culverts, rip road surface, and revegetate." Maintenance would not be necessary on these roads unless they are reopened in the future.

Road Decommissioning or Recontouring: On roads that are currently closed yearlong and are not needed for future access, the same activities would occur as on the roads described above, but would include removing the road prism by recontouring at some locations. Recontouring would typically occur in the beginning segment of the road, at stream crossings, and where unstable cut and fill slopes exist. Some high-risk roads may be entirely recontoured and other roads would be partially recontoured, as needed. All decommissioned roads would be removed from the Forest's transportation system. These roads are identified on the Watershed Improvement Map as "Closed yearlong-Recontour, Revegetate." .

Eliminate Fish Barrier Culverts: Culverts that currently block or impede fish passage in seven drainages would be replaced with larger culverts or bridges to allow year-round passage, reconnect fragmented populations, and enhance fish habitat and populations.

Improve Fish Habitat: Large woody debris would be placed in sections of five drainages. All of these streams lacked woody debris prior to the fires. These projects would increase fish hiding cover, trap sediments, and over time, improve bull trout and/or westslope cutthroat trout spawning and rearing habitat.

Replant Riparian Conifers: In burned sections of two drainages that lack a nearby seed source, the appropriate species of riparian conifers would be planted to speed the return of overstory shade and woody debris recruitment.

Reforesting Burned Lands

Planting activities would be conducted in suitable timberlands, as follows

Artificial Regeneration – Planting trees would occur on many sites that include a salvage/regeneration treatment. Surveys to determine and ensure regeneration success following this treatment would be conducted for three to five years.

Natural Regeneration – Many sites are planned for natural regeneration where seed sources are present and a desired species mix can be achieved. If it is determined through monitoring that natural regeneration is inadequate, some sites may be planted.

Forest Plan Amendment

Implementation of Alternative B would require a site-specific amendment to the Bitterroot Forest Plan (1987). This amendment would modify the Forest-wide snag retention standard, Forest-wide standards for elk habitat effectiveness (EHE) and thermal cover, and the coarse woody debris standards for four management areas, and would only apply to this project. To improve EHE and progress towards meeting the Forest Plan standard, motorized access would be seasonally restricted on about 2.4 miles.

Table S-2 in the "Alternatives Comparison" section summarizes the Alternative B activities.

Alternative C

This alternative responds to the following key issues: Need for and method of fuel hazard reduction, Effects on soils, watersheds, and aquatic habitat, Remaining consistent with current Forest Plan standards, Effects on unroaded lands, and Effects on old growth and prime Flammulated Owl habitat. This alternative modifies the Proposed Action by achieving improved watershed conditions by more road decommissioning and restoring vegetation in burned areas by planting. It includes no harvesting or other fuel reduction activities.

Fuel Reduction

No fuel reduction work would occur in this alternative. All fuels, snags, and trees in the burned areas would be retained. No temporary roads would be constructed.

Watershed and Aquatic Habitat Improvement

Similar watershed improvement roadwork and aquatic restoration activities are proposed in this alternative as described previously for Alternative B. However, 28 miles of road proposed in Alternative B to be placed in storage for future use would be decommissioned and recontoured in Alternative C.

Reforesting Burned Lands

Natural regeneration and planting would occur as described in Alternative B. All funding for this work would be provided through appropriations, since no receipts would be generated by timber harvest.

Forest Plan Amendment

No amendments to the Forest Plan would be needed. To meet Forest Plan Standards for EHE, motorized access would be seasonally restricted on about 5.4 miles of road.

Table S-2 in the "Alternatives Comparison" section summarizes the Alternative C activities.

Alternative D

This alternative was developed by modifying the Proposed Action in response to the following key issues: Changes in motorized and non-motorized access, Bark beetle risk, and Economic opportunities. This alternative focuses on reducing fuels, improving economics of the project, addressing bark beetle risks, reforesting burned lands and improving watershed conditions while maintaining current access opportunities. This alternative would conduct more timber salvage. Thinning in high-risk bark beetle stands would increase harvest volume and economic benefits. It would also improve economics by allowing some summer or "dry season" ground based skidding and use more temporary roads to reduce logging costs.

Fuel Reduction

All fuel reduction activities are limited to Forest Plan MAs 1, 2, 3a, and 3c. INFISH interim buffer widths would be applied.

This alternative includes all of the fuel reduction treatments proposed and described in Alternative B and the following:

- More harvest units were added to Alternative Band would provide additional house-log opportunities.
- In low or mixed severity burned areas where there is a moderate or high-risk of Douglas-fir bark beetle mortality, additional areas would be thinned to create stand structures and densities more resilient to bark beetle attack.
- Allow ground-based equipment to operate in low severity burned areas during the "normal operating period" (June 15 to October 15) on a slash mat (slash placed on the ground in front of equipment) when soil moisture is low. High or moderate burn severity activity units would be harvested either using helicopters or skyline logging systems, regardless of season, or, where slopes are gentler, using ground-based equipment over snow/frozen ground conditions.
- About 10.1 miles of temporary roads would be built to increase the areas where conventional logging systems would be used, improving economics. Temporary roads would be fully recontoured and revegetated following use.

Watershed and Aquatic Habitat Improvement

Watershed and aquatic habitat improvement work described in Alternative B would occur in this alternative. Reduction in motorized and non-motorized access opportunities would be minimized in response to issues. Roads that are currently open to OHVs would retain an OHV accessible prism. Some roads where motorized access is not currently allowed would retain a path to accommodate foot travel and riding stock.

Reforesting Burned Lands

Planting and natural regeneration would occur as described in Alternative B.

Forest Plan Amendment

This alternative includes a site-specific amendment to the Forest Plan. This amendment would modify the Forest-wide snag retention standard, Forest-wide standards for elk habitat effectiveness and big game thermal cover, and the coarse woody debris standards for four management areas. Alternative D would not impose any seasonal motorized access restrictions for EHE and make no progress toward the EHE standard in three third-order drainages that currently don't comply.

Table S-2 in the "Alternatives Comparison" section summarizes the Alternative D activities.

Alternative E

This alternative was developed by modifying the Proposed Action in response to the following key issues: the need for and method of fuel reduction and effects on soils, watersheds and aquatic habitat.

Fuel Reduction

This alternative includes all of the fuel reduction treatment methods described in Alternative B. The proposed action was modified to develop Alternative E as follows:

- Fuel reduction activities would be limited to only the wildland-urban interface and warm dry forest lands (VRU 2). Only dead trees would be harvested in these areas. No live trees would be commercially harvested, except where needed for skid trails, skyline corridors, and safety.
- Skyline yarding would be limited to snow covered or frozen ground conditions, as would all ground-based harvest or other fuel reduction work using mechanized ground-based equipment such as excavators.
- No new temporary roads would be allowed, including short spurs to access landing sites.
- Stream buffer widths would be increased from the INFISH interim widths.

Watershed and Aquatic Habitat Improvement

Watershed and aquatic habitat improvement work are the same as those described in Alternative C.

Reforesting Burned Lands

Planting and natural regeneration methods would occur as described in Alternative B, but would only occur in the wildland-urban interface areas and the warm dry forest types.

Forest Plan Amendment

This alternative includes a site-specific amendment to the Bitterroot Forest Plan. This amendment would modify the Forest-wide snag retention standard and the coarse woody debris standards for four management areas. This amendment is described in more detail in Chapter 1. Alternative E would not amend standards for EHE or thermal cover. To meet Forest Plan standards for EHE, motorized access would be seasonally restricted on about 5.4 miles of road.

Table S-2 in the "Alternatives Comparison" section summarizes the Alternative B activities.

Alternative F

This alternative was added following the DEIS in response to public and other agency comments as well as interdisciplinary evaluation of DEIS alternatives. Alternative F was developed by modifying the Proposed Action in response to the following key issues: Effects on soils, watersheds, and aquatic habitat, Changes in motorized and non-motorized access, Economic opportunities, and Effects on old growth and Flammulated Owl habitat.

This alternative focuses on reducing fuels, improving economics of the project, and reforesting burned lands and improving watershed conditions, while minimizing reduction of current access opportunities.

Fuel Reduction

This alternative modifies the proposed action based on the above issues, as follows. See discussions under Alternative B for detailed descriptions of proposed fuel reduction treatments.

- Level of thinning are reduced to limit potential water yield increases. Three units totaling about 320 acres are dropped to further protect water quality.
- Fuel treatment activities in the Rye Creek drainage upstream from Road 311 are dropped to further protect the bull trout population (all or portions of 20 units totaling about 3,100 acres).
- Skyline yarding in units on landtypes with high erosion hazard are limited to winter with snow covered or frozen ground conditions.
- Fuel reduction with ground-based equipment is allowed in low severity burned areas during the "normal operating period" (June 15 to October 15) subject to meeting standards requiring less than 15 percent detrimentally impacted soil conditions. Ground-based equipment in high or moderate burn severity areas would be limited to snow/frozen ground conditions.
- Logging systems are changed in some units from helicopter to "tracked line machine"(TLM) to improve economics. A tracked line machine is a skyline yarder mounted on a tracked excavator
- Heavy equipment use in fuel reduction activity units would be limited to one entry in order to minimize impacts on soils.
- Stream buffer widths would be increased from the INFISH interim widths
- About 7.9 miles of temporary roads would be built to increase the areas where ground-based and skyline systems would be used instead of helicopters, improving economics.
- Within the boundaries of two pre-existing timber sales burned by the fires, 325 acres are added to harvest units included in Alternatives B and D for study in this alternative.

- This alternative includes thinning to address bark beetle susceptibility in some moderate/high-risk stands by thinning, but the majority of treatments are limited to removing dead and dying trees. Fewer acres of treatment would occur in this alternative compared to Alternative D.
- Prescriptions in some thinning units are changed to salvage prescriptions.
- Harvesting within old growth habitat would not occur.
- Fuel reduction certain units were dropped and other unit treatments modified to further limit potential effects to three areas of burned Flammulated Owl Habitat known to be occupied.
- At the request of researchers, seven units totaling about 400 acres located in ongoing Forest Service research sites would be delayed until after September 2002.

Watershed and Aquatic Habitat Improvement

Watershed and aquatic habitat improvement work described in Alternative B would occur in this alternative, with some modifications. An additional 30 culverts in fish bearing streams would be replaced with larger culverts placed to form a natural stream bottom to further improve fish habitat connectivity. About 20 miles of road proposed for decommissioning in Alternative B would be placed in storage in this Alternative, in order to maintain options for uses in the future. Reduction in motorized and non-motorized access opportunities would be minimized in this alternative.

Reforesting Burned Lands

Planting and natural regeneration would occur as described in Alternative B.

Forest Plan Amendment

This alternative includes a site-specific amendment to the Forest Plan. This amendment would modify the Forest-wide snag retention standard, Forest-wide elk habitat standards for EHE and thermal cover, and coarse woody debris standards for four Management Areas. Two drainages would be brought into compliance with the EHE standard and a third drainage would be included in the amendment to allow on-going motorized access.

Table S-2 in the "Alternatives Comparison" section summarizes the Alternative F activities.

Alternative G

Alternative G was added following the DEIS at the request of certain environmental groups and individuals commenting on the DEIS. This alternative responds to the following key issues: Need for and Method of Fuel Reduction, Effects on Soils, Watershed and Aquatic Habitat, Economic Opportunities, and Effects on Unroaded Lands.

Fuel Reduction

A community and homeowner education campaign (e.g., direct mail to every household in Ravalli County, public meetings and TV, radio and newspaper ads) would be established to increase the awareness of fire's ecosystem benefits and how to protect structures from wildland fires. Forest Service sponsored home protection work on private property would occur based on home ignitability research by Cohen (Cohen, 2000). These activities would focus on reducing fuels within 40 meters of private residences in the wildland-urban interface in order to reduce fuel hazards and improve defensible space. A "Community Conservation Corps" would be established to provide local jobs, home ignitability assessments, and fuel hazard reduction assistance. Activities to reduce fuels would include raking, pruning, manual debris piling, and debris disposal.

In burned National Forest lands in VRU 2 located outside of unroaded lands and where fuel conditions are outside historic ranges, two fuel prescriptions would be applied to reduce fuels. Prescriptions are (1) felling, placement, and prescribed burning and (2) slashing and bucking, hand-piling, and burning piles. Wider stream buffers would be used as specified for Alternatives E and F. A map of unroaded lands was provided with the requested alternative and used to define where fuel reduction and reforestation activities would occur on National Forest lands. This work would be accomplished with appropriated funding.

Watershed and Aquatic Habitat Improvement

Roads needed in the foreseeable future would have their culverts upgraded to meet INFISH specifications. Where these roads are in INFISH RHCAs and are delivering sediment to priority watersheds, the road segment would be recontoured and traffic would be rerouted using existing alternate routes. Roads to be recontoured in RHCAs include 21 system road segments totaling 57 miles. Many other secondary roads would also be recontoured to improve watershed conditions.

Alternative G includes six units of log erosion barriers (trees felled and placed contour on the slope to trap sediment and reduce erosion) installed on approximately 2,500 acres of land that burned at high severity, are high hazard landtypes, were managed in the past, and/or are located in the wildland-urban interface.

Reforesting Burned Lands

Planting would occur as described in Alternative B, but would be limited to burned plantations.

Forest Plan Amendment

This alternative includes a site-specific amendment to the Bitterroot Forest Plan. This amendment would modify the Forest-wide snag retention standard and coarse woody debris standards for fuel reduction activities and research sites (see below.) To meet Forest Plan standards for EHE, motorized access would be seasonally restricted on roads totaling about 5.4 miles.

Other Features Of Alternative G

Local Economy Emphasis

Contract design and hiring for work would emphasize competitiveness for local citizens, in order to increase economic benefits to Ravalli County and Western Montana citizens.

Weed Prevention

Increased efforts to prevent weeds in burned areas would be made.

Develop Science

Four units would be established to study the effects and effectiveness of various fuel reduction activities described under Alternative B.

Eliminate Grazing

Livestock grazing would be suspended in burned areas until further National Environmental Policy Act (NEPA) analysis and decision-making is complete. This element of Alternative G would not follow the established schedule to complete range management NEPA between now and 2007 (Rescission Bill HR-1944, 1995).

Table S-2 in the “Alternatives Comparison” section summarizes the Alternative G activities.

Management Requirements, Mitigation Measures, and Monitoring

Detailed mitigation measures and plans for monitoring are specified for each of the action alternatives. A complete list is found in the FEIS.

Alternatives Considered But Not Given Detailed Study

During early public scoping, project development, and comments on the DEIS, several suggested alternatives were considered for detailed study but not studied in detail.

The following alternative concepts were considered, but not given detailed study as follows:

- Stabilize More Burned Slopes
- Chip Slash to Speed Vegetation Regrowth and Reduce Smoke from Burning
- Bring Roads That Are Proposed For Decommissioning or Placing in Storage Up To BMP Standards
- Bark Beetle Suppression
- Treating More Burned Areas Using Harvest
- Complete a Programmatic EIS on Fire Recovery for the Northern Region
- Harvest By Helicopter Only and Construct No New Roads
- Integrate Fire Into the Ecosystems or Fuel Reduction Through Natural Fire
- Add Permanent Roads, Improve Existing Roads, Extend Roads Further Into Burned Areas
- Noxious Weed Control
- No Harvest in Burned Areas Adjacent to Inventoried Roadless Areas

Comparison of Alternatives and Environmental Effects Summary

Table S-2: Activities Proposed by Alternative

Treatment	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G
WILDLAND URBAN INTERFACE (WUI) ACRES							
Intermediate Harvest	0	8382	0	8690	0	3949	0
Salvage Harvest	0	567	0	539	558	849	0
Salvage/Regeneration Harvest	0	7524	0	7604	9796	8430	0
Planting	0	5968	0	6048	7866	7593	0
Natural Regeneration	0	1556	0	1556	1930	837	0
Manual/Rx Fire Fuels Reduction	0	763	0	591	305	455	3737
Planting	0	320	0	148	150	127	0
Research Treatments (Intermediate Harvest)	0	0	0	0	0	0	105
Research Treatments (Rx Fire)	0	0	0	0	0	0	86
Total Harvesting	0	16473	0	16833	10354	13228	105
Total Planting	0	6288	0	6196	8016	7720	0
Total Manual/Rx Fire	0	763	0	591	305	455	3823
VRU 2 OUTSIDE WUI (ACRES)							
Intermediate Harvest	0	6292	0	6291	0	216	0
Salvage Harvest	0	1081	0	1081	1044	4707	0
Salvage/Regeneration Harvest	0	5363	0	5371	7143	7837	0
Planting	0	5363	0	5371	6591	7487	0
Natural Regeneration	0	0	0	0	552	350	0
Manual/Rx Fire Fuels Reduction	0	4043	0	3832	617	1094	5295
Planting	0	694	0	507	617	213	0
Natural Regeneration	0	39	0	34	0	24	0
Total Harvesting	0	12736	0	12743	8187	12760	0
Total Planting	0	6057	0	5878	7208	7700	0
Total Natural Regeneration	0	39	0	34	552	374	0
TREATMENT OF SUITABLE TIMBERLAND[1]							
Intermediate Harvest	0	477	0	1279	0	0	0
Salvage Harvest	0	3272	0	2066	0	1209	0
Salvage/Regeneration Harvest	0	17741	0	18261	0	14721	0
Planting	0	9170	0	9341	0	7652	0
Natural Regeneration	0	8571	0	8920	0	7069	0
Manual/Rx Fire Fuels Reduction[2]	0	1720	0	1840	0	1832	0
Planting	0	1089	0	1162	0	1186	0
Natural Regeneration	0	45	0	92	0	12	0
Total Harvesting	0	21490	0	21606	0	15930	0
Total Planting	0	10259	0	10503	0	8838	0
Total Natural Regeneration	0	8616	0	9012	0	7081	0
BURNED PLANTATIONS (ACRES)							
Manual/Rx Fire Fuels Reduction & Plant	0	456	0	504	368	430	0
Planting	0	1965	4947	1810	3061	1909	4167
Total Planting	0	2421	4947	2314	3429	2339	4167
HIGH RISK BARK-BEETLE STANDS[1] (ACRES)							
Intermediate Harvest	0	125	0	684	0	0	0
Salvage Harvest	0	919	0	771	0	455	0
Manual/Rx Fire Fuels Reduction	0	235	0	235	0	55	0
Total Harvesting	0	1044	0	1455	0	455	0
TOTAL FUEL REDUCTION (ACRES)							
Intermediate Harvest	0	15276	0	16944	0	4165	105
Salvage Harvest	0	5839	0	4457	1602	7220	0
Salvage/Regeneration Harvest	0	30628	0	31236	16939	30988	0
Total Harvesting	0	51743	0	52637	18541	42373	105
Manual/Rx Fire Fuels Reduction	0	7217	0	7002	1290	3866	9118
TOTAL REFORESTATION - PLANTING (ACRES)[3]	0	31824	36259	32029	20227	32977	4167
TOTAL REFORESTATION - NATURAL (ACRES)[3]	0	11664	0	11961	2521	9467	0

Treatment	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G
IMPROVE WATERSHED CONDITION							
Maintenance (miles)	0	502	502	502	502	513	298
Pull Culverts, Stabilize, Place in Storage (miles)	0	102	74	82	74	105	30
Road Decommissioning or Recontouring (miles)	0	60	88	80	88	46	526
Improve Fish Habitat (miles)	0	16	16	16	16	16	16
Enlarge Culverts (number)	0	7	7	7	7	37	23
Plant Trees (riparian) (miles)	0	4.5	4.5	4.5	4.5	4.5	4.5

1 - Outside WUI and VRU 2
2 - Also includes burned over plantations where a fuels treatment contributes to breaking up fuels at the landscape level.
3 - Also includes additional planting and natural regeneration in areas of mixed severity fire and areas not associated with fuel reduction

Effects on Fire and Fuels

Firefighter and Public Safety/Fuel Loads

Alternative B is the most effective in fuel reduction treatments in achieving fuel loads less than 30 tons/acre to reduce resistance to control and improve firefighter safety. Alternative D is nearly equal and the next most beneficial, while Alternatives F, E, and G treat fewer acres. Alternatives A and C would not reduce fuels in any burned areas.

Wildland-Urban Interface Fuel Loads

Alternative D would treat the most acres in the Wildland Urban Interface (WUI). Alternative B is nearly equal in effectiveness, while Alternatives F, E, and G follow in descending order of treated acres. Alternatives D and B would be nearly equal in fuel reduction treatments in the WUI, providing increased levels of defensible conditions given WUI fire occurrence. Alternatives A and C do not propose fuel treatments.

Dry Forest Type Fuel Loads

Alternatives B and D treat the most acres in the Dry Forest Types (VRU2). Alternative F is the next most effective, while Alternatives E and G follow in descending order of acres treated. Alternatives D and B would most effectively reduce ladder fuels through green tree thinning, with Alternative F and G following. Alternatives A, C, and E do not propose green tree thinning.

Suitable Timberlands

Suitable timberlands are contained in the total fuel reduction acres, as all lands considered for treatment are in the suitable timber base. Where reforestation monetary or time investments are made, there is a risk of loss to future fires. Where fuels are reduced, the threat is reduced. Alternative D treats the most acres for fuel reduction (33,683 acres) followed closely by Alternatives B (33,271 acres) and F treat (32,980 acres), while Alternatives E and G treat considerably less acreage (18,078 and 9,032 acres respectively). Alternatives D and B would provide the greatest level of fuel reduction to protect suitable timberland and plantation investments from adverse impacts. Alternatives A and C do not propose fuel treatments.

Large Expanses of Heavy Fuels

Alternatives B and D would be the most beneficial in reducing heavy fuel loads and disrupting large fuel continuity. On a local and landscape scale, these two alternatives would provide the highest level of breaking up fuel continuity, and would increase opportunities for firefighters to make reasonable strategic and tactical decisions. Alternatives F, E, and G treat less acres and are less effective in reducing fuel load and fuel continuity. Alternatives A and C do not propose fuel treatments.

Effects on Air Quality

Smoke from prescribed burning can cause short-term impacts on recreation, visual quality, and people with health problems who live in and near the project area. If burns are properly scheduled and conducted when good mixing and dispersal conditions are forecast, smoke should not accumulate in unacceptable levels and any impacts should be temporary and short-lived. All proposed prescribed burning, regardless of alternative, would be conducted to maintain or protect air quality and smoke management

Alternatives A and C

In the absence of fuel reduction, and in the event of future wildland fire occurring, varying levels of smoke could persist in the Bitterroot Valley for several weeks, depending on local climatic conditions, level of dispersion (poor, good, etc.) and amount of smoke or emissions produced. Health and visibility could be adversely affected. Alternatives A and C do not propose to conduct any harvest activities or fuel reduction treatments to mitigate current and future heavy fuel loadings. Therefore, they are the least effective in reducing smoke emissions and associated pollutants from future wildland fires. Alternatives A and C do not propose to conduct any prescribed fire, therefore no smoke would occur from this activity.

Alternatives B, D, E, F and G

These alternatives propose to apply prescribed fire to reduce fuels. Use of prescribed fire in order of most to least is Alternative D, B, F, G and E. Smoke emissions would be produced in direct proportion to acres treated.

Effects on Soils

The Issue Indicators, soil disturbance, effective ground cover (EGC), and fuel loading are used for evaluating the effects of individual action alternatives and are discussed below.

Soil Disturbance

Soil disturbance related to fuel reduction and timber harvest can be expressed through soil displacement and/or compaction. Soil disturbance may, or may not be detrimental as defined by the Regional SQS. The potential for detrimental soil disturbance is related to the method of fuels treatment. By applying the mitigation measures specified in Management Requirements and Mitigation Measures for all alternatives, the design of new activities would not create detrimental soil conditions on more than 15% of an activity area, which meets the requirements in the R1 SQS.

Use of mechanized equipment for fuel reduction activities has the potential to result in damage to soil resources. Presented below is a comparison of equipment limitations proposed for each alternative.

Alternative B – Limits all (tractor, excavator, spyder) ground based equipment to winter.

Alternative D – Limits ground based equipment (tractor, excavator, spyder) in high and moderate severity to winter, allows dry season equipment (tractor, excavator, spyder) with slash mat in low severity.

Alternative E- Limits all ground based equipment (tractor, excavator, spyder) and skyline to winter.

Alternative F –Limits ground based equipment in high and moderate severity to winter, allows dry season equipment operation in low severity consistent with R1 Soil Quality Standards (SQS). There is no excavator piling or spyder piling in this alternative. Any additional fuels treatments (non-commercial) would be accomplished in conjunction with the commercial harvesting and/or be accomplished by hand methods. Skyline units on landtypes with steep slopes and erosive soils are limited to snow/frozen ground conditions.

Alternative G – (Research Units) Limits all (tractor, excavator, spyder) ground-based equipment to winter.

Table S-3: Net Acres of Fuel Reduction Treatment by Logging System

Method	Alt. B	Alt. D	Alt. E	Alt F	Alt G
Helicopter	33,405	33,088	11,471	23,180	0
Skyline	10,633	11,397	3,831*	9,952	26**
Tractor/Winter	7,705	7,815	3,239	7,634	79**
Tractor/Summer	0	238	0	482	0
Tracked Line Machine	0	98	0	973	0
Total	**51,743**	**52,637**	**18,541**	**42,221**	**105**

* Winter conditions only for skyline in Alternative E.

** Mechanized fuel reduction for research purposes.

The predicted level of soil disturbance can be ranked by logging method from least to most: helicopter < skyline < tractor/winter <tractor/summer. As indicated in Table S-4 below, of the alternatives that conduct fuel reduction, Alternative G would cause the least short-term detrimental soil disturbance based on the amount of ground-based harvest. Alternative E has the second least amount of ground-based harvest, all of which would be conducted in the winter. Skyline and mechanized fuel removal in Alternative E would also occur in winter conditions. Alternative F has the next least potential for detrimental soil disturbance, and would treat slash by manual methods only.

Table S-4. Acres of Slash Reduction with Mechanized Equipment

Alternative	B	D	E	F	G
Excavator or spyder® piling of slash	2,448	9,441	5,160	0	0

Effective Ground Cover

Effective ground cover (EGC) consists of slash, vegetation, woody debris and similar materials that reduce the impact of raindrop slash and restrict sheet flow, thereby limiting the mechanisms of soil erosion. There is evidence indicating that 30-60 percent EGC resulting from fuel reduction treatment can reduce soil erosion on severely burned soil (Robichaud et al., 2000). Table S-5 below shows how the alternatives compare in this regard. Alternatives B, D, and F would be similar in acres with effective ground cover, while Alternative G would have the least.

Table S-5: Percentages and Net Acres of Effective Ground Cover (EGC) Resulting from Fuel Reduction Activities

Alternative	B	D	E	F	G
Percent of Total*	34%	34%	17%	31%	<1%
Acres	32,047	31,982	15,728	29,592	105

*94,191 total acres of high severity burn.

Heavy Fuel Loading

Fuel loadings that are greater than 50 tons/acre are believed to result in an increased likelihood of severe effects to soils when a fire occurs. As shown in the table below, Alternative D treats the most acres, with Alternative B treating similar levels.

Table S-5: Net Acres Treated With Fuel Loadings > 50 tons/acre

Geographic Area	Alt B	Alt D	Alt E	Alt F	Alt G
Blodgett	300	300	275	275	275
Skalkaho-Rye	5,760	5,749	1,915	4,687	846
East Fork	5,497	5,871	1,695	4,147	500
West Fork	447	632	0	490	0
TOTAL	12,004	12,552	3,885	9,599	1,621

Effects on Watershed

Comments and initial analysis suggested that sediment issues were foremost regarding watershed and aquatic impacts. The alternatives are compared based upon two issue indicators: amount of sediment in streams on MTDEQ's 1996 and 2000 303(d) and watershed improvement from road decommissioning and storage activities. Net sediment yield changes for the alternatives have been estimated, including both sediment increases from harvest activities in 303(d) listed streams and decreases from watershed improvements.

Estimated percentage changes in sediment in listed streams put the increases or decreases into context with the existing condition and watershed size. The relatively small degree of change (less than 2%) suggests minimal overall impacts on a watershed scale. Reasons for these small increases include the high sediment level estimated for the post-fire existing condition, low-impact logging methods, and RHCA buffers. Viewing the net change totals gives a relative comparison for the alternatives. Results suggest that Alternative D would produce the most sediment in watersheds, followed in decreasing effect by Alternatives B, F, E, A (no action), C and G. Alternatives C and G are estimated to decrease sediment below the existing condition due to the lack of harvest and conducting watershed improvements on roads. Watershed modeling results

are best used for a relative comparison between alternatives and should not be interpreted to represent actual sediment yields.

Sediment modeling suggests that while there are differences in the sediment production estimates, the percentage changes from existing condition would be small for all alternatives. This is due mainly to the large analysis area, the high level of sediment attributed to the 2000 fires, and reduced disturbance of low-impact logging methods. Harvest activities produce short-term sediment, which is considered a short-term watershed cost of the alternatives. Road treatments are considered a long-term benefit to watershed with minor short-term impacts in terms of sediment.

Watershed improvement from the roads proposed for decommissioning and storage, for each alternative has also been estimated. This data suggests Alternative G would be the most beneficial for long-term sediment reduction in all watersheds, due to the large number of road miles treated. Alternatives B, C, D, and E all are similarly ranked with 162 miles of total road treatment. Alternative F would be ranked 6th in long-term sediment reduction, but may not be indistinguishable from B, C, D, and E in the field due to the small difference (12 fewer miles, or 7% less). Alternative A would rank last using this method due to the lack of any miles treated.

The above watershed issue indicators do not consider the potential costs or benefits of fuel reduction and potential for fire severity. Fire and fuels analysis for this project indicates there may be some longer term watershed benefits attributable to removal of heavy fuels (see discussion and citations for Fire and Fuels section). Potential long-term benefits include reduced severity and duration of future fires from the reduced fuel loads and continuity. This, in turn, could reduce the extent or severity of hydrophobic soils, erosion, sedimentation, gully formation, and loss of riparian shade caused by future fires.

Effects on Fish

In the long-term, Alternative G would be the most beneficial alternative for the fishery because it would; (1) produce the highest sediment reductions and the greatest improvements in bull trout and westslope cutthroat trout spawning and rearing habitat, (2)increase access to 73.5 miles of spawning and rearing habitat by replacing or removing 37 culverts that are either complete or partial fish barriers, (3) improve undercut bank cover, narrow stream channels, increase riparian shade and shrub cover, reduce exposure to solar radiation, and reduce sediment inputs from livestock bank trampling, and (4) reduce losses of adult bull trout and westslope cutthroat trout to anglers in the larger streams that were formerly encroached by roads

Alternative C would be the second most beneficial alternative for the fishery. It would produce the lowest sediment inputs to bull trout and westslope cutthroat trout in the short-term, but substantially smaller long-term reductions as compared to Alternative G. The main strengths of Alternative C are that it would reduce long-term sediment inputs from the road network with minimal short-term inputs, and it would increase bull trout and westslope cutthroat trout access to 20 miles of spawning and rearing habitat by replacing seven culverts that are complete fish barriers. It has two weaknesses. It would only increase access to 20 miles of spawning and rearing habitat, not 73.5 miles like Alternatives G and F, and assuming that future fires will occur, does nothing to reduce risks on two small, isolated westslope cutthroat trout populations in the Little Sleeping Child and Medicine Tree Creek drainages.

Alternative E would rank third. Alternative E would increase access to 20 miles of spawning and rearing habitat by replacing the seven culverts that are known fish barriers, and accomplish a combination of three items that none of the other harvest alternatives could do; (1) produce the lowest sediment inputs of the salvage harvest alternatives, (2) conduct the watershed improvement activities to reduce sediment from roads, (3) reduce VRU 2 fuels in the two severely burned watersheds (Little Sleeping Child Creek and Medicine Tree Creek) where small, isolated westslope cutthroat trout populations may be vulnerable to future fires

Alternative F would rank fourth. It's main benefits are that it would increase bull trout and westslope cutthroat trout access to 73.5 miles of spawning and rearing habitat by replacing 37 culverts that are complete or partial fish barriers, conduct the watershed improvement activities, and reduce VRU 2 fuels in the Little Sleeping Child and Medicine Tree Creek drainages. The reason that it would be less favorable than Alternative E is because it would produce higher short-term sediment inputs to bull trout and westslope cutthroat trout habitat, and generate cumulative sedimentation effects of greater extent and duration.

Alternative A would rank fifth. It would not reduce sediment inputs, improve access to spawning and rearing habitat, or treat fuels in the Little Sleeping Child and Medicine Tree Creek drainages. It ranks above Alternatives B and D because it would not produce short-term sediment inputs or generate negative cumulative effects from sedimentation.

Alternatives B and D would rank last. The effect of these two alternatives is likely to be indistinguishable in the field. The reason that Alternatives B and D are ranked last is because they would produce the highest short-term sediment inputs to bull trout and westslope cutthroat trout habitat, and generate cumulative sedimentation effects of the longest duration and greatest magnitude.

Effects on Forested Vegetation

Effects on Dry Forest Lands

The fires of 2000 burned with greater intensity compared to historic fire, in the low elevation dry forests where ponderosa pine historically dominated (VRU 2). With the amount of ponderosa pine mortality caused by the fires and the number of stands that remain at risk of future lethal fires, establishment of ponderosa pine and the restoration of historic species composition and stand structures are best addressed in Alternatives B, D, E, and F. All action alternatives include provisions for reforestation of ponderosa pine where natural regeneration of this species is considered questionable due to lack of seed sources, competing vegetation, or harsh sites. Alternative B, C, D, E and F reforest about the same acres to ensure ponderosa pine establishment. Planting in Alternative G is limited to burned plantations and ponderosa pine would be planted where appropriate.

Alternatives B, D, E and F vary in the amount of acres where historic fuel levels, stand structures and composition would be created using harvest and non-harvesting means. Alternative B and D treat the most acres and allow thinning live trees to better achieve the desired conditions. Alternative E would reduce fuels in dry forest types but would not improve stand structure or stand composition by thinning in areas that burned at low severity. Alternative F treats more acres than Alternative E and less than B and D, and would conduct a limited amount of live tree thinning to achieve desired conditions. Alternative A would allow natural process to take place, regeneration of ponderosa pine would be slow and the increased risk of future lethal fires would remain. Alternative C would replant burned ponderosa pine habitats but would not reduce fuels on those sites. These stands would be more vulnerable to future fire and loss of reforestation investments. Alternative G limits fuel reduction to manual methods and prescribed burning and would not adequately reduce fuel to levels that approximate historic conditions.

Effects on Mid-and-High Elevation Forests (VRUs 3 and 4)

The effects on stands in the mid-and-high elevation range as a result of the Alternatives B, D, E and F are directly related to amounts of fuel reduction and reforestation investment protected. Where natural and artificial regeneration are prescribed, the fuels treatments reduce the potential for future fire to burn up reforestation time and dollar investments. Alternative B and D treat around the same amount of acres. Alternative F would conduct the next highest level of fuel reduction in these plant communities. Alternative E only treats VRU 3 sites that are within the wildland-urban interface. Alternatives A and G would allow natural processes to take place and not address future fire severity or loss of natural regeneration. Alternative C plants the largest number of acres because every acre with a possibility of being nonstocked in the short-term are proposed for planting. This alternative would not reduce fuels to protect investments.

Table S-7 - Reforestation Summary by Alternative and Geographic Area

Measurement	A	B	C	D	E	F	G
Acres Planted	0	31824	36259	32029	20227	32977	4167

Effects on Bark Beetle Risk

Alternatives A, C, and G do not treat any stands for Douglas-fir beetle susceptibility reduction, remove any beetle killed or infested trees, or treat any high/moderate bark beetle risk stands. Alternative D treats the most acres for Douglas-fir beetle susceptibility reduction by thinning. Alternative B and F treat approximately half of the acres in Alternative D for Douglas-fir beetle susceptibility reduction. Alternative B and F treat the most acreage to remove beetle killed or infested trees by salvage as well as thin stands with high/moderate bark beetle risk. Alternative E would only remove beetle killed or infested trees by

salvage on 52 acres. These treatments will have some effect on reducing beetle populations at the local or stand level. Alternatives A, C, E, and G allow the current level of Douglas-fir bark beetles to continue and would not attempt to reduce mortality or reduce the risk of mortality in stands determined to be at high or moderate risk for bark beetle mortality.

Table S-8 - Acres of Bark Beetle Susceptibility Reduction

Alternative	A	B	C	D	E	F	G
Total	0	3602	0	4672	0	1215	0

Table S-9 - Acres of Bark Beetle Moderate/High Risk Stands Treated

Alternative	A	B	C	D	E	F	G
Total	0	8608	0	8342	52	3152	0

Effects on Sensitive Plants

Activities that include operating any type of ground-based equipment over bare soils are the most likely to cause adverse impacts on individual sensitive plants. Any alternative that increases the risk of weed spread could potentially have an adverse impact on sensitive plant habitat, particularly in VRU 2 and VRU 3 habitats. Sensitive plant species most at risk include Lemhi penstemon (*Penstemon lemhiensis),* hollyleaf clover *(Trifolium gymnocarpon),* and woolly-head clover *(Trifolium eriocephalum* ssp. *arcuatum),* since these species were found in areas of proposed activities and are more vulnerable to adverse impacts. Dwarf onion *(Allium parvum),* Rocky Mountain paintbrush *(Castilleja covilleana),* and bitterroots *(Lewisia rediviva)* were also found in VRU 2 and VRU 3 habitats and could be affected by proposed activities. The bitterroot is a species of special concern due to its significance to the Salish and Kootenai Tribes and State flower status. Candystick *(Allotropa virgata)* occurs in VRU 4 types and is less likely to be impacted by noxious weeds, but the use of ground-based equipment on bare soil could adversely impact the soil mycorrhizae associated with this species.

Alternatives D and F would have the most adverse impacts on local Lemhi penstemon sensitive plant populations and/or their habitat. Skyline cable logging that is proposed for Alternatives B, D, and F in units containing Lemhi penstemon could also increase the risk of weed spread. Activities proposed for Alternative E would have fewer impacts than in Alternative B, since all harvesting would occur over frozen ground and /or settled snow. Activities proposed in Alternative G would have still fewer impacts than Alternative E because no commercial harvest would occur, removing any impacts from skidding logs. However, Alternative G might have slightly more impacts on Lemhi penstemon habitat in the short-term than those proposed in Alternative C, since some manual tree-felling and underburning would be accomplished within activity units. Alternative A (No Action) would have the least impacts on Lemhi penstemon plants or their habitat in the short-term, but there is potential for adverse impacts in the long-term due to accumulated fuels increasing the risk of more severe fire events in future decades.

Hollyleaf and woolly-head clovers occur only on the West Fork District and there is potential to directly impact these species if landings proposed in Alternative D are built. The cumulative effects of past activities in the area could adversely impact the local population viability if more plants and/or habitat is destroyed. Impacts are reduced in Alternatives B, E, and F, where landings are not proposed for locations where hollyleaf or woolly-head clover exists. Alternative E would have the least short-term impacts since no activities are proposed in units containing hollyleaf or woolly-head clover. Alternative F proposes only helicopter harvest, reducing on-the-ground impacts, and Alternative B would include skyline cable harvest over bare soil, increasing the risk of weed spread. Activities proposed in Alternative G might have slightly more impacts on sensitive plant habitat in the short-term than those proposed in Alternative C, since some manual tree-felling and underburning would be accomplished within units. Alternative A (No Action) would have the least impacts on any sensitive plant species or their habitat in the short-term, but there is potential for adverse impacts in the long-term due to accumulated fuels increasing the risk of a more severe fire event in future decades.

Candystick populations and habitat can be adversely impacted by any ground disturbing activities on bare soil due to the soil mycorrhizae associated with the species (Lichthardt, 1995). Green tree harvest in Alternatives B and D could adversely impact individual candystick plants due their association with a living conifer host. Impacts associated with temporary road and landing construction cannot be mitigated, since the construction and use of these areas would likely adversely impact soil mycorrhizae. Based on these criteria, Alternative D has the greatest potential to adversely impact candystick plants or habitat, since temporary roads and landings are proposed for construction in areas of suitable candystick habitat. Alternative F has fewer potential impacts since only one temporary road is proposed in candystick habitat. Alternative B

would have slightly less impacts than F and Alternative E would have the least short-term impacts since no activities are proposed in candystick habitat. Alternatives A (No Action), C, and G would have the least impacts on candystick species or habitat in the short-term, but there is potential for adverse impacts in the long-term due to accumulated fuels increasing the risk of a more severe fire event in future decades.

Effects on Noxious Weeds

The fires of 2000 have created an environment ripe for invading noxious weed seed, so that even the no action alternative would allow weed spread. Any further activity would only add to this risk by exposing burned areas to weed seed from activities associated with logging, road decommissioning, reforestation, and slash piling and burning. Alternative D would spread weeds more readily than any other alternative due to the proposed construction of temporary roads. Recontouring and revegetating these roads would mitigate this impact some, but would still create conditions favorable for weed invasion. Alternative F would be the next most likely to contribute to weed spread for similar reasons, followed by B, E, G, C, and A. These comparisons are based on short-term impacts, including acres of proposed activity. In the longer term, there is a risk of a severe fire event occurring due to fuel accumulations from fire-killed trees. Such an event would increase the probability of soil heating and damage to underground plant parts, slowing their rate of recovery and favoring the invasion of noxious weeds. If this were to occur, and it most likely would happen in some areas, the risk of weed spread would be greatest in Alternative A (No Action) with the most fuel left on site, followed by Alternatives C, G, E, F, D, and B.

Effects on Wildlife

Summary of Effects

Any change in habitat characteristics caused by management actions will benefit some species and negatively affect others. Proposed management actions would have long-term benefits for most wildlife species present in the analysis area that have evolved under the known disturbance regimes. The short-term negative impacts will include the harvest of trees that remove foraging, nesting, roosting, and denning sites. However, even short-term impacts have been mitigated on treatment sites so that adequate habitat characteristics are present in all habitats including old growth. The extensive availability of dead trees in untreated units and riparian corridors and retention of snags and course woody debris habitat features in treated areas is believed to be adequate to support viable wildlife populations across the Bitterroot National Forest. Some species will be absent from severely burned areas due to the now absent habitat, but this project as proposed would not negatively affect viability of any wildlife species.

Alternative A followed by C, and G would have the least short term effects on wildlife species, but are anticipated to have greater long term negative effects if future severe fires were to occur across large portions of the analysis area. Alternatives E and F would maximize recovery of habitats by planting seedlings on the areas most likely to have poor natural regeneration. Alternatives E, F and G also propose increased riparian buffer widths that benefit many management indicator species, threatened, endangered, sensitive, native and desired non-native species. Alternatives C, F, and B maximize recovery of habitats by planting seedlings on the most area. Alternative G would obliterate nearly 10 times the miles of road compared to other alternatives, thereby enhancing the habitat suitability for a range of species sensitive to human disturbance.

Management Indicator Species (Pine Marten, Pileated Woodpecker, Elk)

Alternatives considered would have limited adverse effect on management indicator species. Project actions as designed have minimized potential adverse effects to these species. Green tree treatments pose the potential for degrading habitat for indicator species and therefore alternatives that minimize thinning in green trees (A, C, E, G) would have fewer potential impacts on these species. Similarly, alternatives that maximize planting in VRU3 would speed recovery for indicator species because this VRU is used by pine marten, elk and pileated woodpeckers and lost most seed trees to wildfires and may not recover as rapidly as VRU4 habitat. Alternatives B, C, D and F maximize planting in VRU3.

Effects on Elk Thermal Cover

Thermal cover was reduced across all geographic areas by the 2000 fires and effects will be monitored in conjunction with the State in following years. Green tree harvest may affect this habitat component. Elk populations are not likely to be affected by this habitat loss but thinning green trees may reduce the quality of existing cover in the short term. In the longer term these treatments would result in reduced risk of high severity fire and insect epidemic and future loss of thermal cover. Alternatives A, C, E and G would not alter any thermal cover. Alternatives that maximize planting would speed recovery of thermal cover. Alternatives C, F, D and B in that order maximize recovery of elk thermal cover.

Effects on Elk Habitat Effectiveness

Habitat effectiveness is related to open road density during the hunting season on the Bitterroot National Forest. Road closures would improve habitat effectiveness for elk by limiting access in specific drainages. Alternative C, E, and G would impose road closures in three third order drainages in Skalkaho-Rye, East Fork, and West Fork geographic areas to raise habitat effectiveness to Forest plan standards. Alternatives A and D would close no roads, Alternative B would close some roads in each of the three drainages, but not to Forest plan standards. Alternative F would meet standards in two areas, but not in Laird Creek.

Effects on Elk Security

No alternative would have substantial effects on elk security. Green tree harvest is the most likely activity to affect this habitat component and alternatives that thin the fewest acres would have the least short-term effect on security habitat. Alternatives that plant the largest number of acres would help improve security habitat on the most acres in the long term. Therefore, alternative C that treats the least number of green tree acres but plants the most area would provide the least short-term impacts with the greatest long-term movement towards security habitat recovery. Alternatives F, D, and B would rank next considering both short-term impacts and long-term benefits.

Old Growth

None of the activities proposed in any of the alternatives would have an effect on acres or amount of old growth habitat remaining after the fires. Alternatives A, C, F and G, will not affect old growth because no green tree harvest is planned. Alternatives B, D and E would treat approximately 40 percent of VRU2 and VRU3 old growth habitats in the analysis area, but old growth attributes would be retained in the treated stands. The proposed understory treatments are designed to restore historic structure of vegetation and thereby have long-term benefits for old growth in treated areas.

Flammulated Owls

Displacement of Flammulated Owls may occur during implementation of all alternatives except A and C as a result of conducting fuel reduction activities during the breeding season. Displacement is not expected to affect species viability. None of the alternatives would affect habitat suitability for Flammulated owls because the proposed activities are designed to restore historic vegetative structural conditions that are preferred by this species.

Effects on Threatened, Endangered, and Sensitive Wildlife Species Habitats

Although short-term impacts are expected for a variety of wildlife species across the analysis area, species viability would not be affected for any TES species. During harvest activities, planting or temporary road building wildlife species would potentially be displaced by human presence, noise, etc. This effect is expected to be greatest in areas that have green tree activities because it is predicted that wildlife species, marten, lynx, flammulated owls, pileated woodpeckers, possibly fisher, and wolves may at times (although the likelihood is low) be present in remaining forested areas.

Project design that retains structural attributes for snags and course woody debris and/or elimination of units in sensitive habitats (Alternative F) mitigated all but displacement impacts to wildlife species across the analysis area. Alternative G road closures would have the greatest long-term benefits on TES species by opening up habitats to forage, mate, breed and/or raise young away from human disturbance and also by decreasing the risk of human caused mortality.

Effects on Scenery

Logging Systems

Harvest activities in visually sensitive areas (retention and partial retention) could result in visual impacts. In general, helicopter logging results in fewer visual impacts than other logging systems. Skid trails and skyline corridors can leave more visually evident patterns where tractor or skyline/TLM systems are used. Table S-10 displays the number of activity units by logging system for the alternatives in visually sensitive areas.

Table S-10 - Logging System Summary by Alternative

Alternative	Skyline/TLM logging units in partial retention.	Helicopter logging units in partial retention/retention.	Tractor logging units in partial retention.
A	0	0	0
B	31	96	21
C	0	0	0
D	34	97	21
E	14	38	12
F	32	75	21
G	1	1	1

Alternatives A and C do not utilize any logging systems and have no impact to visual quality. Of the alternatives that utilize mechanical treatment methods, Alternative E has the least visual impacts to the landscape; Alternative D has the most visual impacts to the landscape.

Fuel Reduction

Fuel reduction activities can affect scenery and effects would vary by prescription. In general, salvage and salvage/regeneration prescriptions would be more noticeable than intermediate and manual/Rx fire prescriptions.

Table S-11 - Fuel Reduction Treatment Methods by Alternative

Alternative	Intermediate	Salvage	Salv/Regen	Manual/Rx Fire Fuel Reduction
A	0	0	0	0
B	15,276	5,839	30,628	7,217
C	0	0	0	0
D	16,944	4,457	31,236	7,002
E	0	1,602	16,939	1,290
F	4,165	7,220	30,988	3,866
G	105	0	0	9,118

Alternatives A and C do not utilize any fuel reduction treatment methods and have no impact to visual quality. Of the alternatives that utilize mechanical treatment methods, Alternative E has the least visual impacts to the landscape; Alternatives B and D haves the most visual impacts to the landscape.

Planting

Reforestation accelerates visual recovery following the fires.

Table S-12 - Artificial Planting and Natural Regeneration by Alternative

Alternative	A	B	C	D	E	F	G
Artificial	A	31,824	36,259	32,029	20,227	32,977	4,167
Natural	B	11,664	0	11,961	2,521	9,467	0

Alternative C has highest amount of planting which would accelerate reforestation on the greatest amount of acres. Natural regeneration would occur in Alternatives A and G but with limited active management such as monitoring sites and making sure areas are stocked with trees.

Effects on Recreation

Changes in Motorized Access

Table S-13- Change in Motorized Access

Category	Alt. A	Alt. B	Alts. C/E	Alt. D	Alt. F	Alt. G
Roads open to motorized use yearlong *changed* to closed to yearlong to motorized use	0.0	1.7	0.8	0.0	3.7	141.8
Roads with seasonal motorized restriction *changed* to closed to yearlong motorized use	0.0	14.0	14.0	0.0	3.2	135.0
Road open yearlong to motorized use *changed* to seasonal motorized restriction	0.0	3.2	6.9	0.0	4.7	9.6
Roads with seasonal restriction *changed* to open yearlong to motorized use	0.0	1.2	1.2	0.0	0.0	0.0
Roads open to yearlong motorized use	0.0	0.0	0.0	1.7	0.0	0.0
Roads open to seasonal motorized use	0.0	0.5	0.5	*13.0	*16.8	0.0

* Change in type from full size vehicles to off-highway vehicles

Changes in Non-Motorized Roaded Access

The roads addressed in this section are currently closed yearlong to motorized use. Treatments affecting non-motorized use, such as hiking and stock riding, are ripping the existing roadbed (and leaving a rough walking surface) and recontouring the road prism. Table S-14 summarizes changes in reduced non-motorized roaded access by alternative.

Table S-14 –Total Miles of Reduced Non-Motorized Roaded Access

Geographic Area	A	B	C/E	D	F	G
Blodgett	0	0	0	0	0	0
Skalkaho-Rye	0	37	53	44	24	180
East Fork	0	22	34	34	20	238
West Fork	0	1	1	2	1	108

Effects on Wilderness and Inventoried Roadless Areas

The proposed activities would not occur in designated Wilderness or Inventoried Roadless Areas. However, fuel reduction activities in proximity to these lands have the potential to affect users in their periphery. Sights and sounds of work crews and noise of equipment from adjacent units may have short-term affects on the solitude of visitors.

Effects on Unroaded Lands

A map of unroaded lands provided by local environmental groups was used to determine these effects.

Table S-15 - Summary Table of Effects on Unroaded Lands

Alternative	B	C	D	E	F	G
Miles of Temp Road Construction	0	0	3.9	0	3.4	0
Total Harvest Treatment	21,744	0	22,234	8,875	14,351	0
Rx Fire/Manual Treatment	2,844	0	2,844	206	976	0

Effects on Economic Values

Table S-16 – Summary of Economic Indicators

Alternative	A	B	C	D	E	F	G
Estimated Harvest Volume (MMBF)	0	235	0	240	79	181	0.5
Project Present Net Value ($000)	-$960	-$20,674	-$18,414	-$20,411	-$13,180	-$16,753	-$23,533
Fuel Reduction Cost Per Acre	0	$82	0	$69	$46	$6	$804
Total Employment	16	5078	1089	5171	1974	2659	821
Percentage of Treatment Area by Yarding System							
Conventional[1]	N/A	36	N/A	36	37	45	100%
Helicopter		64		64	63	55	0%

[1] Ground based and skyline logging systems

Effects on Social Resources

Alternative A responds to the desires of those who believe that nothing should be done in the burned areas. It would result in no disruptions of residents' daily living and work activities in the near term.

Alternatives B, D, E and F respond in varying degrees to those who support fuel reduction in the wildland-urban interface and other burned areas. The amount of disruption to residents' daily living and work activities that would be created by each of these alternatives is related to the amount of work proposed. Potential sources or disruption include increased traffic, noise from helicopters, potential travel delays, etc. Alternatives D and B propose the most activity, respectively, followed by Alternative F, then Alternative E which proposes considerably less.

Alternatives C and G respond to those who do not support commercial or mechanized fuel reduction but do support watershed restoration. Alternative C does not contain any fuel reduction. Alternative G would focus mechanical/manual/prescribed fuel reduction only in the Wildland-Urban Interface and dry ponderosa pine areas outside of unroaded areas. These alternatives would disrupt residents' daily living and work activities the least of the action alternatives. Alternative G also emphasizes fuel reduction and fire hazard protection near homes, and local employment.

Forest Plan Amendment

table S-17 –Response to Key Issue: Forest Plan Amendment (Need by Alternative and Geographic Area) [1]

	Alternative						
Measurement	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Snag Retention/CWD Standard							
Blodgett Area	No	Yes	No	Yes	Yes	Yes	Yes
Skalkaho-Rye Area	No	Yes	No	Yes	Yes	Yes	Yes
East Fork Area	No	Yes	No	Yes	Yes	Yes	Yes
West Fork Area	No	Yes	No	Yes	Yes	Yes	Yes
Elk Habitat Effectiveness Standard							
Blodgett Area	No	No	No	No	No	No	No
Skalkaho-Rye Area	No	Yes	No	Yes	No	Yes	No
East Fork Area	No	Yes	No	Yes	No	Yes	No
West Fork Area	No	Yes	No	Yes	No	Yes	No
Thermal Cover Standard							
Blodgett Area	No	No	No	No	No	No	No
Skalkaho-Rye Area	No	Yes	No	Yes	No	Yes	No
East Fork Area	No	No	No	No	No	No	No
West Fork Area	No	No	No	No	No	No	No

[1] "Yes" means a Forest Plan Amendment would be needed to implement that alternative in that area. "No" means a Forest Plan Amendment would not be needed.