CHAPTER 2
Alternatives

I. INTRODUCTION

This chapter describes and compares the alternatives considered by the Forest Service for the *Moose Post-Fire Project*. It includes a discussion of how alternatives were developed, monitoring and other features common to all alternatives, a description and map of each alternative considered in detail, and a comparison of these alternatives focusing on the significant issues. Chapter 2 is intended to present the alternatives in comparative form, defining the issues and providing a clear basis for choice among options by the decision maker and the public (40 CFR 1502.14).

Some of the information used to compare alternatives at the end of
Chapter 2 is summarized from Chapter 3, "Affected Environment and Environmental Consequences." Chapter 3 contains the detailed scientific basis for establishing baselines and measuring the potential environmental consequences of each of the alternatives. For a full understanding of the effects of the alternatives, consult Chapter 3.

Changes to Chapter 2 between the DEIS and FEIS

Details of the all action alternatives changed in response to further field verification, monitoring, additional information, and public comment. They include the following:

As a result of field verification, monitoring, and additional information:

- Unit boundaries and acres were refined to better reflect on-the-ground conditions (also, some units were dropped). This included verification of logging systems and access to facilitate logging (no temporary roads are needed for any units).

- Treatment prescriptions and stand conditions were clarified and refined. This potential slash treatments; soil conditions and their influence on logging systems and slash treatments; residual tree components; location of streams and leave areas; unit volumes; and treatment prescriptions along open roads where snag and downed wood habitat is accessible to firewood cutters.

- Refinement of spruce and Douglas-fir bark beetle management plans, using information from 2002 beetle population surveys. This includes further details of proposed treatments and acres, especially regarding the use of pheromone treatments and Douglas-fir trap trees.

- Elimination of proposed treatments within the 300-foot riparian habitat conservation area along Big Creek or the North Fork Flathead River in the Glacier Institute and Big Creek Campground fuel reduction units.

The changes in all action alternatives between the draft EIS and the final EIS are described unit by unit in Appendix A, in the table column titled “Changes DEIS to FEIS.” The change in treated acres for each unit is also listed in this table. Appendix A tables have also added additional information on each unit, including timber volume by unit, potential slash treatments, and expected slash loadings.

Public comment led to the inclusion of different larch snag retention prescriptions for seven units within Alternative 3. All larch >20” DBH would be left within these units, while all other units would continue with the original prescription of leaving all larch >18” DBH. Refer to Chapter 4, comments #129, #131, and #136. Public comment also led to the development of another alternative considered, but was subsequently eliminated from detailed study. This alternative considered altering the post-fire mortality guidelines to retain more trees.

In response to public comments received during the comment period on the draft EIS, we reviewed the motorized use of the Elelehum Trail 194 and Deadhorse Trail 255. We discovered an oversight not disclosed in the DEIS: these trails are in grizzly bear security core areas. Grizzly bear security core areas allow no motorized use during the non-denning season (see Amendment 19 or Appendix TT of the Forest Plan). This resulted in closing these trails to motorized use during the grizzly bear non-denning season. See the *Recreation* section under *III. Design Criteria* later in this chapter for a more complete explanation of this action.

II. ALTERNATIVE DEVELOPMENT PROCESS

Public Involvement

The public involvement process started on January 6, 2002, with a legal notice in *The Daily Inter Lake* that provided information about the initial proposal and purpose of and need for the *Moose Post-Fire Project* (project record exhibit B-1). A *Notice of Intent to Prepare an Environmental Impact Statement* was published in the *Federal Register* on January 10, 2002 (project record A-2). *The Daily Inter Lake, Hungry Horse News,* and *Whitefish Pilot* also published numerous news articles about the proposal (project record B-1 through B-7). At this time, about 310 letters were mailed to the public, government agencies, and groups or individuals potentially interested in or affected by the project, asking them to review and comment on the proposed project (project record D-1). Letters and phone calls from about 20 more people were received requesting information on the project.

The public had 30 days to comment during
the "scoping" process. As a result, we received nearly 160 letters, phone calls, and e-mails. After receiving these comments, we categorized them into six areas to help determine significant issues that might lead to alternative proposals or analysis of effects to certain resources. This process is explained in more detail in the issues section of this FEIS and in the project record.

The DEIS was published and available for public comment on June 26, 2002. Before this date, a letter was sent to all parties on the project mailing list announcing the expected DEIS publication date. The letter asked the parties to choose the document and format they desired. Some people asked only for the draft EIS summary, and others asked for the entire DEIS. Format choices included a hard copy or a CD-ROM. We also posted the DEIS on the Flathead National Forest website at www.fs.fed.us/r1/flathead. An e-mail address was provided for comments. Also, copies of the DEIS were placed at Flathead County library branches at Columbia Falls, Whitefish, and Kalispell.

During this same public comment period, news releases were sent to the local news media for publication and broadcasting, regarding the project. The Planning Team held an evening open house in Kalispell, Montana, hosting approximately 40 people.

Meetings with various local civic groups, government agencies, and congressional staff personnel took place following the DEIS publication (project record exhibit section C).

Seven free 4-hour bus tours of the project area took place in June and July, including one tour in which specialists from the planning team hosted the tour.

Following the publication of the DEIS, the public had 45 days to comment on the document. The comment period ended August 12, 2002. This effort produced over 1400 comments in letters, e-mails, postcards, form letters, and phone calls from individuals, organizations, and agencies. Because of the large number of comments, we obtained the services of a content analysis team to evaluate the comments as they related to this project. The results of the analysis gave the planning team information pertinent to the project for which more study or further explanations were needed. Chapter 4 of the FEIS contains the summary of comments received and the planning team's response to the comments.

The project record contains the documentation of the public involvement process.

Ongoing coordination throughout the analysis process included discussions with the U.S. Fish and Wildlife Service, Montana Fish, Wildlife and Parks, the Environmental Protection Agency, and the Montana Department of Environmental Quality. This coordination will continue through project implementation.

Summary of Comments Received during Public Scoping

Soil, water, fish: People expressed concerns that we maintain, protect, or enhance water quality and riparian values, particularly bull trout spawning grounds. Some believed that removing trees from riparian areas may cause further degradation to Big Creek; others said we should remove trees at risk from beetle populations or future fires, or trees that might create log jams detrimental to fish passage. Several comment letters referenced the Beschta report (1995), which presents general concerns related to post-fire management actions to soils and other resources. The Moose Interdisciplinary Team reviewed the Beschta report, and incorporated relevant information into alternative development and effects analysis throughout the FEIS. Appendix D of this FEIS contains specific information about the Beschta report and how it was considered.

Wildlife: Some people said we should leave large live trees or large dead trees on site as habitat for birds, bears, ungulates, and other wildlife species. Some believed that we should provide more secure habitat for wildlife during hunting season because of the large amount of burned areas that have less hiding cover, making animals more vulnerable. Others believe habitat has been destroyed by the fire

and there is no need for additional habitat security.

Salvage: Most responders said we should salvage dead and dying trees, although the comments often showed vastly different ideas about why, where, and how much we should salvage. Reasons varied from cutting trees in order to provide revenues and jobs for the local economy, to reducing future fire hazards or threats from beetle epidemics to remaining trees. Others suggested we should cut trees only after consideration of the ecological roles of trees, both living and dead, beetle-infested or not, burned or not, and how this project will maintain or enhance those roles. Many wanted to know why we identified only 4,300 acres in which to salvage trees, when over 35,000 acres burned on national forest system lands. Some also suggested the use of pheromone traps without logging to address the beetle issues. Still others discussed various logging systems and their merits related to this project, such as using helicopters or forwarders.

Access/road closures: Road closures are proposed to meet Forest Plan requirements designed to provide secure habitat for grizzly bears. Amendment 19 to the Forest Plan directs us to restrict, or in some cases to decommission, roads to reach specific road density levels within areas called "grizzly bear subunits" by the end of a ten-year period. The ten-year mark is approaching and there are more miles of roads within the two subunits in our project area that need to be restricted or decommissioned to meet Forest Plan standards. Some respondents cited the need to close roads to meet Amendment 19 standards as the single most important aspect of our project. Others expressed equal concerns over a cumulative loss of motorized recreational opportunities and the increasing inability of people who cannot or do not want to hike, bike, or ride horseback to reach favorite recreation areas, such as huckleberry sites or camping spots. Watershed health related to road decommissioning was also of concern to some people. Finally, some expressed concerns about safety hazards and costs associated with decommissioning roads.

Wild and Scenic River: Some comments suggested we should exclude lands in the Wild and Scenic River corridor from salvage.

Economics: These comments focused on the economic effects of this project from two different viewpoints. Some suggested we should look at the benefits of cutting trees on the local economy, including jobs, school revenues, and providing lumber to local mills. Others suggested we should look at non-market benefits of not logging, such as scenic, aesthetic, ecological, and recreational values.

Inventoried roadless: Some were concerned that removing trees in inventoried roadless areas would compromise the values of these areas, creating habitat fragmentation, impacts to recreational opportunities, and the loss of unique ecological values.

Fuels/fire: Concerns about future fire risk in the Big Creek drainage prompted some people to suggest we salvage trees to reduce the fuel loading. These individuals reason that when the dead trees fall to the forest floor and new trees reestablish, the resulting fuel conditions may increase the severity of the next fire. Others believed there is not enough scientific evidence to support removing trees as a method to prevent a high intensity fire. Also, some cited research that suggests thinning or burning in a 40-meter buffer around structures is adequate fire protection.

***Miscellaneous*:** This includes some general comments in support of our proposal. Other comments suggested we seek an emergency exemption to our normal appeals process so that trees can be salvaged while still merchantable.

Issue Development Process

The ID team reviewed all comments received in response to scoping to identify significant issues, determine appropriate analysis procedures, and identify alternatives to the proposed action. Some comments were beyond the scope of this project; others were addressed by the Forest Plan or other regulatory framework, were beyond the geographical influence of this project, or did not pertain to this specific proposal. Comments and concerns that fell into these categories were not considered relevant to this project-specific assessment, and therefore were not addressed.

The remaining comments and concerns were further examined to determine how they could best be addressed in the assessment and EIS. A few comments were best addressed by developing alternatives to the proposed action. These concerns became the significant issues that are described below. Others were best addressed by disclosing the effects of implementing the proposed action and its alternatives. Some comments were best addressed by developing design features common to all action alternatives. Project record exhibit D-2 contains further information regarding alternative development.

Issues Used for Alternative Development

The following are the significant issues that were used to develop alternatives to the proposed action. The issue statement is followed by "issues indicators," which provide a means to measure the effects of each alternative.
The building of temporary road, which was an issue in the DEIS, has been removed. No temporary roads are proposed in any of the alternatives due to logging system changes.

1. **Tree salvage in inventoried roadless areas does not allow natural processes to continue to occur within these areas and may therefore alter its roadless character.**

Some respondents were concerned that removing trees in inventoried roadless areas would compromise the values of these areas, creating habitat fragmentation, impacts to recreational opportunities, and the loss of unique ecological values. One of these writers specifically stated, "I encourage the FS to not log in inventoried roadless lands. These lands should be our control group as we experiment with post-fire management. Let natural processes play out unhindered in roadless lands."

This issue was addressed through development of Alternatives 3 and 4, which propose no timber salvage in inventoried roadless areas.

Issue Indicator: *acres of salvage in inventoried roadless area, changes to natural integrity, apparent naturalness, remoteness, solitude, primitive recreation opportunities, manageability, and boundaries in inventoried roadless areas*

2. Tree salvage in the Wild and Scenic River corridor may affect the character of the corridor.

In 1976, Congress designated the North Fork Flathead River as part of the National Wild and Scenic River System. Management direction for the river corridor is discussed in more detail in Chapter 3 of this EIS. The comments received on this issue provided no reasons why salvage harvest should not occur within the river corridor. However, we believe that some people have concerns that salvage logging in the river corridor may alter its character or integrity or may somehow harm the watershed. For example, several people stated "[t]he watersheds must be protected and an alternative developed in the EIS that would not allow logging in the most sensitive areas, riparian areas, and the Wild and Scenic River corridor."

This issue is addressed through development of Alternative 4, which proposes no timber salvage within the North Fork Wild and Scenic River corridor.

Issue Indicator: *acres of salvage and acres of fuels reduction within the Wild and Scenic River corridor*

3. Snag and downed wood material retention should be increased over that in the proposed action to ensure that these wildlife habitat and ecosystem components are provided over the landscape over time.

Because of the large number of trees burned on national forest system lands in the Moose Fire, some people had concerns for a lack of both large live and large dead trees critical to some wildlife species and for other ecosystem functions. Where large live trees--some retained as old growth--once occurred, there now are only dead standing or dead downed trees. Some people asked us to leave large dead trees on site as habitat for birds, bears, ungulates, and other wildlife species. One letter said, "Special consideration should be given to retaining burned old-growth and generous amounts of snags in areas that serve to connect existing areas of unburned old growth. We ask that snag retention guidelines be more generous than those provided in Amendment 21 in order to better provide for wildlife and to compensate for the effects of the Moose Fire."

This issue is addressed through development of Alternative 4, which proposes to retain greater levels of snags and downed wood material than other alternatives.

Issue Indicators: *acres and percentage of high and moderate snag potential areas treated and acres and percentage of high and moderate downed wood habitat potential areas treated*

4. Riparian habitat conservation areas (RHCA) as described in the Inland Native Fisheries Strategy (INFISH) may not be large enough to compensate for the combined effects of the Moose Fire and proposed management activities.

Concerns for increased sediment to the streams from the Moose Fire, compounded by salvage and road management activities, might negatively affect streams critical to bull trout survival and recovery. By increasing the size of the RHCAs (or buffer areas surrounding streams), some people believe this may mitigate the negative effects from the fire in these important areas. One writer recommends following INFISH standards for RHCAs and increasing them in sensitive reaches where bull trout spawn, and where soils are particularly unstable. This could include spawning reaches of Big Creek, Hallowat Creek, Nicola Creek, Coal Creek, South Fork of Coal Creek, and Mathias Creek. Increasing buffers for post-fire salvage is a management technique used by other forests to reduce potential sediment impacts to bull trout habitat."

This issue is addressed through development of Alternative 4, which proposes 300-foot riparian habitat conservation areas on all streams. No salvage would be allowed within riparian habitat conservation areas.

Issue Indicators: *RHCA widths; changes in sediment yield attributable to RHCA widths*

5. The fire may have affected wildlife security particularly during hunting seasons.

Along with trees, the fire consumed many low-lying plants and shrubs. When alive, many plants served to hide wildlife. Some people have concerns that this loss of hiding cover will have negative effects on wildlife, especially during hunting season. Some people have asked us for seasonal closures on some roads during hunting season, at least until some hiding cover returns.

This issue is addressed through development of Alternatives 4 and 5. Alternative 4 proposes to implement seasonal restrictions to motorized use for more miles of roads than are needed to meet Forest Plan standards for open road density. Alternative 5 uses seasonal road restrictions to provide a higher level of wildlife security during hunting season, while meeting Forest Plan requirements for grizzly bear security.

Issue Indicators: *a comparison of summer habitat effectiveness values within affected Habitat Analysis Units; and potential effects of salvage logging and road management on security and vulnerability during the hunting season*

6. The proposed salvage treatments and road strategy may result in ineffective use of winter range areas by ungulate species.

Similar to other concerns for a loss of secure habitat for wildlife, this concern focuses on a reduction of hiding and thermal cover, effective habitat, and security during hunting season for big game in winter range areas.

This issue is addressed through development of Alternative 4, which proposes to implement seasonal restrictions to motorized use for more miles of roads than are needed to meet Forest Plan standards for open road density. Motorized access would be seasonally restricted with this alternative for the

portion of Big Creek Road #316 that traverses through the fire area. Alternative 4 also prohibits winter logging in all units.

Issue Indicators: *qualitative assessment of potential effects of winter logging and removal of trees on elk and mule deer hiding and thermal cover*

7. More roads may need to be decommissioned and restricted than what the Forest Plan (Amendment 19) specifies due to accelerated runoff from burned lands, and less cover and security for grizzly bears because of the fire.

To protect bull trout habitat, some people asked us to decommission more roads because accelerated runoff may threaten smaller culverts. If the culverts fail, runoff may add more sediment into Big Creek and Coal Creek. Also, regulations of Amendment 19, designed to provide secure habitat for grizzly bears, may no longer provide adequate security because the fire consumed much of the vegetation that made up the secure habitat in the subunit. A more open forest environment exists, increasing sight distances, which may affect security.

This issue is addressed through development of Alternative 4, which proposes to decommission more miles of road than needed to meet Forest Plan standards for grizzly bear habitat security.

Issue Indicators*: miles of road proposed for decommissioning; miles of road closed to motorized access yearlong by subunit; miles of road closed to motorized access seasonally by subunit*

8. Provide a higher level of public motorized access than Forest Plan standards allow.

When the *Big Creek Ecosystem Analysis at the Watershed Scale (EAWS)* was in progress (1999), a collaborative group helped formulate a road management plan for the Big Creek drainage. The group would like to see this plan carried forward and implemented through the Moose Post-Fire Project. One respondent said, “A lot of work was done with many diverse interests, including recreationists, to come up with that proposal. It does not totally meet A-19, because seasonal closures do not count toward A-19 closure requirements. Seasonal closures, however, could buy as much habitat security as full year closures in some areas, like around Moose Lake.”

This issue is addressed through development of Alternative 3, which proposes a road management strategy that would allow more public motorized access than would occur to meet Forest Plan standards for grizzly bear security. This alternative would require a project-specific Forest Plan amendment to allow higher open and total road densities, and lower security core area than currently specified by Forest Plan grizzly bear standards.

Issue Indicators: *miles of road open to conventional motorized use (wheeled vehicles) yearlong; miles of road open to conventional motorized use seasonally, miles of road decommissioned*

9. Big Creek Road 316 should be re-opened because it provides good huckleberry picking and other recreation options.

Restrictions on the use of wheeled motorized vehicles were put into place on the upper portions of Big Creek Road 316 as a result of the Forest Supervisor’s 1995 decision on the Expansion of the Big Mountain Ski and Summer Resort Project. Many people have asked us to reopen the road because it has offered families a good huckleberry picking area; it provided the only road access to the Smoky Range National Recreation Trail; and, along with the Werner Divide and Red Meadow roads, was only one of three roads where people could drive over the Whitefish Divide.

This issue is addressed through development of Alternatives 3 and 5. Alternative 3 proposes a road management strategy that would provide a higher level of motorized public access than Forest Plan standards allow. Road 316, currently closed to motorized use yearlong, would allow seasonal motorized use. This alternative would require a project-specific Forest Plan amendment to allow higher open and total road densities, and lower security core area than currently specified by Forest Plan grizzly bear standards. The road management strategy developed for Alternative 5 would meet Forest Plan standards for grizzly bear security while allowing seasonal motorized access on Road #316. To accomplish this, other roads would be restricted yearlong, including roads currently providing public access to the Moose Lake campground.

Issue Indicators: *change in restrictions of conventional motorized vehicle use on Big Creek Road #316*

10. Road decommissioning activities may not be compatible with snowmobiling on existing snowmobile routes.

Due to a lawsuit settlement agreement signed earlier this year, snowmobile use within the Glacier View Ranger District is restricted to certain play areas and existing road corridors. Proposed road decommissioning activities such as culvert removals, waterbars, barriers at the beginning of the road, etc. may leave some of these routes/roads in a condition that is neither safe nor desirable for snowmobile use.

This issue is addressed through the development of Alternative 3, which proposes to leave an estimated 10 to 15 stream crossing culverts in roads that would otherwise be decommissioned to meet grizzly bear standards for total road density and security core area. The Forest Plan currently required that roads have all stream crossing culverts removed before the road can be “counted” as decommissioned. Therefore, this alternative would require a project-specific Forest Plan amendment to allow culverts to remain in some roads that are “counted” as decommissioned.

Issue Indicators: *miles of road proposed for decommissioning on existing snowmobile routes*

11. There is concern that the project area needs to be rehabilitated and restored through such actions as road decommissioning and reducing sediment sources; which would include

little to no salvage logging. Concern was also expressed that bark beetle control measures did not include enough non-salvage techniques.

Some people asked us to consider allowing the forest to heal itself. It might or might not include logging, but no logging would take place in inventoried roadless areas, riparian habitat, or "critical stretches of impaired watersheds." It would include road decommissioning and restoring areas affected by fire suppression that occurred during the Moose Fire and from past management activities. In addition, some people asked that we focus more effort on controlling possible beetle populations by using methods that would not require logging infested or susceptible trees.

Alternative 6 was developed specifically to respond to this issue. However, Alternative 6 was eliminated from detailed study. Further details are given on page 2-52.

12. There is concern that the proposed action does not salvage log enough of the project area to address beetle concerns, economic opportunities, and fuel hazards resulting in a reburn potential.

We received many comments from people asking why we identified only 4300 acres in which to salvage trees when over 35,000 acres burned on national forest system lands. Here is one example: "A maximum timber salvage alternative should include not only all economically viable timber on suitable lands, but valuable timber in non-timber management areas where wildlife, visual, or recreation goals can be improved by reduction of future timber deadfall and fire fuels."

Alternative 7 was developed specifically to respond to this issue. However, Alternative 7 was eliminated from detailed study. Further details are given on page 2-53.

13. There is concern that deferring salvage in riparian areas results in a fuel hazard causing a reburn potential, debris jams causing channel instability, breeding habitat for bark beetles, and increases in nutrient loading.

Many trees in riparian areas, especially large spruce trees, died in the Moose Fire. Many of these trees have already fallen over, landing in streams and along stream banks and creating large jackstraws. Concerns from many people exist for the reasons stated in this issue. One writer wrote, "The fire was not selective by not burning riparian areas. In fact, riparian areas were burned very severely in some places. It is important to water quality, fisheries, and wildlife that these areas recover quickly. Salvaging must occur in the riparian areas. This work should be combined with placement of logs and root wads to replace windfalls that were burnt. Allowing massive wind throw with their large root systems to occur will only increase sedimentation, water velocity, and channel migration. How will you minimize the further destruction of the riparian areas?"

Alternative 8 was developed specifically to respond to this issue. However, Alternative 8 was eliminated from detailed study. Further details are given on page 2-54.

14. There is concern that the salvage harvest should not create any openings greater than 40 acres.

One writer requested that an alternative be developed where proposed opening sizes would not be larger than 40 acres; however, no reasons were provided for their request. It is believed, though, that concerns for larger opening sizes relate to effects to cover and security for various wildlife species, effects to water quality and consequently effects to fish.

Alternative 9 was developed specifically to respond to this issue. However, Alternative 9 was eliminated from detailed study. Further details are given on page 2-54.

Analysis Issues

The following resource areas had other concerns expressed during the scoping period that are best addressed by disclosing, comparing, and contrasting the environmental and social effects of the proposed action and its alternatives. The results of the effects analysis on the following resources are described in detail in chapter 3.

- Vegetation (includes spruce/Douglas-fir beetle risk, structure/composition)
- Threatened, Endangered, and Sensitive (TES) Plants
- Noxious weeds
- Fire and fuels
- Wildlife (including TES, ungulates, snags and downed wood material)
- Fish
- Hydrology
- Soils
- Recreation
- Heritage resources
- Visuals
- Inventoried roadless lands
- Wild and Scenic River
- Other unroaded lands
- Economics
- Air quality

III. DESIGN CRITERIA (FEATURES COMMON TO ALL ACTION ALTERNATIVES

Many concerns expressed in the scoping period are best addressed through development of design features that are common to all action alternatives (Alternatives 2 through 5) and that specifically avoid or reduce potential environmental impacts. These design features are an integral part of each action alternative, and therefore are considered requirements should an action alternative be selected. They are listed here to avoid repeating them in each alternative description.

Appendix C includes a complete list of the project-specific best management practices (BMP) and a table linking each measure to the applicable treatment units. BMPs are also features common to all action alternatives, although the location of specific practices varies by alternative.

Heritage Resources

If previously unknown heritage resources are encountered during implementation of the project, activities at the site would be halted and the forest archaeologist would be notified immediately. Activities would not resume until adequate protective measures are developed and specified in the field.

A contractual provision would be included in any timber sale contract that requires identification and protection of known resources and allows modification or cancellation of the timber sale or other contracts if necessary to protect resources discovered while project implementation is in progress.

Wildlife/Fish

Biological assessments for this project were completed for any threatened or endangered species potentially inhabiting the project area.

The following contract provisions would be included in any timber sale contract:

- Use of Roads by Purchaser - Specifies conditions under which purchaser may use roads for hauling.
- Closure to Use by Others - Prohibits hunting, discharging of firearms, transportation of hunters or big game animals by the purchaser within closed areas.
- Protection of Habitat of Endangered Species - For protecting any listed threatened, endangered, or sensitive species encountered during project implementation.
- Conduct of Logging - Sets forth methods of felling, skidding, and yarding required to implement silvicultural prescriptions and meet other land management objectives.

Surveys for wolf presence
would be conducted each March, April, and May to determine whether wolves are using the project area. If wolves are detected and it is determined that denning is occurring, no logging activities would be allowed within a one-mile radius of the den and/or rendezvous sites during March 15 – July 1 (Forest Plan, p. II-44).

Salvage harvest in units 37, 37A, 38, 40, 41, 75, and 76 would be restricted to the time period of May 15 to September 1 to protect bull trout spawning. The removal of any stream-aligned culverts above bull trout spawning areas would be carried out between May 15 and September 1. Culvert removals from streams inhabited by westslope cutthroat trout would be limited to the period of July 15 to April 30. Culvert removals from streams meeting both criteria would be carried out from July 15 to September 1 each year.

Any “moist sites” located during layout of salvage units would be protected and provided with an appropriate riparian buffer (Forest Plan, p. II-35).

Duration of Activities

Timber sale contracts would be awarded for a 3-year term, beginning in the fall of 2002 or spring of 2003
. Fuels reduction activities within salvage units, if needed, would be conducted within two years of completion of salvage operations. Tree planting would occur within two years of completion of salvage or fuels reduction activities, assuming adequate availability of trees. Road decommissioning work would be completed by late autumn of 2009. These dates are tentative, based upon anticipated budgets, work force availability, weather and other considerations. Actual dates for implementation and accomplishment could vary.

Proposed activities have been modified to avoid potential impacts to three occurrences of one sensitive plant, pink corydalis, found during pre-salvage surveys (see write up in Chapter 3 under *Vegetation: C. Threatened and Sensitive Plants*). If unknown populations of sensitive plants were found during project implementation, they would be evaluated and protected as necessary to retain population viability. A contract clause would incorporate this into any timber sale contract. This clause specifies that the contract would be modified to protect these plants if located.

Air Quality

Excavator pile burning and jackpot burning are the only prescribed burning actions proposed with this project.
Prior

to prescribed burning, a burn plan would be prepared for each prescribed burn proposed with the action alternatives. Air quality sensitive areas, such as the Bob Marshall Wilderness Complex, Glacier National Park, and the Flathead Valley would be identified in each specific burn plan. Prescribed burning resulting from this project would be scheduled when smoke would not accumulate in unacceptable concentrations. Burn timing would also be planned to minimize effects on these smoke sensitive areas. Extended meteorological and spot weather forecast on mixing height, atmospheric stability and wind speed would be required prior to burning to ensure that federal and state ambient air quality standards are met.

Prescribed burning would use effective firing techniques to minimize smoke output per unit area and appropriate fuel moisture conditions to remove only those fuels needed to meet the prescribed burn objectives. The prescribed burn plan would contain the appropriate mop-up category to ensure actions taken reduce impacts of residual smoke on visibility and health.

The Flathead National Forest cooperates with the State Air Quality Bureau and is a member of the Montana/Idaho State Airshed Group. This coordination ensures that, during project implementation, burning only occurs under conditions that
would protect air quality and meet state and national standards.

Removal of Trees

All action alternatives focus on removing trees that were affected by the fire and exhibit the conditions specified in the Post-Fire Mortality Analysis and Guidelines contained in Appendix B of this FEIS. It is acknowledged that in following these guidelines, there may be some trees that are removed that would otherwise live, and some trees that are left that may die. The guidelines as developed are generally conservative, erring on the side of leaving trees that might die, rather than taking trees that might live. This recognizes the value that live trees can hold across a burned landscape.

For the purpose of brevity in the remaining portions of the FEIS, the trees that exhibit these conditions discussed in Appendix B and are proposed for salvage removal will be referred to as “dead and dying.” Please note that the trees proposed for removal also include Douglas-fir and spruce trees that are infested with bark beetles.

Retention of Live Trees

All salvage units require that trees of all species uninjured by the fire would be left within the units. Depending upon management objectives and tree species, additional trees with varying degrees of fire injuries would be left within all units as well. The post-fire mortality guidelines (Appendix B) provide criteria for leave tree selection that would be followed in all salvage units except those within the inventoried roadless areas, Wild and Scenic River corridor, and in Management Area 13a (winter range unsuitable for timber management). In these latter areas, only trees infested with beetles would be salvaged; therefore, there would be many other trees of all species, sizes and degrees of fire injury remaining on the site after salvage is complete. Please note that some live trees would likely be cut for logging access or safety reasons. These trees would be left on the ground except where felled to create landing areas. All ponderosa pine, whether live or dead, would be left within all salvage units.

Downed Wood and Snags

Dead, larger-diameter
larch trees (i.e. >18” DBH or >20” DBH, depending upon alternative and unit) would be left within all salvage units as per the site specific prescriptions (refer to alternative descriptions in this chapter and in

Appendix A) to provide primarily for wildlife snag habitat, long term soil productivity, and forest structural diversity objectives. Dead ponderosa pine of all sizes would be left within all salvage units in all alternatives. Please note that incidental trees meeting these criteria would likely be cut to accommodate landings, skid trails, skyline corridors, snow road locations, or for safety reasons. If these trees are tipped over or felled for safety reasons during the logging operation, they would not be removed but left for downed wood habitat (except if on a landing site).

Larger-diameter high value
wildlife snags within 200 feet of an open road (either inside or outside a salvage unit) or within riparian habitat conservation areas would be designated/signed to protect from firewood cutters. Definition of these wildlife trees generally refers to larch, ponderosa pine, cottonwood or Douglas-fir; typically larger diameter; usually showing signs of decay, broken tops, woodpecker use, other animal use, etc. Each alternative also has additional snag marking/signing that would occur along open roads, as described under the alternative descriptions later in this Chapter.

In most units, abundant unmerchantable trees would remain within the unit, standing where possible. Trees felled during the logging operation but not removed from the site would be left as intact as possible, with only tree limbs removed to get slash closer to the ground if necessary and hasten its decomposition.

Slash reduction

Treatment of logging slash (i.e. piling and burning, or jackpot burning) would be limited to those units where fuel loadings pose other resource concerns (such as regeneration potential or fire risk). Given current knowledge of site conditions, Appendix A lists potential slash treatment needs by unit. Though some amount of downed wood is of value to protect soil surfaces, a post-harvest condition that minimizes heavy slash concentrations is more desirable to meet other resource concerns (such as regeneration and fuel loading). In all alternatives, logging practices that create conditions where most unmerchantable trees are left standing, excessive slash concentrations are minimized, and soil impacts are avoided or minimized, would be encouraged and used. Downed unmerchantable trees would be left as intact as possible, rather than bucking into short pieces. In some units, slash would be placed on skid trails to lessen the impact of logging equipment. In areas where fire severity was low to moderate and slash is composed of mostly fine needles and branches, this material would be left on the site to leach into the soil for at least one wet season. After this period, the sites would be evaluated to determine the need for further slash treatment.

Tree Planting

All salvage units would be reforested through either natural regeneration or tree planting of native conifer species (primarily larch, Douglas-fir, western white pine or ponderosa pine). This would restore the productive capacity of the land in a timely manner and ensure desired species diversity in the future forest. Refer to Appendix A and the alternatives descriptions within this chapter for projected planting acres.

Scenic/Visual Resources

In order to reduce the short-term visual impacts of slash residue in units in close proximity to “foreground viewing areas” or “middle-ground viewing areas,” the following actions would be taken:

- Dispose of burn piles along open roads within two years.
- Low cut or angle cut stumps in the immediate foreground (100’) along the North Fork, Coal Creek, and Big Creek roads
(maximum stump height – 6”).

- Rehabilitate landing areas next to open roads. Dispose of slash and scarify as necessary to establish new vegetation.

Riparian

To reduce potential impacts on soils, water quality, wetland, and riparian areas, the following would occur:

- Requirements of the Montana Streamside Management Zone (SMZ) Law and the Inland Native Fish Strategy (INFISH) would be followed for all treatments within or adjacent to wetland or riparian areas.

Timber sale contracts contain standard clauses that provide protection for riparian areas, stream management zones and riparian habitat conservation areas.

Public Firewood Gathering

Currently, a temporary closure order (up to 1 year) is in place that restricts firewood cutting within the national forest portion of the Moose Fire area. All alternatives would continue this closure order restricting public firewood cutting in the Moose Fire area during proposed salvage sale operations.

Water

All timber sale contracts would require dust abatement measures to minimize the airborne delivery of sediment to streams.

The timing of culvert removals and application of BMP measures can minimize the effects of road decommissioning activities. When possible, the staggering of culvert removals over more than one season in a single watershed would reduce the amount of sediment entering a stream at any given season. Following a culvert removal, the use of erosion control matting and shrub planting for streambank stabilization would reduce additional erosion and sedimentation.

Soils

Management practices to protect soil from erosion and maintain soil productivity include the following. These requirements would be incorporated in to any timber sale contract through the inclusion of the contract clauses.

- Minimize ground disturbance by using helicopters, skyline cable systems, and ground-based mechanized equipment that has proven capability to be “light on the land” (ground-based equipment that is light on the land could include excavators and log forwarders).

- Use ground-based mechanized equipment (such as skidders and feller-bunchers) only on areas where terrain and soil conditions would cause minimal impact to soils (slopes generally less than 35%).
- Operate equipment only when soils are at an acceptable level of dryness, as determined by the timber sale administrator based on site-specific sampling.
- Designate main skid trails and temporary access roads and/or lay down treetops and limbs on these trails to protect the soil during skidding operations.
- Winter logging would be done when the ground has enough snow or is frozen enough to protect soils.
- In

most units of low to moderate fire severity, where fine needles and branches remain on the trees, yarding of tops (i.e. whole tree yarding) would not occur. This fine organic material would be left in the units over at least one wet season to provide ground cover that reduces soil erosion rates and, if needles remain, provides nutrients. In some units, abundance of unmerchantable material may provide enough fine organic material to supply the needs for productivity. In addition, depending upon how long after the fire event the salvage harvest occurs, most if not all of the needles will have already fallen from the scorched trees, providing nutrients to the site.

- To minimize erosion and other detrimental impacts to the soil resource,

salvage harvest would be completed using BMPs or Soil and Water Conservation Practices (SWCPs). The practices are described in detail in the Forest Service Soil and Water Conservation Handbook (FSH 2509.22), the Soil Management Handbook (FSH 2509.18) and the Forest Plan (pages II: 40-46). Included are such practices as providing for sufficient road drainage, limiting tractor logging operations to periods when soils are dry or under winter snow and less subject to compaction, seeding of landings and cut and fill slopes of roads, and maintaining vegetative buffer strips between cutting units and streams for sediment filtration. Each harvest unit and all proposed road work would be reviewed and applicable SWCPs identified on a site-specific basis for protection of the soil and water resource. These practices would be listed and described in the Decision. Refer to Appendix C: BMPs.

- All skyline corridors would have waterbars installed and slash placed on bare soils

as needed, to provide ground cover and reduce soil erosion. All skid trails would have waterbars installed and slash placed on the trails as needed.

- If mechanical fuel treatments were deemed necessary, they would be accomplished with excavators to reduce soil disturbance (Land and Resource Management Plan Annual Monitoring Report, 1992 page 131-139).
- Required mitigation: All salvage units where levels of detrimental soil disturbance exceeds 15% post-harvest would require measures be implemented to reduce detrimental disturbance to 15% or below.

Dry soils are determined using the hand squeeze method. If a sample of soil does not form a sturdy clump or ball when squeezed and does not leave a wet muddy coating on one’s fingers, then it is at the proper moisture level to put equipment on the ground.

A slash mat would be thick enough to prevent deformation of the soil surface by the equipment tracks or wheels. In other words, no tracks would be visible in the soil. The depth of the slash mat would vary with the type of material available for the slash mat.

Winter logging requires that there be enough snow so muddy water does not mix into or bleed into the snow where equipment operates. The depth of snow varies with the snow conditions. It takes more dry powder snow than wet dense snow to protect the soil surface. Soils must be frozen enough to prevent deformation of the soil surface where equipment operates.

Additional design measures to minimize soil erosion and compaction based on burn severity ratings (the fire's effect on soil), and slope (which relates to erosion hazard) were developed. In addition, special management practices were developed for units where the fine branches and needles were completely burned. These practices are specific to individual salvage units, and are described in detail in Appendix C - Best Management Practices.

Noxious Weeds

Features listed under the *Soils* section above would also serve to reduce the risk of noxious weed establishment and spread. Specific actions related to noxious weed concerns include the following:

- Wash all off-road equipment before entering the area

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- Re

establish vegetation on bare ground created by road decommissioning or timber harvest activity. Use native material where appropriate and available.

Recreation

All trails would be protected during salvage harvesting. No skidding would occur down any trail. In addition, crossing a trail with heavy equipment would be minimized and trees would be felled away from the trail. Any damage that might occur during logging and associated site preparation activities would be repaired. Activities at developed recreation sites would be timed to accommodate public use to the extent practical.

In response to public comments
received during the comment period on the draft EIS, we reviewed the motorized use of the Elelehum Trail 194 and Deadhorse Trail 255. We discovered an oversight not disclosed in the DEIS: these trails are in grizzly bear security core areas. Grizzly bear security core areas allow no motorized use during the non-denning season (see Amendment 19 or Appendix TT of the Forest Plan). As a result, we have modified the FEIS to close these trails in all action alternatives during the non-denning season (generally, from March 16 to November 14) **t**o comply with Amendment 19 requirements. Monitoring of these trails has shown that they receive little motorized use.

Public Safety / Roads

Other than a minor amount of snow road in Alternatives 2, 3, and 4, no road construction or reconstruction would occur with any alternative. This includes temporary roads, which were dropped from consideration in the FEIS.

Contractors would be required to post signs along Forest Service haul roads warning the public of truck traffic and activities. Warning signs and public announcements would be used to notify the public of logging/site preparation/road management activities in the area.

Grading may be needed in order to maintain road drainage during project activities. Dust abatement on open roads and blading would occur as needed on the main haul routes. Dust abatement, using non-petroleum based products, would minimize delivery of airborne sediment to streams.

Warning signs and public announcements would be used to notify the public of logging/site preparation/road management activities in the area.

Roads may be restricted for safety purposes during logging operations. Portions of the project area may be restricted to the public during helicopter operations.

On roads closed to motorized use that are needed to access salvage units, public access would remain restricted. Timber sale contracts would contain clauses to insure that roads remain closed to public motorized use.

Helicopter Landings

An estimated 10 to 15 areas covering approximately 1 to
2 acres each would be used for helicopter landings. Landings would not be located on problematic soils, in riparian habitat conservation areas, inventoried roadless areas, or other areas determined as "sensitive" by an interdisciplinary review. In addition, they would be located in generally level areas. In some cases, roads may be used as landing areas. Landings also would avoid areas with concentrations of live trees.

V. ALTERNATIVES CONSIDERED IN DETAIL

The FEIS considered the proposed action (Alternative 2) and four alternatives in detail. Alternative 1 is the *no action* alternative, under which the project area would have no salvage harvest or road management at this time and would remain subject to natural or ongoing changes only. The other action alternatives represent different ways to satisfy the purpose and need than that of the proposed action by responding with different emphases to the significant issues discussed earlier in this Chapter. Maps of all alternatives considered in detail are provided. The map for Alternative 1, the no-action alternative, represents the current condition of the project area. Larger-scale maps of the alternatives are contained in the project planning record.

Alternative 1 (No Action)

The emphasis of this alternative is to represent the existing condition against which the other alternatives are compared. Alternative 1 proposes no salvage, fuels reduction, pheromone beetle trap treatments or road management changes within the *Moose Post-Fire Project* area at this time. It does include those activities listed as foreseeable actions in Chapter 3. It does not preclude activities in other areas at this time, or preclude activities in the *Moose Post-Fire Project* area at some time in the future. CEQ regulations (40 CFR 1502.14d) require that a "no action" alternative be analyzed in every Environmental Assessment (EA) or Environmental Impact Statement (EIS).

Under this alternative, management activities would be limited to ongoing and foreseeable actions listed in Chapter 3 of this
FEIS.

Map 2-1 displays the existing road management status in the project area.

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MAP 2-1

: Existing Road Management

Alternative 2 (Proposed Action)

The proposed action was developed specifically to respond to the purpose of and need for action. It focuses on reducing potential tree mortality from spruce and Douglas-fir bark beetles, recovering merchantable wood products on lands specified as suitable for timber production in the Forest Plan, and reducing future fire risk and hazard on specific sites adjacent to private property and administrative sites (see *Purpose and Need for Action* in chapter 1). Alternative 2 would comply with all existing Forest Plan standards. It would require no Forest Plan amendments.

Salvage Harvest of Trees

Approximately 2428 acres of salvage harvest would occur across the Moose Fire area (refer to Map 2-2). An estimated 14.7 million board feet would be generated with the implementation of this alternative. No permanent or temporary road would be constructed to facilitate logging systems. S
now roads would be used in units 3 and 26. The following logging systems would be used:

Ground skidder, summer or winter = 255 acres (11% of salvage acres)
Ground skidder winter only, or helicopter = 387 acres (16%)
Skyline = 266 acres (11 %)
Helicopter = 1520 acres (62%)

Table
2-1 and the paragraphs that follow describe the general treatment prescriptions for the salvage units. Appendix A provides information on the treatment and conditions for each individual salvage unit.

Table 2-1: Summary information for proposed salvage units in Alternatives 2 and 5

Salvage Units within Forest Plan Management Areas 9, 13, and 15. NOT within Inventoried Roadless Area.			
These lands are classified as suitable for timber management, with timber production a primary goal in MA 15 and allowed in MA 9 and 13 if compatible with elk and deer winter range management goals. Salvage harvest addresses the purpose of recovering merchantable wood fiber and decreasing potential mortality due to spruce and Douglas-fir bark beetles.			
Group	**Units**	**Fire Severity**	**Treatment prescription**
1	**40 Units** **1473 acres** Units 3,3A,4, 5,6,8,9,10,11,12,13,18,19, 21,26,27,28, 29,30,31,33, 34,35,37,37, 40,43,44,46, 48,49,53,54, 58,58A,59,61,62,64,65	**Mod-High to High** 75+% tree mortality, usually nearly 100%	• Salvage harvest would remove dead and dying merchantable trees across the units, either trees killed and damaged directly by the fire, infested with or susceptible to Douglas-fir or spruce bark beetles. Trees to salvage are determined by degree of fire injury to bole or crown of tree, as guided by the post fire mortality guidelines (Appendix B of the EIS). • In all units, numerous trees (mostly dead) would remain on the site after salvage. These consist of unmerchantable trees of all sizes, as well as all larch >18" DBH , all ponderosa pine, and live trees most likely to survive the effects of the fire (refer to snag and leave tree treatments following this table). Live trees would be relatively sparse due to fire severity. Leave patches are left along streams or wet spots, some excessively steep or marginal sites. • Units 13 and 61 would have higher levels of snag retention due to surrounding poor large-snag habitat conditions. All larch would be left (all sizes) as well as larger size burned Douglas-fir (>18" DBH).
2	**14 Units** **575 acres** Units 1, 2, 20, 22, 23, 24, 41, 52, 55, 56, 57, 63, 63A, 66	**Low To Mod** (40-70% tree mortality)	• Salvage harvest would remove dead and dying merchantable trees across the units, either trees killed and damaged directly by the fire, infested with or susceptible to Douglas-fir or spruce bark beetles. Trees to salvage are determined by degree of fire injury to bole or crown of tree, as guided by the post fire mortality guidelines (Appendix B of the FEIS). • There would be greater numbers of live trees remaining within these units after salvage as compared to units that burned at moderately high to high severity (Group 1). These units are in areas that burned at low to moderate severity and contain variable and sometimes substantial amounts of live trees, though most of these trees have been affected to some degree by the fire (such as underburned or partially scorched). Those trees most likely to survive would be left, as guided by the post fire mortality guidelines (Appendix B). They occur as both scattered individuals and in small groups or larger patches throughout the area. Also, in all units, >18" DBH larch would be left, and all ponderosa pine. Additional leave patches include zones of no salvage along all streams or wet spots, excessively steep or marginal sites.

3	**3 Units** **129 Acres** Units 25, 38, 50	**Mod** (around 50% tree mortality)	• These are past shelterwood harvests, 16-84 acres in size, with a pre-fire estimate of 15-30 or more trees per acre overstory larch and Douglas-fir (with the higher amount in Unit 38) and an understory of seedling and sapling trees. Nearly all the understory was killed by the fire, along with variable amounts of the overstory trees. • In Units 25 and 50, helicopter logging would be used. Treatment would leave all larch of all sizes, as well as burned Douglas-fir trees over 18" DBH. Harvest would remove fire-killed/damaged merchantable Douglas-fir trees less than 18" diameter, susceptible to or infested by bark beetles • In Unit 38, skyline logging would be used. Abundant live larch remain throughout most the unit (>15 tpa), with lesser amounts of Douglas-fir, except in the lower 1/3 of the unit where scorched and beetle infested Douglas-fir predominates. Treatment would be focused in this lower portion of the unit, leaving all larch and remove the merchantable and beetle infested Douglas-fir.

Salvage Units within Forest Plan Management Areas 13A, Wild & Scenic River, and Inventoried Roadless			
These lands are classified either unsuitable for timber management (MA 13A and Wild and Scenic River) or have special management direction (within inventoried roadless areas). Timber harvest is allowed if the special values of these lands are retained and the specific land management direction is met. Salvage harvest addresses the purpose of decreasing potential mortality due to spruce and Douglas-fir bark beetles.			
Group	**Units**	**Fire Severity**	**Treatment prescription**
4	**14 Units:** Units 14,15, 16, 17 Winter Range, **(Est. 85 out of a total 252 would be salvaged**) Units 67, 68, 69 Wild & Scenic River **(15 acs salvaged**) Units 70, 72, 73, 75, 76, 77, 78 Inv. Roadless **(Est. 151 out of 470 acres would be salvaged**)	**Low to High** 60-95% tree mortality 50-85% tree mortality 30-95% tree mortality	• All units would be logged with Helicopter systems. • In these units, only Douglas-fir or spruce trees that are currently infested with bark beetles would be removed. All species other than Douglas-fir and spruce would be left standing (live or dead) or, if unsound and must be felled for safety reasons, would be left as downed wood on the site. • Beetle infested trees are thinly scattered within the boundaries of Units 14-17. Salvage harvest would result in the removal of individual trees in an irregular pattern across the total unit area , leaving the majority of the area in these units unaffected by salvage activities, and remaining in the condition the fire left it. Across all these units, there would be large numbers of fire-killed trees left after harvest, of all sizes, with Douglas-fir the predominant species. Unit 15 and to a lesser degree Unit 16, would also contain many live trees. • The Wild & Scenic river units are quite small, less than 7 acres each, immediately adjacent to the North Fork road, on the bench 100-200 feet above the river. Individual beetle infested Douglas-fir would be removed , which are scattered throughout the area. Based on intensity of beetle infestation, treatment would result in removal of less than ½ of the existing trees. • Based on beetle infestation intensity, salvage harvest in Units 70-78 would result in the removal of small groups and individual beetle infested trees in an irregular pattern across the unit area , leaving most of the area unaffected by salvage, remaining in the condition the fire created. Large numbers of fire-killed trees, along with numerous live trees in Units 70, 75 and 76, would remain after salvage.

All salvage units apply treatments to manage post-harvest residual standing, dead and downed trees within the salvage units and in areas along open roads, where firewood cutting may occur. These treatments are outlined below. These forest and site components are important across a burned landscape. Values include: improved forest structural diversity (both now and into the future); habitat for numerous wildlife species; shade and protection on more exposed sites; long-term soil productivity and organic matter; soil erosion protection; and a host of other less understood ecological functions, such as providing a substrate for soil microorganisms.

Slash Treatment and Downed Wood Material after Harvest:

Treatment of logging slash (i.e. piling and burning, or jackpot burning) would be limited to only those units where fuel loadings pose other resource concerns (such as regeneration potential or fire risk). Though some amount of downed wood is of value to protect soil surfaces, a post-harvest condition that minimizes heavy slash concentrations is more desirable to meet other resource concerns (such as regeneration and fuel loading). In all alternatives, logging practices that create conditions where most unmerchantable trees are left standing, excessive slash concentrations are minimized, and soil impacts are avoided or minimized, would be encouraged and utilized. Logging practices that are most likely to create this desired condition would be encouraged. This might include designating and minimizing number of skid trails
, winter logging, and/or limiting the length of piece to be yarded. Downed unmerchantable trees would be left as intact as possible, rather than bucking into short pieces. In some units, slash would be placed on skid trails to lessen the impact of logging equipment. In areas where fire severity was low to moderate and slash is composed of mostly fine needles and branches, this material would be left on the site to leach into the soil for at least one wet season, to retain nutrients on the site and store them in the soil for plants use.

Appendix A lists individual units and expected slash treatment needs, based on the best available information. Slash treatments would be refined when more information is known about proportion of unmerchantable material (which can increase depending upon how long harvest is delayed), how many trees blow down or are pushed over/felled during the logging operation, and other factors. Upon completion of logging operations, all units would be individually evaluated for slash conditions, potential concerns, and site-specific treatment needs verified. Factors that might influence this decision include slash size (larger-diameter material is less of a fire hazard than fine organic material); slash continuity (discontinuous fuels may not pose a concern); unit location in relation to surrounding fuel and forest conditions; and existing or potential conifer regeneration.

Under Alternatives 2 and 5, slash would be reduced by excavator piling and burning across about 240 acres of units accessible in the summer with ground-based (skidder) logging systems; by jackpot burning (burning of scattered slash concentrations) across about 158 acres of skyline logged units. Another 363 acres of ground-based (skidder) units, primarily those where winter logging is required to protect soils, have no planned post-salvage slash treatment, except what is accomplished through the logging operation with removal of the trees. Some limited hand piling of slash concentrations along open roads may occur in these units. In the helicopter-logged units, no post-salvage slash treatment activities are planned.

Retention of Large Snags and Live Trees:

Because of tree densities, variation in size classes, and the rapid deterioration of burned trees, most units would have many more dead trees per acre that would not be removed (mostly unmerchantable trees of all sizes and species, but also the designated retention trees) than trees that would be salvaged. These trees would be left standing wherever possible, considering logging safety and accessibility to salvaged trees.

Within all salvage units, all larch (live or dead) >18" dbh would be designated to leave, either by marking or description. All ponderosa pine would be left also (all sizes, live or dead). If felling of these trees were necessary for logging access or safety requirements, they would be left on site as downed wood material except in landing areas.

All live trees determined to have high probability of surviving the effects of the fire would be left on the site. The "Post-Fire Mortality Report" (Appendix B) would be applied to all units to aid in determining these trees. If felling of these trees were necessary for logging access or safety requirements, they would be left on site as downed wood material except in landing areas.

Within 200-250 feet of an open road, both within and outside salvage units, the >18" larch snags would be marked and signed as wildlife trees, to afford some protection from firewood cutting. In addition, along open roads within the fire area, both inside or outside of a salvage unit, the high quality wildlife snags would be marked and signed if within 200-250 feet of the road. These trees are defined as larch, ponderosa pine, cottonwood or Douglas-fir; typically larger diameter; usually show signs of decay, broken tops, woodpecker use, other animal use, etc. In areas off limits to firewood cutting under the permit requirements, area closure signing would also occur (such as in streamside areas and in the Wild and Scenic River corridor).

Reforestation:

Following salvage activities, each unit would be reviewed on the ground to verify possible reforestation needs. Many of the units already contain newly regenerated tree seedlings. Other areas may benefit from planting of native conifer species (larch, Douglas-fir, spruce, western white pine and ponderosa pine), to ensure more rapid reforestation of the site and/or improve species diversity. The best available information anticipates planting needs on approximately 1182 acres proposed within salvage units under Alternative 2.

Beetle Funnel Traps/Use of Pheromones/Trap Trees

Spruce beetle:

Pheromone-baited beetle funnel traps would be applied across an estimated 272 acres of spruce stands. These acres have been confirmed by monitoring the spruce beetle infestation in the summer of 2002, which found high infestation levels across most of the area that was identified as susceptible to spruce beetle infestation (project record J-32). Nearly all of the treatment sites are within the riparian areas of Big Creek and its tributaries.

Beetle funnel traps contain an attractant pheromone, mimicking that emitted by the female beetle after she finds a desirable tree in which to breed. The pheromone attracts both male and female beetles, which leads to a mass attack of the tree, aiding the beetle by overwhelming the tree's natural defenses. The intent of the beetle traps are to draw in, capture, and kill as many of the emerging beetles as possible before they have a chance to spread and attack live spruce trees within and outside the fire area.

Limited use of burning (torching) or debarking beetle-infested trees may occur within riparian areas. These methods kill beetle brood under the bark before it has a chance to emerge. They may be applicable in certain site-specific situations, such as where a beetle infested spruce tree is immediately next to one or more unburned, non-infested trees that are considered particularly important to protect. Ground verification prior to the spring of 2004

would determine specific sites and trees where these methods may be employed when adult spruce beetles would emerge.

Douglas-fir beetle:

An anti-attractant pheromone called MCH has recently become available for use with Douglas-fir beetle. This pheromone sends the chemical message of "no vacancy" to the flying bark beetles, indicating the tree is at maximum capacity and the beetle should look elsewhere for breeding sites. MCH use is effective and feasible on a limited geographic basis. MCH would be used to protect the few remaining live Douglas-fir trees in the area immediately around the buildings of the Glacier Institute,
the Big Creek campground, and in portions of the Wild and Scenic River corridor. Application of the "bubble capsules" (stapled to the trees) took place during the 2002 beetle flight to protect the trees. Under Alternative 2, MCH would continue to be applied for as long as beetle populations remain high (a minimum of 2-3 years). Keeping these large trees alive is considered important for their visual and aesthetic values, as potential seed sources, and for wildlife habitat.

Trap trees or trees baited with pheromone attractants would be used to increase the effectiveness of salvage treatments in areas of high
er beetle concentrations, where harvest would be delayed until after the spring 2003 beetle flight, and where unit juxtapositions and conditions are suitable. This combination of conditions occurs primarily on the western edge of the fire area in the Hallowat Creek drainage, and in portions of the Elelehum and upper Lookout Creek drainages. Depending upon salvage timing and prioritization of treatment sites, felling or pheromone baiting of as few as 20 or as many as 100 live Douglas-fir trees are proposed across these areas. Exact locations and numbers of either trap or baited trees would be verified with field surveys prior to implementation. Felling of trap trees or baiting of trees would occur within proposed salvage units before beetle flight begins in the spring of 2003. These trees would then be subsequently removed in the salvage operation. Refer to detailed discussion of trap tree and bait trees in Chapter 3, *Spruce and Douglas-fir Bark Beetles,* under *Direct and Indirect Effects Common to All Action Alternatives.*

Fuels Reduction

Three areas would be treated specifically to reduce current fuel loads and lower future fire risk and hazard adjacent to private property along the northern boundary of the fire area, and in the Big Creek Campground and Glacier Institute area. Treatment would occur on approximately 208 acres (refer to Table 2-2).

Table 2-2: Fuel reduction treatment areas in Alternatives 2 and 5

Treatment area	Fire Severity	Acres	Treatment prescription
Coal Creek	**High** (95+% tree mortality)	67	• Treatment area is a 300-400 foot wide strip of dense sapling/pole sized fire-killed lodgepole pine adjacent to private land boundary near the mouth of Coal Creek. A "thinning" type of prescription would be applied, with trees slashed, piled and burned, or utilized for a commercial product if possible, across the unit area. "Thinning" would be heaviest in the area closest to the private land boundary, leaving 20 or fewer trees per acre standing. More trees would be left as you move away from the private boundary, up to about 40 –80 trees per acre, creating a "feathering" effect of dead standing trees blending into the uncut forest. Very few trees survived the fire; live trees would be left (other than incidental trees cut for logging access or safety). No treatment would occur in stream management zones or within 300' of Coal Creek. • Max 15 tons/acre dead and down would be left on average over the unit. Planting of larch and Douglas-fir seedlings would occur across all acres following treatment.
Big Creek Admin. Site (Glacier Institute)	**Low to High patch mosaic** (40-70% tree mortality)	122	• Treatment area surrounds the administrative site, extending up to about 1000 feet away from buildings, and characterized by dense small diameter lodgepole, with Douglas-fir and larch in some areas, on gentle slopes. Larger diameter, >9" dbh trees occur on some lower slopes and in the areas closest to Big Creek and Glacier Institute. Most trees have been killed by fire, with patches and individual live trees in areas of lower fire severity. • A "thinning" prescription would be applied across most of the area, with trees slashed, piled and burned, or utilized for a commercial product if possible. Thinning would be heaviest closest to the buildings, with tree removal becoming lighter further away, blending into the surrounding untreated forest. Residual tree density would vary from about 25 up to 70 or more trees per acre, with unthinned patches left in some places. • Only dead trees would be removed. All live trees would be left, as well as larger diameter larch or Douglas-fir snags (i.e.>18" dbh) and additional dead or dying trees that are needed to meet desired stand conditions. Trees may be left in groups, patches or individuals to create a diverse structure and appearance. • Maximum 15 tons/acre dead and down would be left on average over the area. • Planting of more fire-resistant trees (ponderosa pine, larch and Douglas-fir) at wide spacing would occur across an estimated 100 acres. • Anti-aggregate pheromone MCH would be applied in the unburned region near the Glacier Institute to protect remaining live Douglas-fir at high risk of Douglas-fir beetle infestation. These are valuable trees for aesthetic reasons, as well as being about the only live larger trees left surviving for some distance.

Big Creek Campground	**Low to unburned**	19	• Fuel reduction activities would thin from below through portions of the campground that were mostly underburned or unburned by the fire. Selected trees of all size classes (saplings and larger) would be removed to open up the forest canopy. The dense Douglas-fir forest around the campsites would be thinned to about 15-25 feet between the tree crowns. In localized spots, planting of ponderosa pine and larch would occur. • Removal of dead trees would occur for safety considerations.

Other design features of Alternative 2

Road Management

In 1995, Amendment 19 to the Flathead Forest Plan established new forest-wide objectives and standards for grizzly bear security within the Flathead National Forest to meet long-term conservation needs of this threatened species. Amendment 19 established short-term (5 years) and long-term (10 years) standards for open motorized access density, total motorized access density and security core area, in areas known as
grizzly bear management subunits. These five and ten-year standards are also contained in the "Terms and Conditions" of the biological opinion on the Flathead Forest Plan provided by the U.S. Fish and Wildlife Service (project record C-13). The five-year period has passed, and the ten-year period will be approaching within a few years. During the Amendment 19 planning process, the portion of the Flathead National Forest that occurred within the grizzly bear recovery zone (includes all of the Glacier View Ranger District) was subdivided into subunits that approximate the size of the home range for an adult female grizzly bear. The Moose Fire affected two of these subunits, Werner Creek (located in the upper drainage of Big Creek), and Lower Big Creek (refer to Map 2-3). These two subunits do not currently comply with the five or ten-year access density standards from Amendment 19 (refer to Table 2-3).

However, Amendment 19's open motorized access density standard
has been met temporarily within both grizzly bear subunits via an emergency special closure order, which was signed on April 1, 2002, effective for one year. This special order restricts approximately 21 miles of open road within the 2 subunits with gates. As a result, the five and ten-year open motorized access density standard specified from Amendment 19 is currently met within the two subunits. The roads that have been restricted by gates due to this special order are the same open roads proposed for permanent restriction in Alternative 2. Table 2-3 does **not** display the existing situation as if this emergency special order road closure were in place; to display this information, existing situation open motorized access density would be shown as 19% for both Werner and Lower Big Creek grizzly bear subunits.

Alternative 2 would modify travel management within the Werner Creek and Lower Big Creek grizzly bear subunits to meet open motorized access density, total motorized access density, and security core specified in the ten-year standards from Amendment 19 (refer to Map 2-3). Management of approximately 190 miles of roads within these two subunits would then be consistent with the objectives and standards of Amendment 19.

Table 2-3: Comparison of Alternative 2 with Amendment 19 Standards

WERNER CREEK GRIZZLY BEAR SUBUNIT	**Existing Alt 1**	**Alternative 2**
Open Motorized Access Density	31%	19%
Total Motorized Access Density	41%	19%
Security Core	41%	70%
LOWER BIG CREEK GRIZZLY BEAR SUBUNIT	**Existing Alt 1**	**Alternative 2**
Open Motorized Access Density	25%	19%
Total Motorized Access Density	34%	19%
Security Core	50%	68%
AMENDMENT 19 STANDARDS	**5 year**	**10 year**
Open Motorized Access Density (<1 mi/mi^2)	≤ 19%	≤ 19%
Total Motorized Access Density (<2 mi/mi^2)	≤ 24%	≤ 19%
Security Core	≥ 64%	≥ 68%

Yearlong road restrictions using gates, berms, and road decommissioning would reduce road densities for increased grizzly bear habitat security. Road decommissioning would include actions that would minimize the potential for future sedimentation of streams or noxious weed development. These actions would include placement of numerous waterbars, culvert removals, grass seeding, slash or debris placement on roads, planting shrubs, and/or physical alteration of the road template. Culvert removals and stream restoration would occur where roads to be decommissioned intersect streams. To reduce the amount of ground disturbed, cross-drain culverts would typically not be removed but waterbars would be placed nearby
to ensure adequate drainage. The amount of physical altering of the road template from culvert removal or waterbar creation would vary according to the sites involved. Berms would be placed at the beginning of decommissioned roads to effectively restrict wheeled motorized vehicle access.

All road mileages displayed in the following table are estimated from computer analysis. Actual miles affected during implementation may be slightly more or less than shown in the tables. However, road changes displayed on the maps in this EIS would be implemented. Approximately 14 miles and 7 miles of open yearlong/seasonally open road would be restricted yearlong within the Werner Creek and Lower Big Creek grizzly bear subunits, respectively.
In addition, approximately 57 miles of road would be decommissioned in both grizzly bear subunits.

Table 2-4: Alternative 2 Travel Management Status

Werner Creek Grizzly Bear Subunit	**Exist Estimated Miles (without current temporary special order in place)**	**Total estimated miles after implementation of Alt 2**
Open Yearlong	28 miles	17 miles
Open Seasonally	3 miles	0 miles
Closed Yearlong/Gate	33 miles	9 miles
Closed Yearlong/Berm	12 miles	20 miles
Closed Yearlong/Natural Revegetation	2 miles	0 miles
Decommissioned Roads (since 1995)	5 miles	5 miles
Proposed to be Decommissioned	N/A	18 miles
Lower Big Creek Grizzly Bear Subunit	**Exist Estimated Miles (without current temporary special order in place)**	**Total estimated miles after implementation of Alt 2**
Open Yearlong	21 miles	14 miles
Open Seasonally	4 miles	4 miles
Closed Yearlong/Gate	34 miles	6 miles
Closed Yearlong/Berm	24 miles	19 mile
Closed Yearlong/Natural Revegetation	4 miles	0 miles
Decommissioned Roads (since 1995)	11 miles	11 miles
County Road – North Fork Road	8 miles	8 miles
Small Private Roads	2 miles	2 miles
Proposed to be Decommissioned	N/A	38 miles

Snowmobile routes/proposed decommissioned roads

There are approximately 9 miles of road proposed for decommissioning that are also snowmobile routes that access high-use snowmobile play areas. Snowmobile use of these routes has occurred for many decades. It is important to note that these snowmobile routes were identified to remain open in a recent settlement agreement from a lawsuit challenging snowmobile access across the Flathead National Forest. As part of the settlement agreement, snowmobile access has been prohibited across much of the Glacier View Ranger District. The Flathead National Forest is currently preparing an EIS to amend its Forest Plan to address winter-motorized recreation. The settlement agreement is the basis for the proposed action that was scoped to the public in August – September 2002. A decision on the amendment is expected in the spring or summer of 2003.

All stream-aligned culverts would be removed on these 9 miles of decommissioned roads/snowmobile routes. There are ten stream crossings on Road 1692, Road 315, and on the Skookoleel road system (Road 316E and its adjoining roads) where the streams are deeply incised and have year-round flow. If culverts were removed at these sites, safe and reasonable snowmobile use would effectively be blocked unless the area receives abnormally large amounts of snow.

Where culverts would be removed on these snowmobile routes/decommissioned roads, slopes would be flattened as much as possible into and out of culvert removal areas to accommodate continued snowmobile use during high snow years. Wheeled motorized access would be restricted by a berm (physical barrier) on these roads.

MAP 2-2: Alternatives 2 and 5 Salvage Map

MAP 2-3: Alternative 2 Road Management Map

Alternative 3 (Preferred Alternative)

Alternative 3 was developed to clearly address the following significant issues, while responding to the purpose and need for action:

1. ***Tree salvage in inventoried roadless areas;***
5. ***The fire may have affected wildlife security during hunting seasons;***
8. ***Provide a higher level of public motorized access than Forest Plan standards allow;***
9. ***Road 316 Big Creek should be re-opened;***
10. ***Decommissioning road activities may not be compatible with snowmobiling on existing snowmobile routes.***

Alternative 3 would include two project-specific Forest Plan amendments.
The Forest Plan would be amended to change open road density and security core standards to 29% and 63%, respectively, within the Werner Creek grizzly bear subunit. In addition, the Forest Plan would be amended to allow 10 specific stream-aligned culverts to remain in place on Road 316E and its adjoining roads, the upper portions on Road 315, and Road 1692, and still be considered a decommissioned road. These project-specific amendments would remain in place pending completion of revision of the Flathead Forest Plan, currently in progress and expected to be completed by 2006. More details on these amendments are described in the road management section for this alternative and in the project record.

Salvage Harvest of Trees

Alternative 3 salvage unit locations are the same as those in Alternative 2, except that Alternative 3 eliminates seven units (about 480 total acres) within inventoried roadless areas in response to public concerns regarding timber salvage in these areas. Alternative 3 also differs from Alternative 2 by altering the treatment prescriptions regarding snag retention within seven units (see Group 1a in Table 2-5 below) and within a 200-to-250-foot zone along open roads within the fire area (see discussion under *Retention of Live trees and Snags* section that follows).

Approximately 2266 acres of salvage harvest would occur across the Moose Fire area under Alternative 3 (refer to Map 2-2). An estimated 14.5 million board feet would be generated with the implementation of this alternative. No permanent or temporary road would be constructed to facilitate logging systems
(snow roads would be used in units 3 and 26). The following logging systems would be used:

Ground skidder, summer or winter = 263 acres (12% of salvage acres)
Ground skidder winter only, or helicopter = 393 acres (17%)
Skyline = 266 acres (12 %)
Helicopter = 1344 acres (59%)

Table 2-
5 and the paragraphs that follow describe the general treatment prescriptions for the salvage units. Appendix A provides information on treatment and conditions within each individual salvage unit.

Table 2-5: Summary information for proposed salvage units in Alternative 3

Salvage Units within Forest Plan Management Areas 9, 13, and 15. NOT within Inventoried Roadless Areas.			
These lands are classified as suitable for timber management, with timber production a primary goal in MA 15 and allowed in MA 9 and 13 if compatible with elk and deer winter range management goals. Salvage harvest addresses the purpose of recovering merchantable wood fiber and decreasing potential mortality due to spruce and Douglas-fir bark beetles.			
Group	**Units**	**Fire Severity**	**Treatment prescription**
1	**33 Units** **1126 acres** Units 3A,4,5, 6,8,11,12,13, 18,19,21,26, 27,28,29,30, 31,34,35,37, 37A,40,43,4449,53,54,58, 58A,59,61,6264,	**Mod-High to High** 75+% tree mortality, usually nearly 100%	• Salvage harvest would remove dead and dying merchantable trees across the units, either trees killed and damaged directly by the fire, infested with or susceptible to Douglas-fir or spruce bark beetles. Trees to salvage are determined by degree of fire injury to bole or crown of tree, as guided by the post fire mortality guidelines (Appendix B of the EIS). • In all units, numerous trees (mostly dead) would remain on the site after salvage. These consist of unmerchantable trees of all sizes, as well as all larch >18" DBH , all ponderosa pine, and live trees most likely to survive the effects of the fire (refer to snag and leave tree treatments following this table). Live trees would be relatively sparse due to fire severity. Leave patches are left along streams or wet spots, some excessively steep or marginal sites. • Units 13 and 61 would have higher levels of snag retention due to surrounding low snag habitat conditions. All larch would be left (all sizes) as well as larger size burned DF (>18" DBH).
1a	**7 units** **359 acres** Units 2, 3, 9, 10, 33, 48, 65	**Low (Unit 2) to High**	• Treatment would be the same as described under Group 1 above. • Trees that would remain on the site would be similar to that described under Group 1 above, except that all larch >20" DBH would be left.
2	**13 Units** **552 acres** Units 1, 20, 22, 23, 24, 41, 52, 55, 56, 57, 63, 63A, 66	**Low To Mod** (40-70% tree mortality)	• Salvage harvest would remove dead and dying merchantable trees across the units, either trees killed and damaged directly by the fire, infested with or susceptible to Douglas-fir or spruce bark beetles. Trees to salvage are determined by degree of fire injury to bole or crown of tree, as guided by the post fire mortality guidelines (Appendix B of the FEIS). • There would be greater numbers of live trees remaining within these units after salvage as compared to stands that burned at moderately high to high severity (Group 1). These units are in areas that burned at moderate or low severity and contain variable and sometimes substantial amounts of live trees, though most of these trees have been affected to some degree by the fire (such as underburned or partially scorched). Those trees most likely to survive would be left, as guided by the post-fire mortality guidelines (Appendix B). They occur as both scattered individuals and in small groups or larger patches throughout the area. Also, in all units, >18" DBH larch would be left, and all ponderosa pine. Additional leave patches include zones of no salvage along all streams or wet spots, excessively steep or marginal sites.

3	**3 Units** **129 Acres** Units 25, 38, 50	**Moderate** (around 50% tree mortality)	• These are past shelterwood harvests, 16-84 acres in size, with a pre-fire estimate of 15-30 or more trees per acre overstory larch and Douglas-fir (with the higher amount in Unit 38) and an understory of seedling and sapling trees. Nearly all the understory was killed by the fire, along with variable amounts of the overstory trees. • In Units 25 and 50, helicopter logging would be used. Treatment would leave all larch of all sizes, as well as burned Douglas-fir trees over 18" DBH. Harvest would remove fire-killed/damaged merchantable Douglas-fir trees less than 18" diameter, susceptible to or infested by bark beetles • In Unit 38, skyline logging would be used. Abundant live larch remain throughout most the unit (>15 tpa), with lesser amounts of Douglas-fir, except in the lower 1/3 of the unit where scorched and beetle infested Douglas-fir predominates. Treatment would be focused in this lower portion of the unit, leaving all larch and remove the merchantable and beetle infested Douglas-fir.

Salvage Units within Forest Plan Management Areas 13A and Wild & Scenic River

These lands are classified as unsuitable for timber management. Timber harvest is allowed if the special values of these lands are maintained or enhanced. Salvage harvest addresses the purpose of decreasing potential mortality due to spruce and Douglas-fir bark beetles.

Group	Units	Fire Severity	Treatment prescription
4	**7 Units** Units 14,15, 16, 17 Winter Range, **(Est. 85 out of a total 252 would be salvaged**) Units 67, 68, 69 Wild & Scenic River **(15 acs salvaged**)	**Low to High** 60-95% tree mortality 50-80% tree mortality	• All units would be logged with Helicopter systems. • In these units, only Douglas-fir or spruce trees that are currently infested with bark beetles would be removed. All species other than Douglas-fir and spruce would be left standing (live or dead) or, if unsound and must be felled for safety reasons, would be left as downed wood on the site. Beetle infested trees are thinly scattered within the boundaries of Units 14-17. Salvage harvest would result in the removal of individual trees in an irregular pattern across the total unit area, leaving the majority of the area in these units unaffected by salvage activities, and remaining in the condition the fire left it. Across all these units, there would be large numbers of fire-killed trees left after harvest, of all sizes, with Douglas-fir the predominant species. Unit 15 and to a lesser degree Unit 16, would also contain many live trees. • • The Wild & Scenic river units are quite small, less than 7 acres each, immediately adjacent to the North Fork road, on the bench 100-200 feet above the river. Individual beetle infested Douglas-fir would be removed, which are scattered throughout the area. Based on intensity of beetle infestation, treatment would result in removal of less than ½ of the existing trees.

All salvage units apply treatments to manage post-harvest residual standing, dead and down trees within the salvage units and in areas along open roads, where firewood cutting may occur. These treatments are outlined below. These forest and site components are important across a burned landscape. Values include improved forest structural diversity (both now and into the future); habitat for numerous wildlife species; shade and protection on more exposed sites; long-term soil productivity and organic matter; soil erosion protection; and a host of other less understood ecological functions, such as providing a substrate for soil microorganisms.

Slash Treatment and Downed Wood Material after Harvest:

Slash treatment objectives and the means to achieve those objectives are the same as described under Alternative 2. Under Alternative 3, slash would be reduced by excavator piling and burning across about 248 acres of units accessible in the summer with ground
-based (skidder) logging systems; by jackpot burning (burning of scattered slash concentrations) across about 152 acres of skyline logged units. Another 369 acres of ground-based (skidder) units, primarily those where winter logging is required to protect soils, have no planned post-salvage slash treatment except what is accomplished through the logging operation with removal of the trees. Some limited hand piling of slash concentrations along open roads may occur in these units. In the helicopter-logged units, no post-salvage slash treatment activities are planned. Upon completion of logging operations, all units would be individually evaluated for slash conditions, potential concerns, and confirmation of site-specific treatment needs.

Retention of Large Snags and Live Trees:

Because of tree densities, variation in size classes, and the rapid deterioration of burned trees, most units
would have many more dead trees per acre that would not be removed (mostly unmerchantable trees of all sizes and species, but also the designated retention trees) than trees that would be salvaged. These trees would be left standing wherever possible, considering logging safety and accessibility to salvaged trees.

Within all units, ponderosa pine (all sizes, whether live or dead) would be left on the site. Within Units 2, 3, 9, 10, 33, 48, and 65, all larch (live or dead) >20" DBH
would be left (total of about 359 acres). These six units have an abundance of larger larch snags. In all other units, all larch (live or dead) > 18" DBH would be left. Larch leave tree diameter was not increased in these units because they meet one or more of the following conditions:

1) the bulk of the unit is adjacent to an open road, where most of these snags would be harvested based on treatment prescriptions;

2) there are many large larch within the unit, but they are nearly all live or nearly all >20" dbh; or

3)units are adjacent to past harvest areas which have very few to no larger diameter snags remaining.

If felling any of these designated leave trees were necessary for logging access or safety requirements, they would be left on site as downed wood material, except if located on landing site.

All live trees determined to have high probability of surviving the effects of the fire would be left on the site. The "Post-Fire Mortality Report" (Appendix B) would be applied to all units to aid in determining these trees.
If felling of these trees were necessary for logging access or safety requirements, they would be left on site as downed wood material, except in landing areas.

Along all open roads within the fire area, within 200-250 feet of the road the following snag retention prescription would apply:

Ø If the area falls within a salvage unit, only the high quality wildlife snags would be marked and signed as wildlife trees, to protect from firewood cutting. These trees are defined as larch, ponderosa pine, cottonwood or Douglas-fir; typically larger diameter; usually show signs of decay, broken tops, woodpecker use, other animal use, etc. All other trees that meet removal criteria (merchantable fire-killed or dying trees) would be removed during salvage harvest. This prescription would involve 20 harvest units, affecting approximately 250 roadside acres).

Ø If the area is outside a salvage unit, all 18"+ DBH larch snags would be marked and signed as wildlife trees. In addition, the high quality wildlife trees (as defined above) would also be marked and signed.

Ø Some areas are off limits to firewood cutting under the permit requirements, and area closure signing would occur (such as in streamside areas and in the Wild and Scenic River corridor).

Reforestation:

Following salvage activities, each unit
would be reviewed on the ground to verify possible reforestation needs. Many of the units already contain newly regenerated tree seedlings. Other areas may benefit from planting of native conifer species (larch, Douglas-fir, spruce, western white pine and ponderosa pine), to ensure more rapid reforestation of the site and/or improve species diversity. The best available information anticipates planting needs on approximately 1086 acres proposed within salvage units under Alternative 3.

Beetle Funnel Traps/Use of Pheromones/Trap Trees

Spruce beetle:

Pheromone-baited beetle funnel traps would be applied across an estimated 272 acres of spruce stands. These acres were confirmed by monitoring spruce beetle infestations in the summer of 2002, which found high infestation levels across most of the area that was identified as susceptible to spruce beetle infestation (project record J-32). Nearly all of the treatment sites are within the riparian areas of Big Creek and its tributaries.

As described under Alternative 2, limited use of burning or debarking of spruce beetle infested trees may occur. Specific sites and trees where these methods may be employed would be verified on the ground prior to spring of 2004, when adult spruce beetles would emerge.

Douglas-fir beetle:

Use of the anti-attractant pheromone MCH would be the same under Alternative 3 as described in Alternative 2, used at the Glacier Institute, Big Creek campground and in areas within the Wild and Scenic River corridor to protect remaining live Douglas-fir from bark beetle attack.

Use of Douglas-fir trap trees or trees baited with pheromone attractant would be the same as described under Alternative 2. Because salvage units within roadless areas are dropped from this Alternative, this method is of particular value in the area of high beetle infestation within Hallowat Creek. Trap trees or pheromone baited trees would be used to draw emerging beetles out of Unit 75 (in the roadless area) and into adjacent salvage units outside of the roadless area (primarily Unit 41). Refer to more detailed discussion of trap or pheromone baited tree use and locations in Chapter 3, *Spruce and Douglas-fir Bark Beetles,* under *Direct and Indirect Effects Common to All Action Alternatives.*

Fuels Reduction

The same three areas as described under Alternative 2 would be treated, specifically to reduce current fuel loads and lower future fire risk adjacent to private lands near Coal Creek, the Big Creek Campground and the Glacier Institute site. Refer to Table 2-2 under Alternatives 2. Approximately 208 acres total would be treated.

Other design features of Alternative 3

Road Management

Please refer to the same introduction as written for Alternative 2 regarding Amendment 19.

The road strategy included with Alternative 3 includes two project-specific amendments to the Flathead Forest Plan. The first would temporarily amend the open road density and security core standards in the Werner Creek Grizzly Bear Subunit to 29% and 63%, respectively. Currently, the Forest Plan standards for open road density and security core are 19% and 68%, respectively. Road closures and road decommissioning included with Alternative 3 would meet the amended standards. This project-specific amendment would remain in place pending revision of the Flathead Forest Plan. The revision process is currently in progress, and a decision is anticipated in late 2006. During the revision process, grizzly bear standards will be reviewed and possibly modified to reflect the results of ongoing population studies.

The second project-specific Forest Plan amendment included in Alternative 3 would allow the retention of 10 specific stream-aligned culverts on Road 316E and its adjoining roads, the upper portions on Road 315, and Road 1692, while still considering these roads as "reclaimed" under the Forest Plan. Appendix TT of the Forest Plan currently states that a road must have all stream-aligned culverts removed to be "counted" as a reclaimed road for the purposes of calculating total road density.

The Forest Plan open motorized access density standards have been met temporarily within both subunits via an emergency special closure order, signed on April 1, 2002, effective for one year. This special order restricted approximately 21 miles of open road within the two subunits by gates. As a result, the Forest Plan 5 and 10-year open motorized access density standards are currently met within the two subunits. The roads that have been restricted by gates from this special order are some of the same open roads that have been proposed for restriction in Alternative 2. If Alternative 3 were selected, some of these gated roads closed for emergency reasons would be re-opened. Table 2-6 does not display the existing situation as if this emergency special order road closure was in place; to display this information, existing situation open motorized access density would be shown as 19 percent for both Werner and Lower Big Creek grizzly bear subunits.

The road strategy developed for Alternative 3 is similar to the road management proposal suggested by a public collaborative group several years ago during a planning process for the *Big Creek Resource Management Project*. The project area for the Big Creek project included the same two grizzly bear subunits we are addressing in the *Moose Post-Fire Project*. Based on an issue raised during scoping for this project, a road strategy was designed for Alternative 3 that approximated the road strategy recommended by this collaborative group. This group tried to emphasize more seasonal road closures rather than permanent road closures to provide more social acceptance towards these closures and still provide some improvements in grizzly bear habitat.

Alternative 3 proposes to modify travel management within the Werner Creek and Lower Big Creek grizzly bear subunits to help improve current open motorized access density, total motorized access density, and security core levels. All current Amendment 19 standards in the Lower Big Creek grizzly bear subunit would be met with Alternative 3. Open road density and security core standards for the Werner Creek grizzly bear subunit would be temporarily amended to 29% and 63% respectively. Road closures and decommissioning included in this alternative would meet the Forest Plan standards for grizzly bear, as amended.

Table 2-6: Comparison of Alternative 3 with Amendment 19 Standards

WERNER CREEK GRIZZLY BEAR SUBUNIT	Existing Alt 1	Alternative 3
Open Motorized Access Density	31%	29%
Total Motorized Access Density	41%	19%
Security Core	41%	63%

LOWER BIG CREEK GRIZZLY BEAR SUBUNIT	Existing Alt 1	Alternative 3
Open Motorized Access Density	25%	19%
Total Motorized Access Density	34%	19%
Security Core	50%	68%
AMENDMENT 19 STANDARDS	**5 year**	**10 year**
Open Motorized Access Density (<1 mi/mi^2)	≤ 19%	≤ 19%
Total Motorized Access Density (<2 mi/mi^2)	≤ 24%	≤ 19%
Security Core	≥ 64%	≥ 68%

Yearlong road restrictions using gates, berms, and road decommissioning would reduce road densities for increased grizzly bear habitat security compared to pre-fire conditions. Road decommissioning would include actions that would minimize the potential for future sedimentation of streams or noxious weed development. These actions would include placement of numerous waterbars, culvert removals, grass seeding, slash or debris placement on roads, planting shrubs, and physical alteration of the road template. Culvert removals and stream restoration would occur where roads to be decommissioned intersect streams except at ten specific locations on snowmobile routes (see below). To reduce the amount of ground disturbed, cross-drain culverts would typically not be removed but waterbars would be placed nearby to ensure adequate drainage. The amount of physical altering of the road template from culvert removal or waterbar creation would vary according to the sites involved. Berms would be placed at the beginning of decommissioned roads to effectively restrict wheeled motorized vehicle access.

All road mileages displayed in the following table are estimated from computer analysis. Actual miles affected during implementation may be more or less than shown in the tables. However, road changes displayed on the maps in this EIS would be implemented. Approximately 4 miles and 7 miles of open yearlong/seasonally open road would be restricted yearlong within the Werner Creek and Lower Big Creek grizzly bear subunits, respectively. In addition, approximately 56 miles of road would be decommissioned in both grizzly bear subunits.

The following table provides a narrative description of proposed changes to various road segments by Alternative 3.

Table 2-7: Alternative 3 Travel Management Status

Werner Creek Grizzly Bear Subunit	Exist Estimated Miles (without current temporary special order in place)	Total estimated miles after implementation of Alt 3
Open Yearlong	28 miles	12 miles
Open Seasonally	3 miles	15 miles
Closed Yearlong/Gate	33 miles	8 miles
Closed Yearlong/Berm	12 miles	11 miles
Closed Yearlong/Natural Revegetated	2 miles	0 miles
Decommissioned Roads (since 1995)	5 miles	5 miles

Proposed to be Decommissioned	N/A	18 miles

Lower Big Grizzly Bear Subunit	**Exist Estimated Miles (without current temporary special order in place)**	**Total estimated miles after implementation of Alt 3**
Open Yearlong	21 miles	14 miles
Open Seasonally	4 miles	4 miles
Closed Yearlong/Gate	34 miles	6 miles
Closed Yearlong/Berm	24 miles	19 mile
Closed Yearlong/Natural Revegetated	4 miles	0 miles
Decommissioned Roads (since 1995)	11 miles	11 miles
County Road – North Fork Road	8 miles	8 miles
Small Private Roads	2 miles	2 miles
Proposed to be Decommissioned	N/A	38 miles

Snowmobile routes/proposed decommissioned roads

There are approximately 9 miles of road proposed for decommissioning that are also snowmobile routes that access to high-use snowmobile play areas. Snowmobile use of these routes has occurred for many decades. It is important to note that these snowmobile routes were identified to remain open in a recent settlement agreement from a lawsuit challenging snowmobile access across the Flathead National Forest. As part of the settlement agreement, snowmobile access has been prohibited within much of the Glacier View Ranger District. The Flathead National Forest is currently preparing an EIS to amend its Forest Plan to address winter-motorized recreation. The settlement agreement is the basis for the proposed action that was scoped to the public in August – September 2002. A decision on the amendment is expected in the spring or summer of 2003.

All stream-aligned culverts would be removed on these decommissioned roads/snowmobile routes, except at three stream crossings on Road 1692 and the upper portions of Road 315, and at seven stream crossings on the Skookoleel road system (Road 316E and its adjoining roads) (refer to map in project record). The Skookoleel road system is currently undergoing decommissioning activities as part of the Big Mountain Ski Area Expansion Project, for which the Record of Decision was signed in 1995 (project record U-1).

The streams at these ten crossings are deeply incised and water runs even in the winter. If culverts were removed at these sites, safe and reasonable snowmobile use would effectively be blocked unless there are unusually large amounts of snow. The culverts that would remain in place would have one of the following actions taken: (1) They would be appropriately sized to meet INFISH 100-year flow capacity requirements with a maximum of 1.5 to 3’ of fill on top of the culvert. The remaining portion of the road prism material above the culvert would be removed from the stream channel and streamside management zone. To minimize any sediment potential (if the culvert were to plug), armoring with large rocks on the upstream and downstream areas of the culvert would occur if the overburden material contains fine soil particles; or (2) the existing culvert would be removed and an arch pipe would be installed to replace the culvert. The replacement of the overburden material would be the same as just described. The purpose of the arch pipe would be to ensure fish passage on larger flatter stream segments.

These culverts would be annually monitored for the first two years and then less frequently depending on monitoring results (more information on the monitoring plan on culverts left in on decommissioned and bermed roads is described in Appendix E). Routine hand maintenance (non-motorized) would be conducted as needed to ensure the culverts are functioning properly.

Where culverts would be removed on these snowmobile routes/decommissioned roads, slopes would be flattened as much as possible into and out of culvert removal areas. Wheeled motorized access would be restricted by a berm (physical barrier) on these roads.

MAP 2-4: Alternative 3 Vegetation Treatments Map

MAP 2-5: Alternative 3 Road Management Map

Alternative 4

Alternative 4 was developed to clearly address the following significant issues, while responding to the purpose of and need for action:

1. ***Tree salvage in inventoried roadless areas*;**
2. ***Tree salvage in the wild and scenic river corridor***
3. ***Snag and downed wood material retention should be increased***
4. ***Riparian habitat conservation areas may not be large enough***
5. ***The fire may have affected wildlife security during hunting seasons***
6. ***Proposed salvage treatments and road strategy may result in ineffective use of winter range areas***
7. ***More roads may need to be decommissioned and restricted than what Amendment 19 specifies***

Alternative 4 would comply with all existing Forest Plan standards, and no Forest Plan amendments would be required.

To reduce potential disturbance to wintering animals and respond to concerns about effective use of winter range, winter logging would be prohibited under this alternative. The units that were limited to ground
-based winter logging under Alternatives 2, 3 and 5 have been changed to helicopter logging systems under Alternative 4.

In response to public concerns regarding the amount of snags and downed wood material retained, increased retention of snags and downed wood would occur under this alternative, compared to the other action alternatives. Refer to discussion under ***Retention of Live Trees and Snags*** that follows.

Salvage Harvest of Trees

Approximately 1793 acres of salvage harvest would occur across the Moose Fire area (refer to Map 2-2). An estimated 11.9 million board feet would be generated with the implementation of this alternative. No permanent or temporary road would be constructed to facilitate logging systems
(snow roads would be used in units 3 and 26). The following logging systems would be used:

Ground skidder, summer only = 208 acres (12% of salvage acres)
Skyline = 123 acres (7 %)
Helicopter = 1462 acres (81%)

Table 2-
8 and the paragraphs that follow describe the general treatment prescriptions for the salvage units. Appendix A provides information on treatment and conditions within each individual salvage unit.

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Table 2-8: Summary information for proposed salvage units in Alternative 4

Salvage Units within Forest Plan Management Areas 9, 13, and 15.
NOT within Inventoried Roadless Areas.

These lands are classified as suitable for timber management, with timber production a primary goal in MA 15 and allowed in MA 9 and 13 if compatible with elk and deer winter range management goals. Salvage harvest addresses the purpose of recovering merchantable wood fiber and decreasing potential mortality due to spruce and Douglas-fir bark beetles.

Group	Units	Fire Severity	Treatment prescription
1	**36 Units** **1225 acres** Units 3,3A,4, 5,6,8,9,10,11, 12,13,18,19, 26,27,28,29, 30,31,33,34, 35,37,37A,4043,44,48,49, 53,58,58A,5961,62,65	**Mod-High to High** 75+% tree mortality, usually nearly 100%	• Salvage harvest would remove dead and dying merchantable trees across the units, either trees killed and damaged directly by the fire, infested with or susceptible to Douglas-fir or spruce bark beetles. Trees to salvage are determined by degree of fire injury to bole or crown of tree, as guided by the post-fire mortality guidelines (Appendix B of the EIS). • In all units, numerous trees (mostly dead) would remain on the site after salvage. These consist of unmerchantable trees of all sizes, as well as all larch of all sizes, burned Douglas-fir >18" DBH, and live trees most likely to survive the effects of the fire (refer to snag and leave tree treatments following this table). Live trees would be relatively sparse due to fire severity. Leave patches are left along streams or wet spots, with minimum 300 foot buffer zone, and along some excessively steep or marginal sites.
2	**14 Units** **483 acres** Units 1, 2, 20, 22, 23, 24, 41, 52, 56, 57, 63, 63A, 66	**Low To Mod** (40-70% tree mortality)	• Salvage harvest would remove dead and dying merchantable trees across the units, either trees killed and damaged directly by the fire, infested with or susceptible to Douglas-fir or spruce bark beetles. Trees to salvage are determined by degree of fire injury to bole or crown of tree, as guided by the post-fire mortality guidelines (Appendix B of the EIS). • There would be greater numbers of live trees remaining within these units after salvage as compared to stands that burned at moderately high to high severity (Group 1). These units are in areas that burned at moderate or low severity and contain variable and sometimes substantial amounts of live trees, though most of these trees have been affected to some degree by the fire (such as underburned or partially scorched). Those trees most likely to survive would be left, as guided by the post fire mortality guidelines (Appendix B). They occur as both scattered individuals and in small groups or larger patches throughout the area. Also, in all units, all larch of all sizes would be left, all >18"dbh burned Douglas-fir, and all ponderosa pine. Additional leave patches include 300 foot zones of no salvage along all streams or wet spots.

Salvage Units within Forest Plan Management Areas 13A

These lands are classified as unsuitable for timber management. Timber harvest is allowed if the winter range values of these lands are maintained or enhanced. Salvage harvest addresses the purpose of decreasing potential mortality due to spruce and Douglas-fir bark beetles.
There are no units in MA 13A in Alternative 4.

Group	Units	Fire Severity	Treatment prescription
4	**4 Units:** Units 14,15, 16, 17 Winter Range, **(Est. 85 out of a total 252 would be salvaged)**	**Low to High** 60-95% tree mortality	• All units would be logged with Helicopter systems. • In these units, only Douglas-fir or spruce trees that are currently infested with bark beetles would be removed. All species other than Douglas-fir and spruce would be left standing (live or dead) or, if unsound and must be felled for safety reasons, would be left as downed wood on the site. • Beetle infested trees are thinly scattered within the boundaries of Units 14-17. Salvage harvest would result in the removal of individual trees in an irregular pattern across the total unit area, leaving the majority of the area in these units unaffected by salvage activities, and remaining in the condition the fire left it. Across all these units, there would be large numbers of fire-killed trees left after harvest, of all sizes, with Douglas-fir the predominant species. Unit 15 and to a lesser degree Unit 16, would also contain many live trees.

All salvage units apply treatments to manage post-harvest residual standing, dead and down trees within the salvage units and in areas along open roads, where firewood cutting may occur. These treatments are outlined below. These forest and site components are important across a burned landscape. Values include improved forest structural diversity (both now and into the future); habitat for numerous wildlife species; shade and protection on more exposed sites; long-term soil productivity and organic matter; soil erosion protection; and a host of other less understood ecological functions, such as providing a substrate for soil microorganisms.

Slash Treatment and Downed Wood Material after Harvest:

The primary slash management objectives and means to achieve those objectives are the same as described under Alternatives 2 and 3.

Under Alternative 4, slash would be reduced by excavator piling and burning across about 208 acres of units accessible in the summer with ground-based (skidder) logging systems; by jackpot burning (burning of scattered slash concentrations) across about 50 acres of skyline logged units. The remaining acres, primarily helicopter logging units, no post-salvage slash treatment activities are planned. Upon completion of logging operations, all units would be individually evaluated for slash conditions, potential concerns, and confirmation of site-specific treatment needs.

Retention of Large Snags and Live Trees:

Because of tree densities, variation in size classes, and the rapid deterioration of burned trees, most units would have many more dead trees per acre that would not be removed (mostly unmerchantable trees of all sizes and species, but also the designated retention trees) than trees that would be salvaged. These trees would be left standing wherever possible, considering logging safety and accessibility to salvaged trees.

Within all salvage units, all larch and ponderosa pine (live or dead, all sizes) would be designated to leave, either by marking or description. All >18" DBH blackened, more severely burned Douglas-fir would also be left. These trees have a low probability of beetle infestation due to their condition. If felling of any of these trees were necessary for logging access or safety requirements, they would be left on site as downed wood material.

All live trees determined to have high probability of surviving the effects of the fire would be left on the site. The "Post-Fire Mortality Report" (Appendix B) would be applied to all units to aid in determining these trees. If felling of these trees were necessary for logging access or safety requirements, they would be left on site as downed wood material.

Within 200-250 feet of an open road, both within and outside salvage units, the >18" larch and Douglas-fir snags would be marked and signed as wildlife trees, to afford some protection from firewood cutting. In addition, along open roads within the fire area, both inside or outside of a salvage unit, the high quality wildlife snags would be marked and signed if within 200-250 feet of the road. These trees are defined as larch, ponderosa pine, cottonwood or Douglas-fir; typically larger diameter; usually show signs of decay, broken tops, woodpecker use, other animal use, etc. In areas off limits to firewood cutting under the permit requirements, area closure signing would also occur (such as in streamside areas and in the Wild and Scenic River corridor).

Reforestation:

Following salvage activities, each unit would be reviewed on the ground to verify possible reforestation needs. Many of the units already contain newly regenerated tree seedlings. Other areas may benefit from planting of native conifer species (larch, Douglas-fir, spruce, western white pine and ponderosa pine), to ensure more rapid reforestation of the site and/or improve species diversity. Based on best available information, planting needs have been anticipated, with approximately 738 acres of planting proposed within salvage units under Alternative 2.

Beetle Funnel Traps/Use of Pheromones/Trap Trees

Spruce beetle:

Pheromone-baited beetle funnel traps would be applied across an estimated 281 acres of spruce stands. These Confirmed by monitoring of spruce beetle infestation in the summer of 2002, these acres have high infestation levels across most of the area that was identified as susceptible to spruce beetle infestation. Nearly all the acres treated are within riparian areas of Big Creek and its tributaries. One of the treatment areas is within Unit 55 as proposed for salvage harvest under Alternatives 2, 3 and 5, but dropped in Alternative 4 because most of it falls within the widened 300-foot buffer zone adjacent to the creek.

As described under Alternative 2, limited use of burning or debarking of spruce beetle infested trees may occur. Specific sites and trees where these methods may be employed would be verified on the ground prior to spring of 2004, when adult spruce beetles would emerge.

Douglas-fir beetle:

Use of the anti-attractant pheromone MCH would be the same under Alternative 4 as described in Alternative 2 and 3, used at the Glacier Institute, Big Creek campground and in areas within the Wild and Scenic River Corridor to protect remaining live Douglas-fir from bark beetle attack.

Use of Douglas-fir trap trees or trees baited with pheromone attractant would be the same as described under Alternative 3. Refer to more detailed discussion of trap or pheromone baited tree use and their tentative locations in Chapter 3, *Spruce and Douglas-fir Bark Beetles,* under *Direct and Indirect Effects Common to All Action Alternatives.*

Fuels Reduction

Three areas would be treated specifically to reduce current fuel loads and lower future fire risk and hazard adjacent to private property along the northern boundary of the fire area, and in the Glacier Institute area. Treatment would occur across approximately 188 acres (refer to Table 2-2).

Table 2-9: Fuel reduction treatment areas in Alternative 4

Treatment area	Fire Severity	Acres	Treatment prescription
Coal Creek	**High** (95+% tree mortality)	67	• Treatment area is a 300-400 foot wide strip of dense sapling/pole sized fire-killed lodgepole pine adjacent to private land boundary near the mouth of Coal Creek. A "thinning" type of prescription would be applied, with trees slashed, piled and burned, or utilized for a commercial product if possible, across the unit area. "Thinning" would be heaviest in the area closest to the private land boundary, leaving 20 or fewer trees per acre standing. More trees would be left as you move away from the private boundary, up to about 40 –80 trees per acre, creating a "feathering" effect of dead standing trees blending into the uncut forest. Very few trees survived the fire; live trees would be left (other than incidental trees cur for logging access or safety). No treatment would occur in stream management zones or within 300' of Coal Creek. • Max 15 tons/acre dead and down would be left on average over the unit.. • Planting of larch and Douglas-fir seedlings would occur across all acres following treatment.
Big Creek Admin. Site (Glacier Institute)	**Low to High patch mosaic** (40-70% tree mortality)	122	• Treatment area surrounds the administrative site, extending up to about 1000 feet away from buildings, and characterized by dense small diameter lodgepole, with Douglas-fir and larch in some areas, on gentle slopes. Larger diameter, >9" dbh trees occur on some lower slopes and in the areas closest to Big Creek and Glacier Institute. Most trees have been killed by fire, with patches and individual live trees in areas of lower fire severity. • A "thinning" prescription would be applied across most of the area, with trees slashed, piled and burned, or utilized for a commercial product if possible. Thinning would be heaviest closest to the buildings, with tree removal becoming lighter further away, blending into the surrounding untreated forest. Residual tree density would vary from about 25 up to 70 or more trees per acre, with unthinned patches left in some places. • Only dead trees would be removed. All live trees would be left, as well as larger diameter larch or Douglas-fir snags (i.e.>18" dbh) and additional dead or dying trees that are needed to meet desired stand conditions. Trees may be left in groups, patches or individuals to create a diverse structure and appearance. • Maximum 15 tons/acre dead and down would be left on average over the area. • Planting of more fire-resistant trees (ponderosa pine, larch and Douglas-fir) at wide spacing would occur across an estimated 100 acres. • Anti-aggregate pheromone MCH would be applied in the unburned region near the Glacier Institute to protect remaining live Douglas-fir at high risk of Douglas-fir beetle infestation. These are valuable trees for aesthetic reasons, as well as being about the only live larger trees left surviving for some distance.

Riparian Habitat Conservation Area Widths

In response to concerns that Riparian Habitat Conservation Areas (RHCA) may not be large enough to compensate for increased sediment levels, RHCA widths would be 300' on either side of all streams, including ephemeral as well as perennial streams with Alternative 4.

Other design features of Alternative 4

Road Management

Please refer to the same introduction as written for Alternative 2 regarding Amendment 19.

In response to public concerns regarding reductions of wildlife security (specifically grizzly bear) resulting from the fire, Alternative 4 proposes to restrict more open roads than are necessary to meet open motorized access standards from Amendment 19 because of the issue related to wildlife/grizzly bear security. In addition, this alternative proposes a seasonal closure to motorized access on the portion of the Big Creek Road 316 that traverses through the fire area during the spring (April and May) until hiding cover has become established. Since the only wheeled motorized access to Road 316 under Alternative 4 starts from the junction with the North Fork Road and Road 316, the seasonal closure effectively closes off wheeled motorized access to the other portions of Road 316 outside the fire area during this time period. Spring is the time that bears are the most likely to be impacted by roads. This alternative also proposes to decommission more roads than is necessary to meet total motorized

access standards or security core because of the issue related to accelerated water runoff.

Alternative 4 would propose to modify travel management within the Werner Creek and Lower Big Creek grizzly bear subunits to meet open motorized access density, total motorized access density, and security core specified in the Forest Plan ten-year standards (refer to Map 2-7). Management of approximately 190 miles of roads within these two subunits would then be consistent with the objectives and standards of Amendment 19.

Table 2-10: Comparison of Alternative 4 with Amendment 19 Standards

WERNER CREEK GRIZZLY BEAR SUBUNIT	Existing Alt 1	Alternative 4
Open Motorized Access Density	31%	1 9%
Total Motorized Access Density	41%	12%
Security Core	41%	75%
LOWER BIG CREEK GRIZZLY BEAR SUBUNIT	**Existing Alt 1**	**Alternative 4**
Open Motorized Access Density	25%	16%
Total Motorized Access Density	34%	7%
Security Core	50%	77%
AMENDMENT 19 STANDARDS	**5 year**	**10 year**
Open Motorized Access Density (<1 mi/mi^2)	≤ 19%	≤ 19%
Total Motorized Access Density (<2 mi/mi^2)	≤ 24%	≤ 19%
Security Core	≥ 64%	≥ 68%

Yearlong road restrictions using gates, berms, and road decommissioning would reduce road densities for increased grizzly bear habitat security. Road decommissioning would include actions that would minimize the potential for future sedimentation of streams or noxious weed development. These actions would include placement of numerous waterbars, culvert removals, grass seeding, slash or debris placement on roads, planting shrubs, and physical alteration of the road template. Culvert removals and stream restoration would occur where roads to be decommissioned intersect streams. To reduce the amount of ground disturbed, cross
-drain culverts would typically not be removed but waterbars would be placed nearby. The amount of physical altering of the road template from culvert removal or waterbar creation would vary according to the sites involved. Berms would be placed at the beginning of decommissioned roads to effectively restrict wheeled motorized vehicle access.

A new trailhead would be constructed for the Elelehum trail 255 at the junction of Elelehum Road 5272 and Big Creek Canyon Creek Road 316 to replace the existing trailhead that would be lost due to road decommissioning efforts. In addition, Elelehum Road 5272 would be decommissioned and then converted to a low use trail.

All road mileages displayed in the following table are estimated from computer analysis. Actual miles affected during implementation may be more or less than shown in the tables. However, road changes displayed on the maps in this EIS would be implemented. Approximately 14 miles and 11 miles of open yearlong/seasonally open road would be restricted yearlong within the Werner Creek and Lower Big Creek grizzly bear subunits, respectively. Also, approximately 87 miles of road would be decommissioned in both grizzly bear subunits.

Table 2-11: Alternative 4 Travel Management Status

Werner Creek Grizzly Bear Subunit	Exist Estimated Miles (without current temporary special order in place)	Total estimated miles after implementation of Alt 4
Open Yearlong	28 miles	0 miles
Open Seasonally	3 miles	17 miles
Closed Yearlong/Gate	33 miles	3 miles
Closed Yearlong/Berm	12 miles	15 miles
Closed Yearlong/Natural Revegetated	2 miles	0 miles
Decommissioned Roads (since 1995)	5 miles	5 miles
Proposed to be Decommissioned	N/A	29 miles
Lower Big Creek Grizzly Bear Subunit	**Exist Estimated Miles (without current temporary special order in place)**	**Total estimated miles after implementation of Alt 4**
Open Yearlong	21 miles	8 miles

Open Seasonally	4 miles	6 miles
Closed Yearlong/Gate	34 miles	1 miles
Closed Yearlong/Berm	24 miles	8 mile
Closed Yearlong/Natural Revegetated	4 miles	0 miles
Decommissioned Roads (since 1995)	11 miles	11 miles
County Road – North Fork Road	8 miles	8 miles
Small Private Roads	2 miles	2 miles
Proposed to be Decommissioned	N/A	58 miles

Snowmobile routes/proposed decommissioned roads

There are approximately 31 miles of road proposed for decommissioning that are also snowmobile routes that access to high-use snowmobile play areas. Snowmobile use of these routes has occurred for many decades. It is important to note that these snowmobile routes were identified to remain open in a recent settlement agreement from a lawsuit challenging snowmobile access across the Flathead National Forest. As part of the settlement agreement, snowmobile access has been prohibited within much of the Glacier View Ranger District. The Flathead National Forest is currently preparing an EIS to amend its Forest Plan to address winter-motorized recreation. The settlement agreement is the basis for the proposed action that was scoped to the public in August – September 2002. A decision on the amendment is expected in the spring or summer of 2003.

All stream-aligned culverts would be removed on these 31 miles of decommissioned roads/snowmobile routes. There are ten stream crossings on Road 1692, Road 315, and on the Skookoleel road system (Road 316E and its adjoining roads) where the streams are deeply incised and water runs year-round. If culverts were removed at these sites, safe and reasonable snowmobile use would effectively be blocked unless the area receives abnormally large amounts of snow.

Where culverts would be removed on these snowmobile routes/decommissioned roads, as much as possible flattened into and out of culvert removal areas. Wheeled motorized access would be restricted by a berm (physical barrier) on these roads.

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MAP 2-6: Alternative 4 Vegetation Treatments Map

MAP 2-7: Alternative 4 Road Management Map

Alternative 5

Alternative 5 was developed to clearly address the following significant issues, while responding to the purpose of and need for action:

5. ***The fire may have affected wildlife security during hunting seasons***
9. ***Big Creek Road 316 should be re-opened***

Alternative 5 would comply with all existing Forest Plan standards, and no Forest Plan amendments would be required.

Salvage Harvest of Trees

All the salvage harvest unit locations and treatment prescriptions are the same as proposed under Alternative 2. Refer to Table 2-1 for acreages and descriptions of the treatments. Also, refer to Map 2-2 for a map of salvage treatment areas.

Description of slash treatment, retention of large snags and live trees, and reforestation proposals are exactly the same as described under Alternative 2.

Beetle Funnel traps/Use of Pheromones/Trap trees

Pheromone-baited funnel traps for spruce beetle, possible burning/debarking of spruce beetle infested trees, use of MCH anti-attractant pheromone for Douglas-fir beetle, and use of trap trees or pheromone baited trees for Douglas-fir beetle would occur exactly as described under Alternative 2. Refer to Map 2-2 for a display of these areas.

Fuels Reduction

The same three areas as described under Alternative 2 would be treated, specifically to reduce current fuel loads and lower future fire risk. Refer to Table 2-2 under Alternative 2. Approximately 208 acres total would be treated. Refer to Map 2-2 for a map of these treatment areas.

Other design features of Alternative 5

Road Management

Please refer to the same introduction as written for
Alternative 2 regarding Amendment 19.

Amendment 19's open motorized access density standards have been met temporarily within both grizzly bear subunits via an emergency special closure order signed on April 1, 2002, effective for one year. This special order restricted approximately 21 miles of open road within the two subunits by
gates. As a result, the five and ten-year open motorized access density standard specified from Amendment 19 is currently met within the two subunits. The roads that have been restricted by gates from this special order are some of the same open roads that have been proposed for restriction in Alternative 5. Table 2-12 does not display the existing situation as if this emergency special order road closure were in place; to display this information, existing situation open motorized access density would be shown as 19% for both Werner and Lower Big Creek grizzly bear subunits.

Alternative 5 would propose to modify travel management within the Werner Creek and Lower Big Creek grizzly bear subunits to meet open motorized access density, total motorized access density, and security core specified in the Forest Plan ten-year standards (refer to Map 2-8). Management of approximately 190 miles of roads within these two subunits would be consistent with the objectives and standards of Amendment 19.

Table 2-12: Comparison of Alternative 5 with Amendment 19 Standard

WERNER CREEK GRIZZLY BEAR SUBUNIT	**Existing Alt 1**	**Alternative 5**
Open Motorized Access Density	31%	1 8%
Total Motorized Access Density	41%	19%
Security Core	41%	68%
LOWER BIG CREEK GRIZZLY BEAR SUBUNIT	**Existing Alt 1**	**Alternative 5**
Open Motorized Access Density	25%	19%
Total Motorized Access Density	34%	19%
Security Core	50%	68%
AMENDMENT 19 STANDARD	**5 year**	**10 year**
Open Motorized Access Density (<1 mi/mi^2)	≤ 19%	≤ 19%
Total Motorized Access Density (<2 mi/mi^2)	≤ 24%	≤ 19%
Security Core	≥ 64%	≥ 68%

Yearlong road restrictions using gates, berms, and road decommissioning would reduce road densities for increased grizzly bear habitat security. Road decommissioning would include actions that would minimize the potential for future sedimentation of streams or noxious weed development. These actions would include placement of numerous waterbars, culvert removals, grass seeding, slash or debris placement on roads, planting shrubs, and physical alteration of the road template. Culvert removals and stream restoration would occur where roads to be decommissioned intersect streams. To reduce the amount of ground disturbed, cross-drain culverts would typically not be removed but waterbars would be placed nearby. The amount of physical altering of the road template from culvert removal or waterbar creation would vary according to the sites involved.
Berms would be placed at the beginning of decommissioned roads to effectively restrict wheeled motorized vehicle access.

All road mileages displayed in the following table are estimated from computer analysis. Actual miles affected during implementation may be more or less than shown in the tables. However, road changes displayed on the maps in this EIS would be implemented. Approximately 14 miles and 7 miles of open yearlong/seasonally open road would be restricted yearlong within the Werner Creek and Lower Big Creek grizzly bear subunits, respectively.
In addition, approximately 56 miles of road would be decommissioned in both grizzly bear subunits.

The road strategy proposed in Alternative 5 is similar to Alternative 2 in that both alternatives meet the ten-year access density standards from Amendment 19. The main difference is that Alternative 5 would restrict motorized access yearlong via gates and berms on the Hallowat Road 315 and the Moose Lake Road 5207, which would allow Big Creek Road 316 to be open for part of the year and still meet the current standards from Amendment 19. This is in response to public comments regarding the restriction of motorized use on Big Creek Road 316. In response to public comments about reduced habitat security during hunting season, the seasonal closure period would prohibit motorized use during hunting season and winter months, thereby providing a greater level of habitat security during this time.

Table 2-13: Alternative 5 Travel Management Status

Werner Creek Grizzly Bear Subunit	**Exist Estimated Miles (without current temporary special order in place)**	**Total estimated miles after implementation of Alt 5**
Open Yearlong	28 miles	8 miles
Open Seasonally	3 miles	9 miles
Closed Yearlong/Gate	33 miles	14 miles
Closed Yearlong/Berm	12 miles	15 miles
Closed Yearlong/Natural Revegetated	2 miles	0 miles
Decommissioned Roads (since 1995)	5 miles	5 miles
Proposed to be Decommissioned	N/A	18 miles
Lower Big Creek Grizzly Bear Subunit	**Exist Estimated Miles (without current temporary special order in place)**	**Total estimated miles after implementation of Alt 5**
Open Yearlong	21 miles	14 miles
Open Seasonally	4 miles	4 miles
Closed Yearlong/Gate	34 miles	6 miles
Closed Yearlong/Berm	24 miles	19 mile
Closed Yearlong/Natural Revegetated	4 miles	0 miles
Decommissioned Roads (since 1995)	11 miles	11 miles
County Road – North Fork Road	8 miles	8 miles
Small Private Roads	2 miles	2 miles
Proposed to be Decommissioned	N/A	38 miles

A new trailhead would be constructed
for trail 194 to Moose Lake and trail 250 at the junction with the Hallowat Road 315 and Big Creek Road 316 to replace the existing trailhead that is located at Moose Lake. In addition, the campground and restroom at Moose Lake would be removed and the area rehabilitated.

The other change from Alternative 2 is that Werner Divide Road 1658 would be restricted seasonally by a gate at the divide and by the Road 316 gate at the junction with Nicola Creek Werner Creek Road 1692. Motorized access would be available July 1 thru October 14. Snowmobile access would be available from December 1 thru April 15.

Snowmobile routes/proposed decommissioned roads

There are approximately 9 miles of road proposed for decommissioning that are also snowmobile routes that access to high-use snowmobile play areas. Snowmobile use of these routes has occurred for many decades. It is important to note that these snowmobile routes were identified to remain open in a recent settlement agreement from a lawsuit challenging snowmobile access across the Flathead National Forest. As part of the settlement agreement, snowmobile access has been prohibited within much of the Glacier View Ranger District. The Flathead National Forest is currently preparing an EIS to amend its Forest Plan to address winter-motorized recreation. The settlement agreement is the basis for the proposed action that was scoped to the public in August – September 2002. A decision on the amendment is expected in the spring or summer of 2003.

All stream-aligned culverts would be removed on these 9 miles of decommissioned roads/snowmobile routes. There are ten stream crossings on Road 1692, Road 315, and on the Skookoleel road system (Road 316E and its adjoining roads) that are deeply incised and water runs even in the winter. If culverts were removed at these sites, safe and reasonable snowmobile use would effectively be blocked unless the area receives abnormally large

amounts of snow.

Where culverts would be removed on these snowmobile routes/decommissioned roads, slopes would be flattened as much as possible into and out of culvert removal areas. Wheeled motorized access would be restricted by a berm (physical barrier) on these roads.

MAP 2-8: Alternative 5 Road Management Map

V. ALTERNATIVES CONSIDERED BUT NOT GIVEN DETAILED STUDY

During the review of internal and public issues and development of alternatives,
the interdisciplinary team considered five additional alternatives, which were subsequently eliminated from detailed study. Public comment on the DEIS led to the development of another alternative considered (Alternative 10), but was subsequently eliminated from detailed study. These alternatives are briefly presented here, along with the rationale for eliminating them from detailed study.

Alternative 6

: Restoration and rehabilitation activities only – no salvage harvest – treat beetle populations through non-salvage methods only

Concerns were expressed that the project area needs to be rehabilitated and restored through such actions as road decommissioning and reducing sediment sources. This would include no salvage logging.

In response to these concerns, an alternative was considered that would involve only restoration and rehabilitation activities and no salvage harvest. Road management restoration actions are included as a feature in all of the alternatives. In addition, other rehabilitation actions are ongoing or planned to occur within the fire area (refer to past, ongoing, and foreseeable actions in Chapter 3).

A “no salvage logging” alternative was not included for detailed study because it would not meet the purpose of and need for action. One of the purposes of the project is to recover merchantable wood fiber and contribute to the long-term yield of forest products, which is a Forest Plan goal. This would not be achieved if salvaging of merchantable wood did not take place. Another purpose of the project is to reduce future fire severity and hazard by reducing future fuel accumulations caused by the Moose Fire adjacent to private property or administrative sites. Thinning trees and removing them by burning or via commercial means is the only option to reduce future fuel hazards.
The final purpose of the project is to decrease potential mortality caused by bark beetles to remaining live Douglas-fir and spruce trees within and outside the Moose Fire area. In developing the proposed action and preferred alternative, all available bark beetle management methods were considered and evaluated in light of the situation unique to the Moose Fire area. Tools available to manage both spruce and Douglas-fir bark beetles include salvage harvest (removing beetle infested or susceptible trees); use of trap trees or trees baited with attractant pheromones; and use of pheromone baited beetle funnel traps. In addition, for Douglas-fir beetle (but not spruce beetle) an anti-attractant pheromone (MCH) is available to protect trees from beetle attack. For spruce beetle, it is also technically

feasible to use mechanical methods such as burning (torching) or debarking to kill the beetle brood under the thinner bark of spruce trees.

An integrated approach that considers and uses several beetle management methods is necessary for effective management of spruce and Douglas-fir bark beetles in the project area. Because of the widespread infestation pattern of Douglas-fir beetle, to even approach meeting the purpose for the Moose Post-fire project and effectively address potentially high beetle population levels, removal of a substantial portion of the beetle infested trees through salvage harvest is a necessary and important tool. Several additional beetle management methods have been proposed for both spruce and Douglas-fir beetles. Refer to the description under each alternative for the tools and treatments proposed by alternative.

The proposed action that was sent to the public in December of 2001 was modified for the draft EIS, based on new information on stand conditions and applicability of different beetle control methods (refer to discussion in Chapter 1). A major change was eliminating proposed salvage activities in the Big Creek riparian area and replacing this with pheromone-baited beetle traps as the primary method to reduce potential spruce beetle populations. This method lends itself well to the spruce beetle risk situation unique to the Moose Fire, where susceptible stands are relatively small in total acreage, easily accessible, and vulnerable/infested trees are concentrated in relatively small patches. It is expected to be effective in reducing beetle populations across the acres treated (refer to Chapter 3 discussion). Beetle monitoring in the summer of 2002 refined the areas where the application of funnel traps would be used.

Under all action alternatives, use of the anti-attractant pheromone 'MCH' would be used to protect live Douglas-fir susceptible to bark beetle in two sites within the fire area, the Glacier Institute, and portions of the Wild and Scenic River corridor. These areas are readily accessible and are considered to have unique values to the public. MCH is a very effective tool for use on small, more localized sites. This treatment would be applied for as long as the threat of beetle attack remains (perhaps 2-4 years). There is no such anti-attractant pheromone available for use with spruce beetle. Refer to the description of these MCH treatments under other sections of this chapter.

For Douglas-fir beetle, widespread use of pheromones alone (either the attractant beetle traps or the anti-attractant MCH) to address the concern of bark beetle outbreak would not be cost-efficient and used alone, would not effectively limit beetle population buildup or spread. Whereas spruce beetle susceptible stands are small, succinct, and concentrated patches, Douglas-fir beetle-susceptible stands and trees are scattered across many thousands of acres – many poorly accessible, on steep slopes, and at some distance from roads. Refer to the vegetation section of Chapter 3 for a full beetle analysis.

Trap trees or trees baited with attractant pheromones would be used on a limited basis to aid in the management of Douglas-fir bark beetles (refer to description under the alternatives in this chapter). Use of trap trees would not be necessary for spruce beetle as long as full implementation of the pheromone-baited beetle traps is completed. Few live spruce are available within the fire area, and those that do occur, we desire to protect from beetle infestation rather than use as a trap tree. The spruce affected by the fire, particularly if they have fallen over, are already functioning very effectively as "trap trees", and in fact have attracted high numbers of spruce beetles in 2002. The concern now is how to limit the spread of beetles from these naturally created "trap trees".

Other non-salvage methods of beetle control, such as burning, debarking, or application of pesticide to beetle infested trees, are not very applicable, feasible, or useful tools to use on a widespread basis, such as in the Moose Fire situation. There may be limited situations where burning or debarking methods would be applicable for spruce beetle, such as where beetle-infested trees are right next to unburned, non-infested trees that we feel are important to protect. Debarking or burning trees or applying pesticide are all very labor-intensive activities, and thus less economically feasible on a large scale. Upwards of $500 per acre would be required to effectively treat areas by these methods. In addition, application of pesticides, particularly within riparian areas, is not recommended, does not comply with Forest Plan management area direction and could cause unacceptable resource effects to other vegetation or to fish habitat. Project record J-23 provides more detail on the use and costs of these other beetle control measures.

During the comment period on the draft EIS, we received a request to consider a "conservation and local economy alternative" which is related to the request we evaluated and discussed above. The purpose of this proposed alternative is to "improve the protection of homes from wildfire; insure the healthy recovery of the burned area; and allow fire to play its natural role in the forest ecosystem." The first feature of this alternative is to protect homes from wildfire through education and thinning trees in close proximity to homes. There is very little private property in the project area and the fuel reduction treatments are only a relatively small proportion of the management actions being proposed: 200 acres in 3 areas at a campground, an environmental education center, and a thin strip adjacent to private property.

The second feature of the alternative is to allow burned areas to recover through natural means, eliminating cattle grazing in burned areas, eliminating and rehabilitating roads, protecting watersheds, planting trees, and preventing and controlling weeds. Salvage harvest is being proposed on less than 7% of the burned area located on the national forest (approximately 35,000 acres). Another large portion of the burned area is found in Glacier National Park (approximately 26,000 acres) and would not be salvaged or managed at all. A couple of the action alternatives do not propose salvage harvest in inventoried roadless areas. There are no cattle grazing allotments on National Forest System Lands within the burned area. Decommissioning roads is part of all of the action alternatives. Road rehabilitation is currently being done in the Big Creek drainage through a separate BMP project that is upsizing culverts to meet INFISH specifications.

Approximately 1000 acres of trees have already been planted within burned plantations with more acres expected to be planted over the next several years. Weed populations were monitored and treated this summer and would be further treated under the specifications of the Flathead National Forest *Noxious and Invasive Weed Control Decision Notice* (May 2001) Refer to project record U-1. Actions needed to protect watersheds from the effects of the fire were done immediately after the fire. These actions included aerial seeding, placing straw wattles on severely burned areas, cleaning road ditches, constructing drain dips, and upgrading culverts. Additional watershed rehabilitation treatments and monitoring of the effectiveness of the completed work have continued this year.

The final feature of the “conservation and local economy” alternative is to integrate fire into the ecosystems by the Flathead National Forest adopting and implementing the Federal Wildland Fire Policy. This particular request is outside the scope of this site-specific project.

Alternative 7

: Salvage more acres within the fire area to address resource concerns

Some people stated that the proposed action does not salvage enough trees in the fire-affected area to address beetle concerns, economic opportunities, and reburn potential due to heavy fuels.

In response to these concerns, all National Forest System Lands within the Moose Fire perimeter were fully evaluated for possible resource concerns or needs, and possible actions to address these concerns. This included biological and social concerns. Some of this evaluation occurred during the Burn Area Emergency Rehabilitation (BAER) process, which began even while the fire was still active. Some of this evaluation occurred during the post-fire assessment stage, completed in the fall of 2001. Some of this also occurred last fall by this interdisciplinary team in the preparation and development of the site-specific actions proposed in this EIS. Two primary purposes for the proposed action revolve around our concern for greatly increased beetle populations in the project area and for the recovery of merchantable wood fiber. We feel the proposal as developed addresses these concerns very well, considering the condition of the burned area and the many other resource values to evaluate and protect.

An alternative was considered that would involve more salvage logging in the burned area. Apart from the proposed treatment areas, there are few other areas within the fire that either contain burned forest at high risk of beetle infestation, or burned forest that contains trees of merchantable value that could be harvested for wood fiber in an economically viable manner. Further details on the condition of lands not proposed for salvage is provided in the project record, section O. A brief summary is provided below. All acres are approximate.

Under the proposed action, about 2400 acres out of a total 35,350 acres (national forest system lands only) within the Moose Fire are proposed for salvage. Of the remaining 32,950 acres:

- Ø 4350 acres are unburned;
- Ø 680 acres are within a small watershed near Skookoleel Creek that burned at very high intensity, and soil concerns led us to avoid disturbance of any kind in this drainage;
- Ø 3280 acres are past regeneration harvests, previously dominated pre-fire by seedling and sapling-sized trees;
- Ø 9450 acres are on lands described as unsuitable for timber management under the Forest Plan. These include higher elevation forest, riparian areas, rocky marginal sites, etc.;
- Ø 11,570 acres are dominated by stands with <9” dbh average diameter of trees. These areas were burned in stand replacement fires in 1910, 1926 and 1919. Some areas are on gentler ground where ground-based (skidder/tractor) logging systems might be used. However, the vast majority is on steep ground where cable (with road access) or helicopter logging is necessary. Because of the small diameter of the wood and the logging system access problems, it would not be economically feasible to log. This is accentuated by the fact that most of these trees will deteriorate rapidly and are likely to be of little economic value by the time the required decision-making process is completed and logging can begin.

The *Moose Post-Fire Project* does not preclude the potential future removal of smaller diameter trees for post and pole material in areas that may be better accessible, such as adjacent to the North Fork Road. However, nothing has been proposed that would make this action foreseeable.

This leaves roughly 2650 acres of forest potentially available for salvage but not proposed in any of the alternatives. Most of these areas have environmental concerns associated with potential salvage that influenced the decision not to treat. A few hundred of the acres are outside the Big Creek watershed (mainly in Coal Creek) and were eliminated from consideration for salvage. This was because ground-disturbing activities in watersheds other than Big Creek would greatly increase the size and complexity (and thus time) it would have taken to complete the environmental analysis process. Nearly a quarter (600 acres) of the 2650 acres are within inventoried roadless areas. Because of public and agency concerns about salvage harvest within inventoried roadless areas, proposed salvage in inventoried roadless areas is limited to only those areas at relatively high risk of beetles infestation. Other acres were left to provide larger diameter snag habitat in regions of extensive past timber harvest. The remaining 2050 acres are a mix of marginal sites, with poor soils and productivity, or uneconomical for logging.

Alternative 8

– Salvage in riparian areas

Concerns were expressed that not salvaging trees in riparian areas may result in increased reburn potential from heavy fuels; channel instability from debris jams; providing breeding habitat for bark beetles; and increased nutrient loading in Big Creek.

In response, an alternative was considered that salvaged trees in riparian areas. The proposed action originally provided to the public for review in January 2002 included close to a thousand acres of harvest within riparian areas to address the spruce beetle concern. However, we decided to not consider this alternative further because intensive field reconnaissance of the riparian areas in Big Creek since the proposed action was sent to the public has allowed accurate identification and mapping of the conditions of the fire-damaged spruce stands. This review has revealed fewer acres of spruce at high-risk to bark beetle than were originally estimated. In addition, the high cost and complexities of logging on these sensitive sites and often-isolated patches was confirmed. Also considered was the high level of concern from oversight government agencies, as well as many members of the public, for potential effects of logging on riparian habitat values and on the threatened bull trout. Instead, to address the concern for spruce beetle outbreak, pheromone-baited beetle funnel traps were proposed in riparian sites only if infested with beetles.

Alternative 9

: Create no openings through harvest that are greater than 40 acres

A concern was voiced that the salvage harvest should not create any openings greater than 40 acres.

In response, an alternative was considered that would not create openings greater than 40 acres. This alternative was not considered for detailed study because of the nature of the proposed actions and the conditions of stands proposed for treatment. The U.S. Forest Service Manual 2470, prepared in accordance with provisions of the National Forest Management Act, provides broad management direction to national forests regarding opening size limitations. It states "size of tree openings created by even-aged silviculture will normally be 40 acres or less. Creation of larger openings will require 60-day public review and Regional Forester approval, with the following exceptions." One of the exceptions is the following: "Where natural catastrophic events, such as fire, windstorms, or insect and disease attacks have occurred, 40 acres may be exceeded without the 60-day review and Regional Forester approval, provided that the public is notified in advance and the environmental analysis supports the decision." The Moose Fire created large areas of fire-killed forest that will provide openings on the landscape for some time. The *Moose Post-Fire Project* proposes salvage harvest in units of greater than 40 acres. Support and analysis of these units is provided in the vegetation section of chapter 3. Many standing live and dead trees will remain within units after salvage (particularly units logged with ground-based logging systems). These include unmerchantable trees, individual trees retained for snag requirements, and groups and patches of trees live and dead left to meet other resource objectives, such as snag/downed wood and winter range habitat conditions (refer to Appendix A). Proposed tree planting within these units would advance the reforestation process, accelerating their return to a "non-open" condition.

Alternative 10: Alter the post-fire mortality guidelines to retain more trees

This concern was received as a comment on the DEIS over the use of post-fire mortality guidelines (as documented in Appendix B) which would "allow the removal of trees that would otherwise live." The writer believed the mortality guidelines to be flawed. In response, an alternative was considered that would change the post fire mortality guidelines, leaving trees with a higher degree of fire injury (either to the bole or the crown) than specified.

This alternative was not considered for detailed study because we believe the post-fire mortality guidelines accurately reflect and integrate the available research literature; professional experience and observations by fire and vegetation managers on this forest; the site-specific conditions of the Moose Fire area (specifically the elevated bark beetle populations); and the purpose and need for the Moose Post-Fire Project. Post-fire mortality prediction is more of an educated and informed judgment, rather than an exact science. Numerous variables (including fire characteristics, pre-fire tree vigor, and post-fire insect and disease interactions) influence tree mortality following fire. Though much has been learned from research and practical experience over the past few decades, as a whole, insufficient data exists to develop truly precise or accurate estimates of post-fire survival for most conifers (FHP 2000, Weatherby *et al.* 2001). Survival of trees on either extreme of the fire injury spectrum – those most severely burned and those with little injury – is obviously more easy to predict than those with variable degrees and kinds of fire injury. The guidelines and their implementation are designed to be conservative, erring on the side of leaving trees that may well die, rather than salvaging trees that may live. Though we may not have complete certainty, the post-fire mortality guidelines as documented in Appendix B of the FEIS provide a reliable estimate of the likelihood of mortality based on parameters that we can measure and observe. In combination with other resource objectives and needs that guide a particular project, this information is considered sufficient for managers to make an informed decision.

VI. MONITORING

Monitoring activities can be divided into Forest Plan monitoring and project-specific monitoring. NFMA requires that national forests monitor and evaluate their forest plans (36 CFR 219.11). Chapter 4 of the Forest Plan includes monitoring and evaluation activities as part of Forest Plan implementation. There are three categories of Forest Plan monitoring:

Implementation monitoring. Used to determine if the goals, objectives, standards, guidelines, and practices are implemented in accordance with the Forest Plan.

Effectiveness monitoring. Used to determine if the Forest Plan standards, guidelines, and practices, as designed and implemented, are effective in accomplishing the desired result.

Validation monitoring. Used to determine whether the data, assumptions, and estimated effects used in developing the Forest Plan are correct.

Effectiveness and validation monitoring are not typically done as part of project implementation. However, implementation monitoring, and any additional project-specific monitoring are important aspects of the project.

Implementation Monitoring

Routine implementation monitoring is part of the administration of all project contracts. They monitor performance relative to contract requirements. Input by resource staff specialists (such as fisheries biologists, soil scientists, hydrologists, and engineers), is regularly requested during this implementation monitoring process. These specialists provide technical advice when questions arise during project implementation.

Fisheries/Soils/Water

The monitoring plan for fisheries, soils, and water is found in Appendix E.

Best Management Practices

Flathead National Forest personnel conduct an annual review of BMP implementation and effectiveness. The results of this and other monitoring are summarized in a *Forest Plan Annual Monitoring and Evaluation Report*. This report provides information about how well management direction for the forest is being carried out and measures the accomplishment of anticipated outputs, activities, and effects.

Sensitive Plants

Sensitive plant field surveys were conducted in the summer of 2002 in proposed treatment areas. The findings and determination calls for the effects on all species listed as sensitive for the Flathead National Forest have been documented in chapter 3 and the project record for this project. One sensitive plant was found, and appropriate mitigation measures have been incorporated into the final design of the project.

Noxious Weeds

Extensive monitoring of the Moose Fire area for the presence of noxious and invasive weed species began in the summer of 2002. Some of this monitoring was identified and was approved for funding under the Burn Area Emergency Rehabilitation Plan (BAER). Survey information
would be used to determine needs for weed control before any activity.

Surveys
would be conducted following vegetation and road treatments to identify any spread of weeds caused by the fire or this action. Weed treatments would be prioritized and scheduled where appropriate. Goals are to prevent any new infestations and to control any existing infestations to the pre-fire level. Weed treatments fall under the authority and guidance of the Flathead National Forest Noxious and Invasive Weed Control EA (March 2001).

Surveys of roads to be decommissioned have been conducted to determine the status of noxious weed infestation and assess appropriate treatments. Any treatments conducted for noxious weeds would be monitored and evaluated for success.

Bark Beetle Activity

Surveys were conducted in all areas at risk to bark beetles within the fire perimeter to monitor beetle populations and spread, beginning in the summer of 2002. Monitoring would continue in succeeding years until the point that beetle populations have diminished to levels that pose little concern. This information would help determine the effectiveness of control activities and to design any continuing or future beetle control actions.

Fire

District fire personnel would monitor moisture conditions to insure that post harvest slash burning is done when soil and duff moisture content would promote fires that maintain organic matter and nutrients on the burned areas.

Wildlife

Snag and downed log quantities would be monitored to determine if timber sale activities maintained expected and prescribed levels of these components. This would be done after the first several units are harvested.

The timing and effectiveness of road closures would be monitored and closure structures maintained.

Monitoring of big game use would focus on understanding ungulate use of post-fire habitat, including locating heavy use areas, forage use, and animal counts. Monitoring would occur during January, February, and March and for at least three winters.

Effectiveness Monitoring

Vegetation treatment areas

Surveys would be conducted on all treatment areas after salvage activity is completed to determine whether treatment objectives were effective and met the desired vegetation conditions (including retention of snags and other trees, downed wood amounts). Using this information, sites would be evaluated for fuel reduction and reforestation needs, or other post-harvest actions. In those areas where planting or natural regeneration is prescribed, surveys would be conducted during the five years following completion of regeneration efforts to monitor survival and growth of the seedlings.

VII. COMPARISON OF ALTERNATIVES

Comparison of Features in the Alternatives

The following table summarizes and compares some of each of the alternative's features:

Table 2-14: Comparison of Features of the Alternatives

Features of the Alternatives	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Acres of trees removed	0	**2428 acres** Helicopter – 1520 (62%) Skyline – 266 (11%) Skidder – 255 (11%) Skid/winter or Heli – 387 (16%)	**2266 acres** Helicopter – 1344 (59%) Skyline – 266 (12%) Skidder – 263 (12%) Skid/winter or Heli –393 (17%)	**1793 acres** Helicopter – 1462 (81%) Skyline – 123 (7%) Skidder – 208 (12%)	**2428 acres** Helicopter – 1520 (62%) Skyline – 266 (11%) Skidder – 255 (11%) Skid/winter or Heli – 387 (16%)
		Common to All Action Alternatives: All units would have many trees remaining after harvest to provide for desired forest structure, snag habitat for wildlife, shade on more exposed sites, soil erosion protection, and long-term soil productivity (see "Live and Dead tree retention" below).			
Tree Planting		1182 acres	1086 acres	738 acres	1182 acres
Timber Volume	0	15.0 mmbf	14.6 mmbf	11.9 mmbf	15.0 mmbf
Acres with trees removed in inventoried roadless areas	0	151 est. treated acres (across a total unit area of about 470 acres)	0	0	151 est. treated acres (across a total unit area of about 470 acres)
		Common to All Action Alternatives: Only Douglas-fir and spruce trees infested with bark beetles would be removed.			
Acres with trees removed in Wild and Scenic River corridor	0	15	15	0	15
		Common to All Action Alternatives: Only Douglas-fir and spruce trees infested with bark beetles would be removed.			
Winter logging	N/A	Yes Winter logging required on 387 acs (heli log is an option)	Yes Winter logging required on 393 acs (heli log is an option)	No winter logging allowed in order to avoid wildlife disturbance	Yes Winter logging required on 387 acs (heli log is an option)
Live and dead tree retention within salvage units	N/A	All ponderosa pine would be left, live or dead. All larch >18" dbh, live and dead, would be left.	All ponderosa pine would be left, live or dead. In seven units (est. 359 acs), all larch >20" dbh, live and dead, would be left. In all other units, larch >18" dbh would be left.	All ponderosa pine would be left, live or dead. All larch (all sizes) live and dead, would be left. All more severely burned Douglas-fir > 18" dbh would be left (bole deeply blackened, small branches of tree crown burned up)	All ponderosa pine would be left, live or dead. All larch >18" dbh, live and dead, would be left.
		Common to All Action Alternatives: Live trees most likely to survive the effects of the fire would be left within salvage areas, following the Post Fire tree mortality guidelines (Appendix B of the FEIS). Dead trees that do not make a merchantable product would remain in all salvage areas. In most units, these trees far outnumber those that would be salvaged, and include large diameter and small diameter trees. Slash treatments would minimize impacts to soils and strive to avoid excessive slash accumulations.			

Treatments within 200-250 feet of open roads		Marking of >18" dbh larch snags, both in areas inside and outside salvage units.	In areas outside the salvage units, all 18"+ DBH larch snags would be marked. Within salvage units, only the high quality wildlife snags (defined below) would be marked. All other trees that meet removal criteria (merchantable fire-killed or dying trees) would be removed during salvage harvest. This prescription would involve 20 harvest units, affecting roughly 250 acres.	Marking of >18" dbh larch and Douglas-fir snags, both in areas inside and outside salvage units.	Marking of >18" dbh larch snags, both in areas inside and outside salvage units.
		Common to All Action Alternatives: Marking of the high quality wildlife snags would occur along ALL open roads, and are defined as larch, ponderosa pine, cottonwood or Douglas-fir; typically larger diameter; usually show signs of decay, broken tops, woodpecker use, other animal use. In areas normally off limits to firewood cutting under the permit requirements, area closure signing would be done (such as streamsides and the Wild and Scenic River corridor).			
Temporary road miles (No construction of permanent roads)	0	0	0	0	0
Total acres of fuels reduction treatments **(Coal Creek, Glacier Institute, Big Cr Campground)**	0	208 (all three sites)	208 (all three sites)	189 (eliminates Big Creek campground area)	208 (all three sites)
Methods of spruce beetle control other than salvage harvest	0	Spruce beetle funnel traps: 272 acs Possible peeling/torching of a few beetle infested trees	Spruce beetle funnel traps: 272 acs Possible peeling/torching of a few beetle infested trees	Spruce beetle funnel traps: 281 acs. Possible peeling/torching of a few beetle infested trees	Spruce beetle funnel traps: 272 acs. Possible peeling/torching of a few beetle infested trees
Methods of Doulgas-fir bark beetle control other than salvage harvest		*Common to all Action Alternatives:* o Application of anti-attractant pheromone MCH to individual live Douglas-fir trees in the Glacier Institute site, Big Creek campground and within the Wild & Scenic River corridor, to protect them from beetle attack. o The felling of up to an estimated 100 Douglas-fir trap trees, within up to 8 of the proposed salvage units, to more effectively manage and contain the potential growth and spread of Douglas-fir bark beetles in regions of higher beetle concentrations, where salvage is expected to be delayed, and reduce mortality of the many remaining live Douglas-fir in these areas.			
Miles of roads to be decommissioned in Big Creek watershed	0	57	56	87	56
Closure of motorized use on Elelehum Trail 194 and Deadhorse Trail 255 from March 16 to November 14.	No	Yes	Yes	Yes	Yes
Snowmobile consideration on decommissioned roads	N/A	Stream-aligned culverts would be removed on decommissioned roads .	Ten stream-aligned culverts would not be removed on decommissioned roads;	Stream-aligned culverts would be removed on decommissioned roads .	Stream-aligned culverts would be removed on decommissioned roads .
Project-specific amendment to Forest Plan	N/A	No	Yes, to Forest Plan Amend. 19 (grizzly bear security): 1) to allow some stream-aligned culverts to remain in place on decommissioned roads (see above). 2) to modify open road density and grizzly bear security core 10 yr standards in Werner Creek Subunit	No	No

Table 2-15: Comparison of Road Management (major road segments) by Alternative

Road Segment	Exist. Si t. Prior to Temp Special Order	Exist. Sit . After Temp Special Order signed 4/1/02	Alternative 2 (Proposed Action)	Alternative 3	Alternative 4	Alternative 5
WERNER CREEK GRIZZLY BEAR SUBUNIT						
Werner Divide Road 1658	Restricted seasonally; conventional vehicle motorized access available from April 15 thru November 30 from the jct. with Big Creek Road 316 to the divide. Snowmobile access available December 1 thru April 15.	Restricted for one year by a gate at the divide and by the Road 316 gate at the jct. with Nicola Creek Road 1692. Snowmobile access available December 1 thru April 15.	Restricted all year by a gate at the divide and by the Road 316 gate at the jct. with Nicola Creek Road 1692. Snowmobile access available December 1 thru April 15.	Restricted seasonally; conventional vehicle motorized access available July 1 thru October 14 from the jct. with Big Creek Road 316 to the divide. Snowmobile access available December 1 thru April 15.	Restricted all year by a gate at the divide and by the Road 316 gate at the jct. with Nicola Creek Road 1692. Snowmobile access available December 1 thru April 15.	Restricted seasonally by a gate at the divide and by the Road 316 gate at the jct. with Nicola Creek Road 1692. Motorized access available July 1 thru October 14. Snowmobile access available December 1 thru April 15.
Hallowat Creek Road 315 (to jct with Road 5207)	Open all year	Open all year	Open all year	Restricted seasonally with a gate beyond mile 3.0, the jct. with Werner Creek Road 5261; motorized access available from July 1 thru March 31.	Restricted seasonally due to a gate on Big Creek Road 316 at the jct. with the McGinnis Creek Road 803; motorized access would be allowed from June 1 thru March 30.	Restricted all year by a gate at the jct. with Big Creek Road 316. Road 5207 to Moose Lake would also be affected by this restriction. Road 315 would be used as a trail to provide access to Moose Lake and two trails that take off from the lake. A new trailhead at the gate would replace trailhead at Moose Lake.
Kletomus Creek Road 5207 (to Moose Lake)	Open all year	Open all year	Open all year	Restricted seasonally by gate on Hallowat Creek Road 315; motorized access available from July 1 thru March 31.	Restricted seasonally due to a gate on Big Creek Road 316 at the jct. with the McGinnis Creek Road 803; motorized access would be allowed from June 1 thru March 30.	Restricted all year with a berm at the jct. with Forks Westside Road 5220. Kletomus Creek Road 5207 (to Moose Lake) would be used as a trail to provide access to Moose Lake and to the two trails that take off from the lake.
Werner Creek Road 5261, Nicola Creek Road1692, and Upper Nicola Road 1655	Open all year	Roads 5261, 1692, and 1655 are restricted by gates for one year.	Restricted all year; Werner Creek Road 5261 would be restricted with a gate from the jct. with Hallowat Creek Road 315 to the junction with Nicola Creek Road 1692**,** and then restricted by a berm. Road 1692 would be restricted by berms at the jct. with Road 5261 and at the jct. with Big Creek Road 316. Road 1655 is controlled by berms on each end of Road 1692.	Restricted all year; Werner Creek Road 5261 would be restricted for its entire length by a berm at the junction with Hallowat Creek Road 315. A berm on Nicola Creek Road 1692 at the jct. with Big Creek Road 316 controls Road 1692 as well as remaining access to Road 5261. Road 1655 is controlled by berms on Road 5261 and Road 1692.	Werner Creek "loop" Roads 5261, 1692, and 1655 would each be decommissioned for its entire length, from the jct. with Road 315 to the junction with Big Creek Canyon Creek Road 316 near four corners.	Restricted all year; Werner Creek "loop" Roads 5261, 1692, and 1655 would each be restricted for its entire length by a berm at the jct. with Road 315 and a berm at the jct. with Big Creek Road 316 near four corners.
Lakalaho Road 1696 (warming hut)	Restricted all year by a gate	Restricted all year by a gate	Restricted all year by a berm for 3.3 miles and then decommissioned	Restricted all year by a gate for 3.3 miles and then decommissioned	Restricted all year by a berm for 3.3 miles and then decommissioned	Restricted all year by a gate for 3.3 miles and then decommissioned
Forks Westside Road 5220	Restricted all year by a gate	Restricted all year by a gate	Restricted all year by a gate	Restricted all year by a gate	Restricted all year by a berm	Restricted all year by a gate
Big Creek Road 316 (upper portions)	Restricted all year by a berm at the jct. with Werner Divide Road 1658 and by a gate at the jct. with Trumble Creek Road 9848.	Restricted all year by a gate at the jctn with Nicola Creek Road 1692 and by a gate at the jct. with Trumble Creek Road 9848.	Restricted all year by a gate at the junction with Nicola Creek Road 1692, and by a berm at the jct. with Werner Divide Road 1658, and by a berm at the jct. with Trumble Creek Road 9848.	Restricted seasonally by a gate at the jct. with Werner Divide Road 1658; conventional vehicle motorized access would be available from July 1 thru October 14 to the jct. with Lakalaho Road 1696. Road 316 beyond would be restricted with berms to the jct. with Road 9848. Snowmobile access on these parts of Road 316 would be available from December 1 thru April 14.	Restricted all year by a gate at the junction with Nicola Creek Road 1692, and by a berm at the jct , with Werner Divide Road 1658, and by a berm at the jct. with Trumble Creek Road 9848.	Restricted seasonally by a gate at the jct. with Nicola Creek Road 1692, motorized access available from July 1 thru October 14 to a point approx. 1 mile west of the jct. with Road 1696 where it would be restricted with a gate all year. A new trailhead at this gate would replace the existing trailhead for the Smoky Range National Recreation Trail. Snowmobile access on this part of Road 316 from December 1 thru April 14.
LOWER BIG CREEK GRIZZLY BEAR SUBUNIT						
Big Creek Road 316 (lower portion)	Open all year	Open all year	Open all year	Open all year	Restricted seasonally by a gate at the jct. with the Lookout Creek McGinnis Cr. Road 803; motorized access would be available from June 1 thru March 30. This restriction effectively shuts off access for the Big Creek drainage for two months.	Open all year

Elelehum Creek Road 5272 (to mile 3.6)	Restricted seasonally by a gate; motorized access available from July 1 thru August 31.	Restricted seasonally by a gate; motorized access available from July 1 thru August 31.	Restricted seasonally by a gate; motorized access available from July 1 thru August 31.	Restricted seasonally by a gate; motorized access available from July 1 thru August 31.	Decommissioned and converted to a low-use trail . A new trailhead at the jct. of Road 5272 and Big Creek Road 316 would replace the existing trailhead.	Restricted seasonally by a gate; motorized access available from July 1 thru August 31.
Langford Road 5222	Restricted all year by a berm	Restricted all year by a berm	Restricted all year by a berm	Restricted all year by a berm	*Decommissioned*	Restricted all year by a berm
McGinnis Creek Road 803 (includes the Lookout Creek drainage)	Open all year	Restricted by gates for one year from the jct. with Road 803L to the jct. with Road 5290 at the divide.	Open all year from Road 316 across Big Creek to the jct. with Road 803L, then restricted with an all year gate to the jct. with Road 1656, and then restricted with all year berms to the jct. with Road 5290 at the divide between Lookout Creek and McGinnis Creek.	Open all year from Road 316 across Big Creek to the junction with Road 803L, then restricted all year with a gate to the jct. with Road 1656, and then restricted with berms to the jct. with Road 5290 at the divide between Lookout Creek and McGinnis Creek..	Open all year from Road 316 across Big Creek to the jct. with Road 803L, then decommissioned to the jct.with Road 1656, and then restricted with a berm to the jct. with Road 5290 at the divide.	Open all year from Road 316 across Big Creek to the jct. with Road 803L, then restricted all year with a gate to the jct. with Road 1656, and then restricted with a berm to the jct. with Road 5290 at the divide.
Roads 1656 and 1664 in Lookout Cr.	Restricted all year by a berm	Restricted all year by a berm	Restricted all year by a berm	Restricted all year by a berm	Decommissioned	Restricted all year by a berm

Table 2-16: Comparison of alternatives by significant issues and issue indicators

Significant Issues	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
1. Tree salvage in inventoried roadless areas does not allow natural processes to continue to occur within these areas and may therefore alter its roadless character. **Indicators:** ***(a)*** *acres of salvage in inventoried roadless area* **(b)** *changes to natural integrity apparent naturalness, remoteness, solitude, primitive recreation opportunities, manageability, and boundaries in inventoried roadless areas*	0 acres No change from existing situation	151 acres Reduced on 1.8% of Deadhorse IRA, and 0.6% of Standard Peak IRA	0 acres No change from existing situation	0 acres No change from existing situation	151 acres Reduced on 1.8% of Deadhorse IRA, and 0.6% of Standard Peak IRA
2. Tree salvage in the Wild and Scenic River corridor may affect the character of the corridor. **Indicators:** **(a)** *acres of salvage and acres of fuels reduction within the Wild and Scenic River corridor*	0 acres	15 acres remove < ½ of the trees	15 acres remove < ½ of the trees	0 acres	15 acres remove < ½ of the trees
3. Snag and downed wood material retention should be increased over that in the proposed action to insure that these wildlife habitat and ecosystem components are provided over the landscape over time. **Indicators:** **(a)** *acres and percentage of high and moderate snag potential areas treated* **(b)** *acres and percentage of high and moderate down wood habitat potential areas treated*	0 acres 0% 0 acres 0%	3326 acres 42% 2797 acres 29%	2866 acres 36% 2415 acres 25%	2211 acres 28% 2295 acres 24% Leaves additional snags in all units (All larch of all sizes and >18" DBH burned Douglas-fir)	3326 acres 42% 2797 acres 29%

Significant Issues	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5

4. Riparian habitat conservation areas (RHCA) as described in the Native Inland Fisheries Strategy (INFISH) may not be large enough to compensate for the combined effects of the Moose Fire and proposed management activities. **Indicators**: **(a)** *RHCA widths*	N/A	<u>Each side of stream</u>: - Min. 100' intermittent streams; - 150' perennial non fish bearing; - 300' fish- bearing	<u>Each side of stream</u>: - Min. 100' intermittent streams; - 150' perennial non fish bearing; - 300' fish- bearing	<u>Each side of stream:</u> 300' all streams	<u>Each side of stream</u>: - Min. 100' intermittent streams; - 150' perennial non fish bearing; - 300' fish- bearing
(b) *changes in sediment yield attributable to RHCA widths*	N/A	Minimum INFISH RHCA widths – would provide adequate undisturbed area to reduce risk of sediment delivery	Minimum INFISH RHCA widths – would provide adequate undisturbed area to reduce risk of sediment delivery	RHCA widths increased to 300' on intermittent and non-fisheries streams – would provide additional protection against sediment delivery	Minimum INFISH RHCA widths – would provide adequate undisturbed area to reduce risk of sediment delivery
5. The fire may have affected wildlife security particularly during hunting seasons. **Indicators:** **(a)** *a comparison of summer habitat effectiveness values within affected Habitat Analysis Units*	Hallowat - 62% Kletomus -45% Lower Elelehum - 38% Langford - 36%	Hallowat - 62% Kletomus -45% Lower Elelehum - 38% Langford - 36%	Hallowat - 62% Kletomus -45% Lower Elelehum - 38% Langford - 36%	Hallowat - 62% Kletomus -45% Lower Elelehum - 46% Langford - 36%	Hallowat - 78% Kletomus -60% Lower Elelehum - 38% Langford - 36%
(b) *potential effects of salvage logging and road management on security and vulnerability during the hunting season*	No salvage logging would occur. Road restrictions would not occur. Security would be reduced and animals more vulnerable compared to pre-fire conditions.	Salvage would remove cover, reducing security. Road restrictions may reduce vulnerability somewhat, but critical lower Big Creek Road #316 would remain open.	Salvage would remove cover, reducing security. Road restrictions may reduce vulnerability somewhat, but critical lower Big Creek Road #316 would remain open.	Salvage would remove cover, reducing security. Road restrictions may reduce vulnerability somewhat, but critical lower Big Creek Road #316 would remain open.	Salvage would remove cover, reducing security. Road restrictions may reduce vulnerability somewhat, but critical lower Big Creek Road #316 would remain open.

Significant Issues	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
6. The proposed salvage treatments and road strategy may result in ineffective use of winter range areas by ungulate species. **Indicators:** **(a)** *qualitative assessment of potential effects of winter logging and removal of trees on elk and mule deer hiding and thermal cover*	No salvage would occur.	Winter logging could increase disturbance to wintering animals. Removal of trees would reduce hiding cover; thermal cover could be reduced in Units 15, 16 and 70.	Winter logging could increase disturbance to wintering animals. Removal of trees would reduce hiding cover; thermal cover could be reduced in Units 15 and 16.	Winter logging would be prohibited. Removal of trees would reduce hiding cover; thermal cover could be reduced in Units 15 and 16.	Winter logging could increase disturbance to wintering animals. Removal of trees would reduce hiding cover; thermal cover could be reduced in Units 15, 16 and 70.
7. More roads may need to be decommissioned and restricted than what Amendment 19 specifies due to accelerated runoff from burned lands and less cover and security for grizzly bears as a result of the fire. **Indicators:** ***(a)*** *miles of road proposed for decommissioning* ***(b)*** *miles of road closed to motorized access yearlong by subunit*	0 miles	56 miles	55 miles	87 miles	56 miles
(c) *miles of road closed to motorized access seasonally by subunit*	Werner – 53 mi L. Big Cr. – 73 mi Werner – 3 mi L. Big Cr. – 4 mi	Werner – 34 mi L. Big Cr. – 36 mi Werner – 0 mi L. Big Cr. – 4 mi	Werner – 24 mi L. Big Cr. – 36 mi Werner – 15 mi L. Big Cr. – 4 mi	Werner – 23 mi L. Big Cr. –20 mi Werner – 17 mi L. Big Cr. – 6 mi	Werner –34 mi L. Big Cr. – 36 mi Werner – 9 mi L. Big Cr. – 4 mi

8. Provide a higher level of public motorized access than Forest Plan standards allow. **Indicators:** **(a)** *miles of road open to conventional motorized use (wheeled vehicles) yearlong* **(b)** *miles of road open to conventional motorized use seasonally* **(c)** *miles of road decommissioned*	49 miles 7 miles 0 miles	31 miles 4 miles 56 miles	26 miles 19 miles 55 miles	8 miles 13 miles 87 miles	22 miles 13 miles 56 miles
9. Big Creek Road 316 should be re-opened because it provides good huckleberry picking and other recreation options. **Indicators**: **(a)** *change in restrictions of conventional motorized vehicle use on Road #316*	No change	No change. The portion of Road 316 located behind Big Mountain would remain restricted to wheeled motorized access yearlong	Road #316 would be open yearlong to wheeled motorized access to the jct. with the Werner Divide Road.	Road #316 would be open seasonally (6/1-3/30) from the McGinnis – Lookout Road to the jct. with the Upper Nicola Creek Connection Road. This would eliminate motorized access to most of the Big Creek drainage during the spring bear-hunting season, and reduce the season of use at the Moose Lake Campground and associated trailheads by approximately 2 weeks.	Road #316 would be open yearlong to the jct. with the Upper Nicola Creek Connection Road. The Whitefish Divide Road and Rd. 316 would be open seasonally (7/1-10/14). This would allow travel across the Whitefish Divide, and provide access to the upper portions of the Big Creek drainage.
10. Decommissioning road activities may not be compatible with snowmobiling on existing snowmobiling routes. **Indicators:** **(a)** *Miles of road proposed for decommissioning on existing snowmobile routes*	0 miles	9 miles	9 miles	31 miles	9 miles

Table 2-17: Comparison of alternatives by their response to effects indicators (described in more detail in Chapter 3)

Effects Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Vegetation Indicators					
• **Acres of salvage harvest**	0 acres	2428 acres	2266 acres	1793 acres	2428 acres
• **Acres of reforestation in harvest units**	0 acres	1182 ac. planted 1246 ac. natural	1086 ac. planted 1180 ac. natural	738 ac. planted 1055 ac. natural	1182 ac. planted 1246 ac. natural
• **Acres of natural successional development in project area**	25,984 acres	24,713 acres	24,820 acres	25,162 acres	24,713 acres
• **Change in access for future timber management**	No change	Road decommissioning would change access to 7000 acres	Road decommissioning would change access to 6400 acres	Road decommissioning would change access to 12,000 acres	Road decommissioning would change access to 6400 acres
• **Salvage harvest by structural stage (acres)**	No harvest	**Stand initiation:** 1792 **Stem exclusion:** 0 acres **Understory reinitiation**: 1150 acres **Young forest multistory:** 0 acres **Late seral:** 0 acres 23,503 acres	**Stand initiation:** 1587acres **Stem exclusion:** 0 acres **Understory reinitiation**: 867 acres **Young forest multistory:** 0 acres **Late seral:** 0 acres 23,640 acres	Stand initiation: 1281 acres Stem exclusion: 0 acres Understory reinitiation: 679acres Young forest multistory: 0 acres Late seral: 0 acres 24,113 acres	**Stand initiation:** 1792 **Stem exclusion:** 0 acres **Understory reinitiation**: 1150 acres **Young forest multistory:** 0 acres **Late seral:** 0 acres 23,503 acres

• **Legacy areas remaining (acres)**	25,906 acres				
Effects Indicator	**Alternative 1 (No Action)**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Spruce and Douglas-Fir Indicators					
• **Spruce Beetle: Funnel trap treatments in areas of spruce beetle infestation (acres)**	No treatment would occur.	272 acres treats nearly all known acres infested at higher levels	272 acres treats nearly all known acres infested at higher levels 64 acres (3 out of 4 infested units treated)	281 acres treats nearly all known acres infested at higher levels	272 acres treats nearly all known acres infested at higher levels 94 acres (all 4 known infested units treated)
• **Spruce Beetle: Salvage treatments in areas of spruce beetle infestation (acres)**		94 acres (all 4 known infested units treated) 50 acres	50 acres	55 acres (2 out of 4 infested units treated)	50 acres
• **Douglas-fir beetle: Anti-attractant MCH pheromone treatment (acres)**		50 acres	up to 100 trees within one to eight proposed salvage units	50 acres	up to 100 trees within one to eight proposed salvage units
• **Douglas-fir beetle: Trap/Bait tree use (total number of trees)**		up to 100 trees within one to eight proposed salvage units	2425 acres	up to 100 trees within one to eight proposed salvage units	2889 acres
• **Douglas-fir beetle: Salvage treatments in areas of Douglas-fir beetle infestation (total acres & percent of known infested acres)**		2889 acres (79%)	(66%)	1960 acres (54%)	(79%)

Invasive Plant Indicators					
• **Relative rating of vulnerability to weed spread (1-highest, 5-lowest) by activity by alternative.**	Lowest risk	Action alternatives have higher risk than no action; all action alternative are similar in risk	Same as Alt. 2	Sale as Alt. 2	Same as Alt. 2
• **Acres at risk from infestation/invasion of selected weeds in the Moose project weed analysis area.**	See Table 3-27 in the FEIS	See Table 3-27 in the FEIS	See Table 3-27 in the FEIS	See Table 3-27 in the FEIS	See Table 3-27 in the FEIS
• **Percent of area at risk from infestation/invasion of selected weeds in the Moose project weed analysis area.**	See Table 3-28 in the FEIS	See Table 3-28 in the FEIS	See Table 3-28 in the FEIS	See Table 3-28 in the FEIS	See Table 3-28 in the FEIS

Effects Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Grizzly Bear Indicators					
• **Whether Forest Plan standards related to grizzly bear would be met (1 9% open rod density; 19% total road density, 68% core area)**	No	Yes	Yes, with a project-specific Forest Plan amendment	Yes	Yes
• **The potential loss of habitat values associated with dead trees.**	Fire reduced hiding cover values on 25, 984 acres of NFS lands	Hiding cover values would be further reduced within 2403 acres of salvage units	Hiding cover values would be further reduced within 2266 acres of salvage units	Hiding cover values would be further reduced within 1793 acres of salvage units	Hiding cover values would be further reduced within 2403 acres of salvage units
Gray Wolf Indicators					
• **The effect on ungulate habitat.**	No change. Post-fire carrying capacity is low.	Some reduction in hiding cover; increased disturbance, increased hunting season and winter vulnerability.	Some reduction in hiding cover; increased disturbance, increased hunting season and winter vulnerability.	Some reduction in hiding cover; increased disturbance, increased hunting season and winter vulnerability.	Some reduction in hiding cover; increased disturbance, increased hunting season and winter vulnerability.
• **The change in habitat security.**	No change	Improvement from road management; winter logging could reduce temporarily.	Same as Alternative 2	Same as Alternative 2, but winter logging would be prohibited.	Same as Alternative 2
Bald Eagle Indicators					
• **The amount of habitat alteration within the habitat zone adjacent to the North Fork Flathead River.**	No changes to eagle habitat	Removal of potential perch or nest trees on 15 acres	Same as Alternative 2	No changes to eagle habitat	Same as Alternative 2
• **The probability that management activity would disturb nesting bald eagles and cause disruption of natural behavior.**	None	Low. Activities > ½ mile from known nest sites	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
• **Adherence to Montana Bald Eagle Management Plan nest territory guidelines.**	Consistent with plan	Consistent with plan	Consistent with plan	Consistent with plan	Consistent with plan

Effects Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Canada Lynx Indicators					
• **Management actions shall not change more than 15 percent of lynx habitat within an LAU to an unsuitable condition within a 10 year period**	No management actions would occur.	Complies. Proposed salvage units are currently unsuitable from fire. Planting would speed recovery to suitable condition.	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
• **Following a disturbance, such as windstorm, fire, or insects/pathogens mortality that could contribute to lynx denning habitat, do not salvage harvest when the affected area is smaller than five acres.**	No salvage is proposed	All proposed salvage areas are greater than 5 acres	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
• **Maintain denning habitat in patches generally larger than 5 acres comprising at least 10 percent of lynx habitat.**	All potential denning habitat would remain	Over 12,000 acres of burned but unsalvaged area would provide for denning habitat	Same as Alternative 2	Same as Alternative 2, but retains more acres	Same as Alternative 2
Black-backed Woodpecker Indicators					
• **Acres and percent of habitat lost**	0 acres; 0%	1939 acres: 34%	1682 acres; 30%	1327 acres; 24%	Same as Alternative 2
• **Number of large bocks unsalvaged**	N/A – all remain	5	6	7	Same as Alternative 2
Boreal Toad Indicators					
• **Extent of activities that could cause direct mortality of boreal toads in terrestrial habitats**	No activities would occur	Salvage units: 2428 acres Decommissioning: 57 mi.	Salvage units: 2266 acres Decommissioning: 56 mi.	Salvage units: 1793 acres Decommissioning: 87 mi.	Salvage units: 2428 acres Decommissioning: 56 mi.

Effects Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Wolverine Indicators					
• **An assessment of effects on potential prey species of wolverine (big game) and on levels of potential disturbance (motorized access).**	No change to prey species. Continued disturbance from motorized access.	Slight increase in risk of mortality to prey species. Winter logging could cause disturbance to wolverine. Road closures would improve habitat suitability.	Slight increase in risk of mortality to prey species. Winter logging could cause disturbance to wolverine. Road closures would improve habitat suitability.	Prohibition on winter logging, higher levels of trees left (more cover) and road management strategy would reduce risks.	Similar to Alternatives 2 and 3, but road management strategy would reduce risks.
Snag and Down Wood Habitat Indicators					
• **Vulnerability to loss of snag habitat on national forest system lands due to firewood cutting (acres within 200' of open road)**	2008 acres	2084 acres	2007 acres	1907 acres	1939 acres
• **Acres of timber salvage relevant to snag habitat across the analysis area (total acres of high quality)**	0 acres	1487 acres	1450 acres	1185 acres Leaves additional snags in all units (All larch of all sizes and >18" DBH burned Douglas-fir)	1487 acres
• **Acres of Timber Salvage Relevant to Larger-diameter Downed Wood Habitat across the Analysis Area (total acres of high quality)**	0 acres	1263 acres	1233 acres	930 acres	1263 acres

Soils Indicators • **Total acres and percent detrimental soil disturbance in the analysis area**.	. 4288 acres / 8.2%	4235 acres / 8.1%	4236 acres / 8.1%	4116 acres / 7.8%	4235 acres / 8.1%

Effects Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Hydrology Indicators					
• **Potential Sediment from Proposed Salvage Above Spawning Area (tons)**	No salvage – 0 tons	79 tons	64tons	22 tons	79 tons
• **Potential Sediment from Proposed Salvage Below Spawning Area (tons**	No salvage – 0 tons	44 4 tons	362 tons	300 tons	44 4 tons
• **Total Potential Sediment from Proposed Salvage - Big Creek (tons)**	No salvage – 0 tons		426 tons	3 22 tons	
• **Qualitative Assessment of Nutrient Load Effects**	Increase post-fire	5 23 tons	Slight increase above post-fire level – mid range of alternatives	Slight increase above post-fire level – lowest of alternatives	5 23 tons
• **Number of culverts removed and sediment produced**	No culverts removed – high risk of culvert failure	Slight increase above post-fire level – highest of alternatives	40 culverts removed 370.8 tons	62 culverts removed 517.8 tons	Slight increase above post-fire level – highest of alternatives
• **Potential Annual Sediment Reduction from Road Decommissioning (tons/year)**	None	40 culverts removed 370.8 tons	345 tons	438 tons	40 culverts removed 370.8 tons
• **Water Yield increase from proposed salvage**	0	345 tons 0 acre-ft	0 acre-ft	0 acre-ft	395 tons 0 acre-ft
Fisheries Indicators					
• **RHCA Buffer Widths (Feet)**	N/A	Each side of stream: - 100' intermittent streams; - 150' perennial non fish bearing; - 300' fish- bearing	Each side of stream: - 100' intermittent streams; - 150' perennial non fish bearing; - 300' fish- bearing	Each side of stream: - 300" all streams	Each side of stream: - 100' intermittent streams; - 150' perennial non fish bearing; - 300' fish- bearing
• **Predicted tons of sediment delivered to streams as a direct result of timber harvest; and tons predicted to be delivered upstream of some portion of the bull trout spawning reaches in Big Creek and Hallowat Creek**	See indicators for Hydrology above	See indicators for Hydrology above	See indicators for Hydrology above	See indicators for Hydrology above	See indicators for Hydrology above
• **Predicted tons of sediment delivered to streams as a direct result of road decommissioning; and tons predicted to be delivered upstream of some portion of the bull trout spawning reaches in Big Creek and Hallowat Cr.**	See indicators for Hydrology above	See indicators for Hydrology above	See indicators for Hydrology above	See indicators for Hydrology above	See indicators for Hydrology above

Effects Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Fisheries Indicators (cont.) • **Qualitative assessment of changes in stream temperature**	Incremental increases may occur	No increase beyond No Action anticipated	No increase beyond No Action anticipated	No increase beyond No Action anticipated	No increase beyond No Action anticipated
Air Quality Indicators • **Particulate Matter (PM10) Generated by Alternative (tons)**	0 tons	66 tons	66 tons	55 tons	66 tons
Scenic Indicators • **a qualitative assessment of changes in scenic quality**	No change from post-fire conditions	Salvage harvest would create open areas in foreground as seen from North Fork Road, and foreground and mid-ground as seen from Big Creek Road. Salvage in Wild and Scenic River corridor may be slightly noticeable.	Salvage harvest would create open areas in foreground as seen from North Fork Road, and foreground and mid-ground as seen from Big Creek Road. Salvage in Wild and Scenic River corridor may be slightly noticeable.	Salvage harvest would create open areas in foreground as seen from North Fork Road, and foreground and mid-ground as seen from Big Creek Road. Salvage would not occur in Wild and Scenic River.	Salvage harvest would create open areas in foreground as seen from North Fork Road, and foreground and mid-ground as seen from Big Creek Road. Salvage in Wild and Scenic River corridor may be slightly noticeable.
Recreation Indicators • **Qualitative assessment of treatments in or near Glacier Institute and recreation sites.**	No treatments would occur. Visitor safety would not be improved. Fire danger would increase over time at Big Creek campground and Glacier Institute.	Visitor safety improved at some dispersed sites. Fire danger would be reduced at Big Creek campground and Glacier Institute.	Visitor safety improved at some dispersed sites. Fire danger would be reduced at Big Creek campground and Glacier Institute.	Visitor safety improved at some dispersed sites. Fire danger would be reduced at Glacier Institute, but not Big Creek campground.	Visitor safety improved at some dispersed sites. Fire danger would be reduced at Big Creek campground and Glacier Institute.
Other Roadless Areas Indicators • **Acres of salvage in other unroaded area**	No salvage would occur	531 acres	531 acres	446 acres	531 acres
• **Changes to natural integrity, apparent naturalness, remoteness, solitude, primitive recreation opportunities, manageability, and boundaries in other unroaded areas**	No change	Natural integrity and apparent naturalness reduced on SW part of Demers Ridge. Solitude reduced during logging operations. Primitive recreation experiences would not change. Boundaries would be more difficult to manage after harvest.	Same as Alternative 2	Similar to Alternative 2, but to a lesser degree due to fewer acres affected	Same as Alternative 2

Effects Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Economics Indicators					
• **Effects on Job Growth Rate**	0 jobs/year	220 jobs/year	217 jobs/year	179 jobs/year	220 jobs/year
• **Effects on Unemployment Rate**	No change	Slight to no change	Slight to no change	Slight to no change	Slight to no change
• **Effects on Personal Income and Wages**	No change	Minimal increase	Minimal increase	Minimal increase	Minimal increase
• **Effects on Cost of Living**	No change	No change	No change	No change	No change
• **Effects on Economic Dependency and Diversity**	No change	Little to no change	Little to no change	Little to no change	Little to no change
• **Effects on Economic Trends**	No change	Very little effect	Very little effect	Very little effect	Very little effect
• **Effects on Income (M$)**	No change	$5145	$5074	$4165	$5145
• **Effects on Revenue Sharing**	No change	No change	No change	No change	No change
• **Effects on Local Economic Development Objectives**	Would not contribute towards meeting	Consistent with objectives	Consistent with objectives	Consistent with objectives	Consistent with objectives

Fire and Fuels Indicators					
• **Effective Fuels Reduction (Ac)**	0 acres	2611 acres	2474 acres	1982 acres	2611 acres
• **Effects on prescribed fire escape risk (pile burning and/or jackpot burning)**	No risk	Very low risk	Very low risk	Very low risk	Very low risk