2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.0 Introduction

This chapter serves with Chapter 1 as part of the Executive Summary. This chapter describes: (1) the process used to formulate alternatives and respond to comments on the Draft EIS, (2) the issues and design criteria that drive alternatives, and (3) the alternatives themselves, including mitigation measures and monitoring requirements. Most important, this chapter summarizes and compares the predicted effects of the alternatives on the human environment. This information provides a clear basis of choice between alternatives for the Forest Supervisor and the public.

2.1 Process Used to Formulate Alternatives and Respond to Comments on the Draft EIS

2.1.1 Public Involvement Process

Pre-Scoping

During and immediately following the 2000 fire season (July-December), the local public remained heavily involved and well informed of fire fighting efforts and post fire rehabilitation (BAER) activities. In addition to television broadcasts and newspaper coverage, Incident Command Teams assigned to the fires kept the public notified through community meetings and briefings. In many instances, local residents were directly involved with fire suppression activities, emergency restoration work, and associated support services.

During completion of the Lolo National Forest Burned Area Assessment (December 2000-March 2001), the Forest did not directly engage the public in discussion of post-fire activities. The Forest, however, did monitor public involvement efforts occurring on the Bitterroot National Forest. During this period, media coverage provided the public with information on national forest management issues relating to the 2000 wildfire season and the National Fire Plan.

Following completion of the Burned Area Assessment and during development of the Proposed Action for the Post Burn Project (March-April 2001), the Forest re-initiated public involvement by conducting four "Pre-Scoping" meetings in communities near and most directly influenced by the fires (Figure 2.1.1). These meetings provided the public with an opportunity to discuss post fire treatment needs. These meetings also provided a forum for the public to review and critique the previous season's fire fighting efforts, public involvement during the wildfire season, and other forest management issues.

Community Pre-Scoping Meetings

Ninemile Community Meeting – meeting held at Ninemile Community Center on March 22, 2001.

Alberton Community Meeting – meeting held at Alberton Public Library and Community Center on April 9, 2001.

Frenchtown Community Meeting – meeting held at Frenchtown High School on April 10, 2001.

Superior Community Meeting – meeting held at Superior Ranger District on April 23, 2001.

Figure 2.1.1. Pre-Scoping Meetings. *The Forest conducted four "Pre-Scoping" meetings in communities near and most directly influenced by the fires.*

Information, comments, and concerns expressed in these meetings led to a formal proposal to manage lands affected by the fires of 2000. This became the Lolo National Forest Post Burn EIS "Proposed Action".

The Proposed Action was officially approved by the Forest Supervisor and presented to the public on June 15, 2001.

■ Notice of Intent – Federal Register Publication

In order to formally notify the public and other Federal and State agencies of the Proposed Action, the Lolo National Forest published a "Notice of Intent" in the Federal Register on Thursday, July 5, 2001 (Figure 2.1.2). This notice indicated that the Forest was proposing to prepare an Environmental Impact Statement on post fire management and watershed rehabilitation activities. The notice provided supplementary information, including a list of proposed activities and the purpose and need for these activities (40 CFR 1508.22). A copy of the Notice of Intent is filed within the Post Burn EIS Project File.

Notice of Intent – Federal Register

Federal Register, Volume 66, No. 129. Thursday, July 5, 2001. Pages 35409-35411.

Figure 2.1.2. Notice of Intent. *The Lolo National Forest published a "Notice of Intent" within the Federal Register on Thursday, July 5, 2001.*

■ Public Scoping and Involvement

❑ *Public Participation Action Plan*

In order to best involve and address the varying public interests, a "Public Participation Action Plan"(PPAP) was developed. The Action Plan focused on methods to inform the public on the Forest's proposal and to solicit public comments to help identify issues, concerns and opportunities associated with the Proposed Action (Figure 2.1.3). The Public Participation Action Plan is filed in the Post Burn EIS Project File.

Public Participation Action Plan - Goals

Help the Lolo National Forest reach a better decision.

Inform the public of activities plans and decisions.

Encourage public participation in the planning and decision process by providing information.

Allow the Lolo National Forest to be aware and responsive to the values of the public, and to evaluate how the public will be affected by the decision.

Ensure that the Lolo National Forest understands the needs and concerns of the public.

Broaden the information base upon which the Forest's decision are made.

Figure 2.1.3. Public Participation Action Plan. *The Action Plan focused on methods to inform the public on the Forest's proposal and to solicit public comments that would help identify issues, concerns and opportunities associated with the Proposed Action.*

In order to meet resource needs and public expectations for a timely response to the effects of the fires, the planning and analysis process for the project was placed on an accelerated timeline. In regards to public participation, the Forest recognized both the benefits and drawbacks of this timeline (PPAP, May, 2001).

Even with time constraints, the Forest maximized public involvement by identifying who needed to be involved, and in what manner, early in the project. The Forest, therefore, avoided missing or "losing" public involvement essential to the analysis process. The following groups of stakeholders, key public, and target audiences were identified within the PPAP (Figure 2.1.4).

Stakeholders, Key Publics, and Target Audiences

Communities and Chambers of Commerce
County Commissioners
Conservation Districts
Tribal Councils
University Extension Agents
Newspapers and Local Media
Utilities
Other Government Agencies
Government Representatives
Adjacent Landowners
Mine Claimants

Timber Industry Representatives
Environmental Advocacy Groups
Forest User Groups
General Interested Publics

Figure 2.1.4. Stakeholders, Key Public, and Target Audiences. *The Forest avoided missing or "losing" public involvement by identifying groups of stakeholders, key publics, and target audiences early in the process.*

Several methods were used to communicate with these groups and individuals and to encourage participation in the development of alternative management strategies (Figure 2.1.5).

Public Participation Methods

Community Meetings and Open Houses
Direct Mailings to Established Mailing Lists
Field Trips
Announcements and Publications in Local Newspapers
Legal Notices in Local Newspapers
Publications in Federal Register
Direct Telephone Calls and Individual Contacts
Brochures
Forest Web Site and E-Mail Links

Figure 2.1.5. Public Participation Methods. *Several methods were used to communicate with groups and individuals and to encourage participation in the development of alternative management strategies.*

❑ ***Project Scoping***

On June 15, 2001, the Lolo National Forest began the formal public involvement or "scoping" process by mailing general information packets containing a summary of the Proposed Action to 1361 individuals and organizations on the Forest's established mailing list (40 CFR 1501.7).

On the same date, a 30-page document entitled ***"An Introduction to the Lolo National Forest Post Burn EIS"*** was placed on the Forest's web page. This document was also placed at community libraries and Forest administrative offices across the Forest and was made available upon request. This document provided a "user friendly" description of the Proposed Action and Purpose and Need, a timeline of the planning process, maps and photographs of the project area, and information on how to get involved. This document is filed in the Post Burn EIS Project File.

On June 27, 2001, the Missoulian (a widely distributed western Montana newspaper) presented a front-page headline article on the Forest's proposal to conduct fire restoration and recovery activities. This article alerted the segment of the public who had not received informational packets or read the Public Notices section of the newspaper where the request for comments would be published.

On July 6, 2001, a "Request for Public Comments" was placed in local newspapers. The Forest's web site, addresses for sending written responses, and telephone numbers of the team leader and responsible officials were included. These newspaper articles and other public involvement information are filed in the Post Burn EIS Project File.

Immediately following the media and mailing events, the Forest held two Open Houses to allow for discussion between the Interdisciplinary Team and the public (Figure 2.1.6). These meetings provided a forum to present detailed maps of the Proposed Action and to discuss issues, concerns and alternatives. Verbal and written comments received at the Open Houses supplemented comments received by mail, e-mail, and telephone.

Following the summer field season, the Forest provided a Public Field Tour of the fires on September 2001. During this tour, the general public, students, environmental advocacy groups, and timber industry representatives had an opportunity to visit with Interdisciplinary Team members "on the ground", to discuss the findings of the team's resource reviews, and to offer final suggestions for developing alternatives. A second field tour was held on September 27, 2001. Field tour handouts and notes are filed within the Post Burn EIS Project File.

On September 25, 2001, the Forest also conducted Post Burn field trips with local elementary school groups to provide a hands-on experience with fire disturbance and post fire restoration. The classroom experience helped local school- aged children better understand the natural role of fire and the effects that fire has on the forest.

On November 26, 2001, Forest representatives attended a mill tour to discuss local industry capabilities for fire damaged timber and utilization standards for small diameter forest products.

Figure 2.1.6 summarizes public involvement

used to solicit comments on the Forest's Proposed Action.

Public Involvement

General Information Packets – mailed on June 15, 2001 to 1361 individuals and organizations on Forest's established mailing list.

Introduction to Post Burn EIS – on June 15th this document was published on the Forest's web page, posted at local libraries and Forest Offices, and provided hard copy upon request.

Newspaper Headlines – on June 27, 2001, a widely distributed newspaper (the Missoulian) runs a front-page article on the Forest's Proposed Action. A second front-page article was run on August 17, 2001, in a local newspaper (the Clark Fork Wagon Wheel).

Legal Notices and Announcements – on July 6, 2001, articles were placed in local newspapers requesting comments to the Proposed Action.

Open Houses – public open houses were held on July 23rd and 24th to meet one-on-one with the public and solicit comments.

Field Tours – on September 25, 2001 and 27, 2001 field tours were held with the public and Environmental Advocacy Groups.

Student Education - on September 25, 2001 educational field trips were held with students from the Superior Elementary School system.

Mill Tour – on November 26, 2001 a mill tour was attended with local timber industry representatives.

Figure 2.1.6. Public Involvement. *Several means of public involvement helped to solicit comments on the Forest's Proposed Action***.**

■ Public Comments on Draft EIS

Approximately nine months after beginning the Post Burn project, the Lolo National Forest released the Draft of the Post Burn Environmental Impact Statement. Four alternatives were presented and evaluated in the Draft EIS.

On March 20 and 21, 2002 a "Request for Public Comments" was placed in local newspapers and on the Forest's web site. Addresses for sending written responses, e-mail addresses, and telephone numbers of the team leader and responsible officials were included.

On March 26, 2002, the Lolo National Forest released a News Release to local newspapers announcing the completion of the Post Burn Draft Environmental Impact Statement.

On March 27, 2002, the Missoulian (a widely distributed western Montana newspaper) presented a front-page headline article on the Forest's proposal to conduct fire restoration and recovery activities. This article alerted the segment of the public who had not requested copies of the Draft EIS or read the Public Notices section of the newspaper where the request for comments would be published.

Between March 14, 2002 and April 7, 2002, open houses were held at five communities. A slide show, maps, graphics and alternative information were presented to solicit response to the Draft EIS.

Presentations of the project and proposed alternatives were made at two locations, including a professional forestry association meeting and University of Montana class to solicit responses and provide an overview of the process used to develop and assess environmental effects.

Meetings and field tours were also held upon request of environmental advocacy groups and other federal and state agencies to review details of the alternatives and address special concerns.

Eleven outdoor classroom sessions were held with elementary grade students in the 5th and 6th grades between May 18, 2001 and June 5, 2002. These classes were conducted in order to interpret the effects of large fires, ecosystem dynamics, and fire suppression activities. The classroom experiences further helped local school-aged children to better understand the natural role of fire and the effects that fire has on a forest.

Figure 2.1.7 summarizes public involvement used to solicit comments on the DEIS.

DEIS Comment Period

Legal Notices and Announcements – on March 20, 2002 and 21, 2002 articles were placed in local newspapers announcing release of the Draft EIS and requesting comments to the Proposed Action. A "Press Release" including a "Fact Sheet" describing the project and alternatives was released to the local press.

Newspaper Headlines – on March 27, 2002 a widely distributed newspaper (the Missoulian) runs a front-page article on the Forest's release of the Draft EIS and project alternatives.

Post Burn DEIS Publication and Distribution – on March

29, 2002, this document was published on the Forest's web page, posted at local libraries and Forest Offices, and provided as a CD, Hardcopy, or Summary to over 100 individuals, groups and organizations.

Open Houses – public open houses were held on March 14th, 25th, 27th, April 24th and May 7th at Ninemile, Frenchtown, Alberton, Superior, Missoula, and Plains to meet one-on-one with the public and solicit comments on the DEIS.

Professional Associations – on April 16, 2002, presentation of the DEIS was made to Missoula Chapter of Society of American Foresters to solicit public comments.

Student Education - on May 7, 2002 a presentation of the DEIS was made to the U of M Forest Policy Class to discuss analysis and alternatives, and to solicit public comments. Between May 18, 2001 and June 5, 2002, educational field trips were held with students from elementary school systems.

Field Tours – on June 10 and 11th field tours were held with the Environmental Protection Agency (EPA) and Montana Department of Environmental Quality (MDEQ) to review watershed conditions and project effects.

Figure 2.1.7. DEIS Comment Period. *Several means of public involvement helped to solicit comments on the draft of the EIS***.**

❑ ***Notice of Availability – Federal Register Publication***

In order to formally notify the public and other Federal and State agencies of the Proposed Action, the Lolo National Forest published a "Notice of Availability" within the Federal Register on Friday, March 29, 2002 (Figure 2.1.8). This notice indicated that the Forest had completed preparation of a Draft Environmental Impact Statement on post fire management and watershed rehabilitation activities and was available for public review and comment. A copy of the Notice of Availability is filed within the Post Burn EIS Project File.

Notice of Availability – Federal Register

Federal Register, Volume 67, No. 61. Friday, March 29, 2002. Page 15193.

Figure 2.1.8. Notice of Availability. *The Lolo National Forest published a "Notice of Availability" within the Federal Register on Friday, March 29, 2002.*

❑ ***Public Response to Draft EIS***

Approximately 170 letters, comment cards, telephone calls, and e-mails were received during the 45-day comment period on the Draft EIS.

Each letter was assessed through a formal content analysis process and summarized as a public concern list. A standardized process was followed including: (1) reading each submission twice, (2) separating comments according to subject, (3) selecting representative quotations, and (4) distilling key ideas and comments into statements to capture the respondents sentiments. Public Concern statements where then presented in the form of an action that the Forest could consider pursuing. All statements were considered during content analysis, even those that were not confined to the scope of the proposed management actions and alternatives.

The list of public concerns and responses to these concerns is in Appendix I of this document. Individual letters, e-mails, and attachments are filed in the Post Burn EIS Project File. Additional analysis, explanations, clarifications, and other responses to public concerns are located throughout the Final EIS and summarized as changes.

An internal professional peer review of the Draft EIS was also conducted by the Lolo National Forest and Regional Office. Responses to peer comments were included as edits in the Final EIS.

■ **Involvement of other Agencies**

In addition to involving the public, the Forest consulted with several other agencies for resource data and issue identification (40 CFR 1508.5). Several of these cooperating agencies are responsible by law or special expertise for administering resources such as endangered species, heritage resources, and water quality.

❑ ***United States Fish and Wildlife Service***

Under the requirements of Section 7 of the Endangered Species Act (16 U.S.C. Section 1531-1544), the Forest Supervisor is required to consult with the United States Fish and Wildlife Service (USFWS) to determine the biological significance of activities on any species designated or proposed as threatened and endangered, or "at-risk" (50 CFR Part 402).

In accordance with the National Fire Plan Biological Analysis and Endangered Species Act (ESA) Consultation Process (USFWS, et al. August 2001), biologists of the United States Fish and Wildlife Service remained involved

throughout the analysis process as ex officio Interdisciplinary Team members. Fish and Wildlife Service representatives attended field tours and Interdisciplinary Team meetings during the planning process.

As part of the consultation process, the USFWS provided assistance with completion of the Biological Evaluations (BE) and Assessments (BA) completed by the Forest to document the effects of the project on Threatened, Endangered and Sensitive species. A response and Biological Opinion (BO) on these effects is filed in the Post Burn EIS Project File.

❑ ***Confederated Salish and Kootenai Tribes***

Under the requirements of several federal regulatory acts (see Heritage Resources, Chapter 3), the Forest is required to involve local tribes in the planning process to determine cultural significance of known heritage sites.

In accordance with these laws, the Confederated Salish and Kootenai Tribes (CS&K), Tribal Preservation Office was consulted. During the consultation process Heritage Resource Specialists from the Lolo National Forest and CS&K corresponded on cultural resource assessments performed as part of the Post Burn Project. Additional survey needs were identified and included within an ongoing heritage assessment contract (Contract No. 53-03R6-6-16027).

The Confederated Salish and Kootenai Tribes issued no other responses to the initial scoping requests or requests to comment on the Draft EIS.

❑ ***Montana State Department of Environmental Quality***

Under the requirements of the Montana Water Quality Act (MWQA) (Title 75, Chapter 5, MCA Revised 1999) the Montana State Department of Environmental Quality (MDEQ) is the responsible agency for water quality permitting and enforcement.

In accordance with MWQA and the Federal Clean Water Act (P.L. 92-500 amended), MDEQ was notified of the project. Subsequent field tours of the analysis area were used to determine potential concerns and issues and help ascertain assessment methods.

MDEQ has remained involved with the Lolo National Forest and residents of the Ninemile Valley to develop and implement the "Ninemile Watershed Group, Inc." (an ad-hoc group of private, state, and federal landowners working jointly to improve water quality within the Ninemile Valley).

MDEQ also remains involved with the Lolo National Forest, EPA, NRCS, Mineral County, and the Town of Superior to manage toxic mine tailings in the Flat Creek drainage.

Following attendance of the June 10th and 11th, 2002 Field Tour, MDEQ expressed general support of the project.

❑ ***Montana State Department of Land Resources and Environmental Sciences***

The Montana Weed Management Plan (MWMP) provides direction for strengthening, supporting, and coordinating private, county, state, and federal weed management efforts in the State of Montana.

In concert with the MWMP, the Montana State Department of Land Resources and Environmental Sciences (MDLRES) has coordinated with the Lolo National Forest, Missoula and Mineral Counties, and private landowners to develop the Flat Creek and Ninemile Weed Management Areas, which include portions of the Post Burn Project. These documents are in the Post Burn EIS Project File.

❑ ***Other Agencies Contacted***

As part of the public involvement and scoping process, several federal, state and local agencies were contacted. They include but are not limited to: Environmental Protection Agency (EPA), Corp of Engineers, Natural Resource Conservation Service, Montana Department of Lands, Montana Fish, Wildlife and Parks Department, Montana State Extension Service, and County Commissioners. Additional information is displayed in Chapter 6, Agencies Consulted.

The EPA issued a detailed response to the Draft EIS including recommendations for clarification of certain information and additional display of cumulative effects analysis within the FEIS. Following the June 10th and 11th 2002 Field Tour,

the EPA issued notes including general support of the project.

2.1.2 Issue Development

Potential issues (defined as actual and perceived effects, risks, and hazards of the Proposed Action) were developed from the results of both "internal scoping" and "external scoping" (public involvement). In some cases, written and verbal comments were used verbatim to develop issue statements. In most cases comments were paraphrased, summarized, or combined with other comments to develop an issue statement.

■ Internal Issue Development

Immediately following the development of the Proposed Action, the Post Burn Interdisciplinary Team (PBIDT) conducted several internal meetings and field tours to review the project area and assess potential issues, concerns, and opportunities associated with the Proposed Action.

The PBIDT also met with members of other teams that had completed (or were implementing) the Burned Area Emergency Rehabilitation Plan and Burned Area Assessment Report to solicit internal issues concerning the Proposed Action.

From these meetings, internal issue statements were developed for each resource (e.g. water quality and hydrology, fisheries, soils, transportation systems, vegetation, heritage, wildlife, etc.). Appropriate indicators (means to measure or quantify effects), threshold levels, and measurement techniques were also identified to assist the PBIDT in data collection and research. Fifty-seven internal issues were identified. These issues are displayed in the Post Burn EIS Project File.

■ Public Issue Development

As a result of public scoping and involvement, 45 written responses (not including informal discussions and public meeting comments) were received from the public. Each response was assessed by the PBIDT.

Using procedures outlined in the Content Analysis Database Guidebook (USDA Forest Service 1999) each response was studied and broken into individual issue statements. These statements were then identified, coded, and entered into a database for tracking. Issues were coded into 22 categories. Each category contained sub-categories that best represented each resource area. For example, the category for "Fire" was broken into 8 subcategories including subjects such as: "wildfire potential", "fuel treatments", "fire suppression", and "fire ecology". Under all categories, 179 subcategories were available for coding issue statements. As a result of the coding process, 484 public issues were identified and coded.

■ Literature Citations, References and Attachments used in Issue Identification

Several letters received from the public during the scoping process included literature attachments or references to previously submitted comments. The information in these attachments was considered during the coding of comments that were specific to the project; however, coding of the specific attachment was not performed in all cases.

❑ *March 23, 2000 Letter to Forest Supervisor from the Ecology Center*

A letter to the Forest Supervisor from the Ecology Center, dated March 23, 2000, was written to address resource issues relevant to all projects conducted on the Lolo National Forest. Although this letter did not specifically address the proposed action, many of the issues in this letter were determined to be relevant to the project. Information in this letter was therefore coded and incorporated into the issue statements.

❑ *Beschta et al. (1995)*

In March, 1995, Dr. Robert Beschta, Oregon State University, and other research scientists produced a commentary entitled: **"Wildfire and Salvage Logging, Recommendations for Ecologically Sound Post-Fire Salvage Logging and Other Post-Fire Treatments on Federal Lands in the West."** This document was prefaced with a discussion of the interrelationships between the natural disturbance cycle and the impacts of past land management, and the need to examine and "focus on the pattern and consequences of current and proposed human manipulation and disturbances of all types at the landscape level."

Beschta et al. (1995) concluded with a summary of principles for fire management and salvage logging (Figure 2.1.9).

Beschta, et al. (1995) Post Fire Principles

Allow natural recovery and recognize the temporal scales involved with ecosystem evolution. Human intervention should not be permitted unless and until it is determined that natural recovery processes are not occurring.

Protect Soils. No management activity should be undertaken which does not protect soil integrity.

Preserve capabilities of species to naturally regenerate.

Do not take actions, which impede natural recovery of disturbed systems.

Salvage logging should be prohibited in sensitive areas.

On portions of the post-fire landscape determined to be suitable for salvage logging, limitations aimed at maintaining species and natural recovery processes should apply.

Because of the wide range of chronic ecological effects associated with road building, the building of new roads in the burned landscape should be prohibited.

Active reseeding and replanting should be conducted only under limited conditions.

Structural post-fire restoration is generally discouraged.

Post-fire management will generally require reassessment of existing management.

Continued research efforts are needed to help address ecological and operational issues.

Additional information must be provided to the public regarding natural fires and post-burn landscapes to provide balance to the "Smokey Bear" perspective of fires and forests.

Figure 2.1.9. Beschta et al (1995) Post Fire Principles. *Because of the public concern about issues discussed by Beschta et al., the principles outlined in this report were considered very closely by the Post Burn Interdisciplinary Team.*

Although the Beschta report itself was not coded, the issues and principles addressed by this report were incorporated into the coding of the letters that this document was attached to and addressed during issue consolidation. Because of the concern about issues discussed by Beschta et al., the principles outlined in this report were used in the development of Design Criteria and Alternatives. Many of the Design Criteria specifically iterate resource protection concerns displayed in the Bestcha et al. commentary. Mitigation measures were also used to offset resource management effects as outlined by Bestcha et al..

Additional discussion on how the Bestcha et al report was considered in project design is located in Appendix J.

❑ ***McGreer***

In May 1996, Dale McGreer, Principal Hydrologist for Western Watershed Analysts, produced a prepublication manuscript entitled: **"Considerations in Development of Riparian Management Strategies: Potential Consequences of Wildfire on Riparian and Aquatic Systems."** This document primarily discusses the comparative benefits and risks of active versus passive management within riparian areas. It suggests that without active management, riparian areas could be at greater risk to the effects of catastrophic fire conditions including reburn.

Although the McGreer manuscript itself was not coded, the issues and principles addressed by this report were incorporated into the coding of the letter that this document was attached to and addressed during issue consolidation.

❑ ***Corridors of Life***

The brochure, "**Corridors of Life, Weaving a Web of Wildlife Habitat in the Northern Rockies**" was produced by the organization "American Wildlands" to present and educate the public on the values of protecting linkages and corridors .

Although the American Wildlands brochure itself was not coded, the issues and principles addressed in this document were incorporated into the coding of the letter that this document was attached to and addressed during issue consolidation.

❑ ***Conservation Decisions in the Face of Uncertainty***

Undated notes from a meeting entitled: **"Missoula Statement: Conservation Decisions in the Face of Uncertainty"** provided information concerning decision making under conditions where uncertain ecological conditions exist.

Although this document itself was not coded, the issues and principles addressed in this document were incorporated into the coding of the letter

that this document was attached to and addressed during issue consolidation.

❑ ***Forest Bird Responses to Thinning and Burning***

An undated preliminary report by Dr. Len Broberg entitled: **"Ponderosa Pine/Western Larch Late Successional Forest Bird Species Responses to Thinning and Burning"** provided study results on the effects of thinning and prescribed burning on several bird species on the Lolo National Forest.

The information contained within this preliminary report was coded and incorporated into the issue statements.

■ **Consolidation and Identification of Key Internal and Public Issues**

Following the coding process, similar internal and public issues were grouped and consolidated into 95 Consolidated Issue Statements (CIS). Issues which: (1) had a common resource, (2) had similar cause-effect relationships, (3) had common geography, or (4) were linked to the same action, were consolidated into one issue statement (Figure 2.1.10).

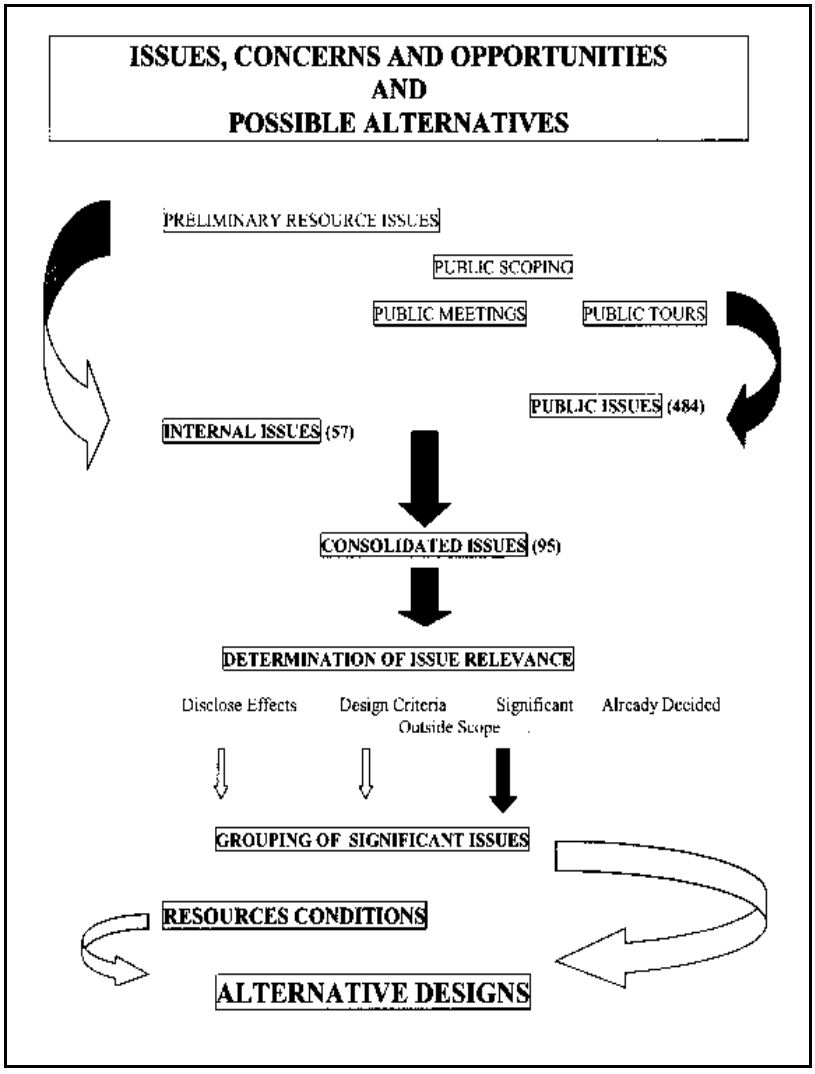


Figure 2.1.10. Development of Alternatives. *Similar internal and public issues were grouped and consolidated into a total of 95 Consolidated Issue Statements. Issues which: (1) had a common resource, (2) had similar cause-effect relationships, (3) had common geography, or (4) were linked to the same action, were consolidated into one issue statement.*

To determine which CIS would become "key" or "driving" to the development of alternatives, the "cause-effect" relationship was assessed. This relationship was determined based on three factors (Figure 2.1.11).

Determination of "Driving" Issues

Extent – the geographic distribution of the effects

Duration – the length of time the effect is likely to occur

Magnitude or Intensity – the value of the effect in relation to acceptable values (including social, economic, and environmental)

Figure 2.1.11. Key Issues. *The given cause-effect relationship was assessed to determine which issues would be key to driving alternatives.*

Issues not identified as "Drivers" or "Key" to the development and analysis of alternatives were assigned to five other categories for tracking (Figure 2.1.12).

Issue Tracking

Driving or "Key" Issue – issues which individually or consolidated will drive the development of an alternative.

Design Criteria – issues, which are applicable to all alternatives and will be used to guide the design of activities within the alternatives.

Disclose Effects – issues which are applicable but do not have cause-effect relationships which drive alternative development, or have law that requires that effects are disclosed.

Already Decided – issues of actions that are ongoing or are already covered by previous Forest decisions.

No Scientific Evidence – issue is conjecture or opinion and is not supported by science

Beyond Scope – issues that are not pertinent to the scope of the Proposed Action and cannot be resolved at the scale of this project

Figure 2.1.12. Issue Tracking. *Issues not identified as "Driving Issues" were assigned to five other categories for tracking.*

2.1.3 Issues used to Develop Alternatives

Fifty-six of the Consolidated Issue Statements were identified as relevant to driving the development of alternatives (Figure 2.1.13). Driving issues were used to formulate alternatives, prescribe mitigation measures, or analyze environmental effects.

Driving Issues

Consolidated Public Issues

BESCO 7 – Road System Environmental Impacts, Costs and Analysis - There is a concern that the degraded condition of most non-wilderness watersheds on the Lolo National Forest warrants the implementation of rehabilitation and restoration projects that propose no further commercial logging or road building.

ECO 2 – Restoration of Ecosystem Processes - There is a concern that the proposed activities do not emulate natural ecosystem processes and are designed solely for the gain of economic benefits from the burned area, therefore disregarding the principles of ecosystem management. There is further concern that these actions disrupt, rather than restore natural ecosystem process to the landscape

ECO 3 – Insect Infestations – There is a concern that the large numbers of stressed and dying trees impacted by the fires of 2000 will lead to the spread of and damage by insect populations known to be present within the area. There is also concern that the failure to remove both stressed and dying burned trees, and susceptible overstocked unburned trees, will lead to additional insect infestation and loss.

ECO 6 – Noxious Weed Spread and Non-Native Species Introduction – There is a concern that the removal of fire killed stands of dead and dying trees and the commercial thinning of unburned trees may increase the spread and establishment of noxious weeds. There is further concern that noxious weeds, or exotic grass species used to prevent weed spread, may compete with native forbs and grasses, especially sensitive plants that potentially occupy very small habitats.

ECON 3 – Contributions to Local Jobs, Counties, and Economies – There is a concern that local jobs and support to local economies will be lost if timber salvage, commercial thinning, and other proposed forest management activities are not conducted. There is also concern that federal funding provided to local counties from timber sale proceeds would not be available unless forest management activities were conducted and therefore schools and roads would deteriorate.

ECON 5- Product Deterioration and Value Loss – There is a concern that standing dead and dying timber is quickly deteriorating and value will be lost before burned trees can be salvaged.

FIRE 1 – Fuel Levels and Effect on Fire Behavior and Reburn – There is a concern that existing and future fuel loads created by past fire suppression, burned vegetation, and unburned vegetation killed by disease, insects or competition, could lead to higher fire severities, fires less resistant to control, and increased rate of spread. There is also concern that fuels created by the fires of 2000 increase the potential for reburn.

FIRE 2 - Fuels Vary by Fire Regime and Elevation - There is concern that prescribed fire, fuels reduction, and other vegetation treatments are being proposed within areas historically dominated by moderate to severe fire regimes.

Prescribed burning and vegetation treatments to return fire are unnecessary in these areas and should be focused within the low elevation, low-severity fire regimes or areas adjacent to important structures.

FISH 1 - Effects on Fish and Aquatic Habitat - There is a concern that the removal of fire killed stands of dead and dying trees and the commercial thinning of unburned trees could adversely affect fish populations and aquatic habitat necessary to support fish and riparian fauna. Furthermore, there is a concern that previous logging, road development, mining, and other land uses have impacted fish populations and aquatic habitat to levels that preclude any further detrimental impacts.

MINER 1 - Historic Mining Impacts on Water Quality - There is a concern that historic and abandoned mine sites may adversely affect water quality and aquatic health. Reclamation would be effective at reducing the impacts of these sites and could be completed along with adjacent stream and riparian rehabilitation projects.

PLAN 8 – Proposed Alternatives - There is a concern that an adequate range of alternatives may not be evaluated. There is a request for the consideration of specific alternatives and alternative designs.

ROADS 1 – Closure Affects Long Term Land Management and Public Access - There is a concern that road closures and road decommissioning will limit access for future land management and public access. There is additional concern that road closures are an unnecessary expense and remove an existing or established infrastructure. There is also a concern that the decommissioning of roads that are already heavily vegetated may produce additional and unnecessary sedimentation and resource impacts. Roads are observed as an asset. Temporary (vs. permanent) closures can be used to protect resources without jeopardizing future access. Roads can be designed to produce little impact and be of low maintenance and should be considered for areas that are presently not roaded.

ROADS 2 – Effects of Roads on Ecological Values - There are concerns that the existing road system is adversely affecting water quality, aquatic habitat, wildlife, and other resources. There is also a concern that existing road densities exceed Forest Plan Standards for protecting resource health and that there is no "room for additional roads". There is concern that poor maintenance has caused unnecessarily high levels of sedimentation to stream systems and that many unclassified roads have not been monitored and have not received maintenance. If these roads are not to be closed, they should be placed on the system and maintained.

ROADS 3 – Maintenance Practices and Best Management Practice Standards - There is a concern that present maintenance and management practices are not effectively reducing road sediment delivery and may further degrade water quality and aquatic habitat. There is also a concern that many roads do not receive any maintenance because they are presently unclassified or unaccounted for in the Forest Service Inventory of roads.

RDLES 1 – Unroaded and Inventoried Roadless (RARE II) Areas - There is a concern that removal of fire created stands of dead and dying trees, the commercial thinning of unburned trees, and the removal of understory fuels could alter the undeveloped character of large unroaded areas. Roadless areas within or adjacent to the analysis area that have contiguous unroaded parcels adjacent to them include Reservation Divide (1205), Stark Mountain (01800), North Siegel (01796), South Siegel (01795), Hoodoo/Great Burn (01301), and Meadow Creek – Upper North Fork (01302).

SOILS 1 – Fires Impacts on the Chemical, Physical, and Biological Components of Soil - There is a concern that the fires and fire suppression activities may have adversely affected soil stability, structure and erosion potential. There is concern that soils within the area are now highly prone to mass wasting and increased erosion due to the loss of vegetation. Furthermore, there is a concern that the fires caused soil structure damage that could lead to increased overland flow and extensive erosion.

TIMBE 1 – Harvesting Needed to Improve Forest Health - There is a concern that without harvesting, forest health may decline. There is concern that without vegetation management, disease, insects, and decadence will increase, resulting in a loss of forest products and economic values. There is additional concern that without harvesting, increases in course woody debris could divert stream courses and adversely affect riparian stability. There is a desire to harvest merchantable trees in an environmentally sound manner, leaving non-merchantable trees and adequate snags to protect other resource values.

TIMBE 2 – Harvesting Not Ecological, and Unnecessary for Fire Recovery - Refer to Issue ECO 2 that addresses ecological impacts of vegetation management and road management.

TIMBE 3 – Harvesting Leads to Fuel Problems - Refer to Issue FIRE 4 that address fuel increases following vegetation management.

TIMBE 4 – Past Logging Has Caused Resource Damage - Refer to ECO 2 that addresses ecological impacts of vegetation management and road management.

TIMBE 6 – Harvesting Increases Weed Spread - Refer to Issue ECO 6 that addresses land management as a cause of weed spread.

TIMBE 7 – Planting Un-Ecological and Unnecessary - There is a concern that planting will introduce non-native species of trees and atypical (offsite) tree genotypes. There is further concern that planting accelerates the natural regeneration cycle and does not represent the ecological cycle that occurs following fire. There is a desire that all planting be delayed for 5 years to allow natural regeneration to occur. In areas where natural regeneration does not occur, planting of on-site genotypes could be conducted.

TIMBE 8 – Small Sales Opportunities Needed - There is a concern that opportunities for small sales, roundwood (including post and poles and small sawtimber), and commercial firewood are not being provided to meet a diversity of jobs and economic needs. There is a desire that these opportunities be provided for local employment and utilization of lower value wood products.

WATER 1 – Reburn in Riparian Areas - There is a concern that reburns (that could occur because fuels reduction projects are not being conducted with RHCAs) may consume nearly all vegetation and organic matter and adversely affect riparian areas, riparian area stability, and water quality.

WATER 2 – Wetlands and Riparian Areas - There is a concern that removal of fire created stands of dead and dying

trees, the commercial thinning of unburned trees, and the removal of understory fuels could adversely affect wetlands and riparian areas.

WATER 5 – Water Quality and Degradation of WQ Limited Stream Segments - There is a concern that the removal of fire created stands of dead and dying trees and the commercial thinning of unburned trees could exceed non-degradation criteria established by State Water Quality Standards and lead to further degradation of water quality and adverse effects on beneficial uses. Two drainages, Ninemile and Trout Creek have been listed as "Water Quality Limited" within the Montana 303(d) report. Although not listed as impaired, several other drainages, including Flat Creek, Johnson Creek, and First Creek have been impacted by previous land uses.

WATER 6 – Restoration and Re-disturbance of Disturbed Areas - There is a concern that vegetative treatments and access needed for proposed land management activities may re-disturb areas previously restored, or restored recently following the fires of 2000. There is also a concern that previous land management activities have left many areas in need of land restoration. Restoration activities identified are for damage caused by roads, logging, livestock grazing, and other sediment sources.

WLF 1 – Burned Stands (Snag Associated bird Species) - There is a concern that the removal of fire created stands of dead and dying trees could adversely affect habitat for several bird species that utilize snags and burned trees created by wildfires. Approximately 74,000 acres burned on the Lolo National Forest during 2000. Of this acreage, approximately 12,500 acres of lethal and mixed lethal burn intensities within mature stands of VRUs 2 and 3 is considered ideal habitat for species such as the Black Backed Woodpecker.

WLF 2 – Green Stands (Closed Canopy Associated Bird species) - There is a concern that the reduction of canopy closure and stand density caused by fuels reduction activities and commercial thinning may adversely affect habitat for several bird species that are dependent upon late-successional dry forests with closed canopies and high basal area.

WLF 3 – Forest Fragmentation Effects on Bird Species - There is a concern that fragmentation of the forested area by harvesting and road construction may adversely affect interior songbirds and other birds associated with large parcels of unaltered forest habitat.

WLF 5 – Big Game and Non-Game Habitat - There is a concern that the removal of fire created stands of dead and dying trees and the commercial thinning of unburned trees could adversely affect habitat for several big game species and other smaller non-game species that utilize forested conditions for hiding and thermal cover.

WLF 6 – Lynx and other Fur Bearer Habitat - There is a concern that the removal of fire created stands of dead and dying trees and the commercial thinning of unburned trees could adversely affect habitat for Canada Lynx, pine marten, fisher, and other wildlife species dependent upon snags, burned stands and mature forest conditions.

WLF 7 – Potential and Listed Sensitive, Threatened, and Endangered Species - There is a concern that the removal of fire-created stands of dead and dying trees, the commercial thinning of unburned trees, and the removal of understory fuels, could adversely affect Proposed, Threatened or Endangered Species and listed Sensitive, Threatened or Endangered Species (ST&E) known to be present within or to be potential to the analysis area.

WLF 8 – Linkages, Corridors, and Habitat Fragmentation - There is a concern that the removal of fire created stands of dead and dying trees, the commercial thinning of unburned trees, and the removal of understory fuels could fragment habitat and adversely affect established wildlife movement corridors within the project analysis area. There is also a concern that these same activities may be detrimental to linkages between ecosystems within western Montana and Idaho, and thus lead to further island-ization of core habitat. Roadless and unroaded parcels along the FIR Divide, Ninemile Divide, and Lightening Peak - Bitterroot Crestline provide wildlife movement corridors within the project analysis area and between local habitats. The Ninemile Valley, including relatively undeveloped areas along the FIR and Ninemile Divides, is identified as one of the linkages between the Cabinet-Yaak and Bitterroot Selway Ecosystems. The FIR Divide may also provide a connection between the large core areas such as the Mission Mountains, Bob Marshall, and Glacier and the Cabinet-Yaak and Bitterroot Selway ecosystems. All of these core areas are identified as essential to long-term recovery of large carnivores such as the grizzly bear.

WLF 9 – Old Growth Dependent Species - There is a concern that the reduction of canopy closure and stand density caused by fuels reduction activities and commercial thinning may both beneficially and adversely affect habitat for old growth dependent species.

Consolidated Internal Issues

VEG 1 – Fire Weakened Trees Susceptible to Insect Predation - Fire weakened trees are more susceptible to insect predation, especially Douglas-fir from the Douglas-fir beetle, and in large wildfire events, these conditions can trigger a local epidemic which spreads into unburned stands resulting in high levels of tree mortality.

VEG 2 – Continued Insect Predation - Mountain pine beetle, western pine beetle, and Douglas-fir beetle were causing elevated levels of tree mortality prior to the wildfires in response to the large areas of moderate and high risk stands of lodgepole pine, ponderosa pine, and Douglas-fir. Risk of continued epidemic predation will continue without the added effects of the year 2000 wildfires.

VEG 3 – Reburn Effects on Soils and Regeneration - The potential for another wildfire increases as fire killed trees fall to the ground and greatly increases fuel loadings. Another high intensity burn in VRU2 within approximately 3 to 35 years could cause soil damage beyond the range of natural variation. Wildfires could also cause mortality of saplings that regenerate after the year 2000 wildfire.

VEG 4 – Old Growth Protection and Enhancement - Old growth stands in burned and unburned portions of VRU2 are at risk to insects and disease, and wildfires by the overly dense understory conditions that are beyond the range of natural variation. A significant amount of old growth forests has been harvested since settlement and mining began in the late 1800's. Protecting, enhancing, and recruiting old growth forests in burned and unburned portions of VRU2 is important to the ecological integrity of these landscapes.

VEG 5 – Protecting, Enhancing and Establishing "Species at Risk" - Several seral conifer species occurring in these landscapes have been identified as "species at risk" in the Northern Region Overview primarily as a result of wildfire suppression. Natural regeneration of these species may be deficient in some burned areas for lack of adequate seed fall. Protecting, enhancing, and establishing western larch, ponderosa pine, and whitebark pine is important to the ecological integrity of these landscapes and conifer species.

FISH 1 – Roads Impair Stream Function - Roads impair stream function, produce fine sediment that may be delivered to stream channels, alter watershed hydrology by more efficiently delivering upslope runoff to channels, and may affect instream flows where they cross channel (See HYDRO 4). An increase in fine sediment delivered to stream channels may reduce available pool and intergravel quantity and quality (fish rearing), thereby reducing early life history survival and further impair viability of important fish populations such as bull and westslope cutthroat trout.

FISH 2 – Vegetation Management Affects Fisheries Habitat - Timber harvest (salvage and green) in areas that burned with moderate, moderate-high, and high severity may increase fine sediment inputs to instream habitats. An increase in fine sediment delivered to stream channels may reduce available pool and intergravel quantity and quality (fish rearing), thereby reducing early life history survival and further impair viability of important fish populations such as bull and westslope cutthroat trout.

FISH 4 – Culverts Impede Fisheries Connectivity - Stream crossings and undersized culverts may impair function and recovery of fish populations, as well as increase the risk for sediment production and delivery to instream habitats. Inappropriately sized or placed culverts at stream crossings can prevent upstream fish passage; this reduces the ability of fish populations to persist in a healthy state or to recover from landscape disturbances such as wildfire. Stream crossings and undersized culverts increase the potential for sediment inputs to instream habitats through failure or long-term sediment recruitment from fill areas.

HYDRO 3 – Accelerated Soil Loss - Harvest activities and fire suppression may lead to accelerated soil loss due to ground disturbance; past activities may also contribute. Road rehabilitation may also cause short-term impacts until disturbed sites are stabilized. Soils may be especially vulnerable in areas of high-severity burn. Accelerated erosion in upland areas may lead to increased sediment delivery to stream channels, which may cause a decline in water quality downstream. Ninemile Creek and Trout Creek are on the Montana list of streams not meeting water quality standards under Section 303(d) of the federal Clean Water Act. Management activities related to timber harvest and roads have the potential to further degrade water quality in these streams.

HYDRO 4 – Road Sediment and Hydrologic Effects - Roads that are open to use produce sediment that may be delivered to stream channels, alter watershed hydrology by more efficiently delivering upslope runoff to channels, and may affect instream flows where they cross channels. Changes in runoff timing, peak discharge, sediment loads, and channel stability may result.

HYDRO 5 – Increased Water Yields and Flood Peaks - Removal of vegetative cover may alter evapotranspiration and interception of incoming precipitation; this may lead to an increase in annual water yields and flood peaks. Such changes in runoff patterns have the potential to destabilize channels. Culvert sizing may also need to take account of this potential impact.

FIRE 4 – Fuels in Intermix Communities - High fuels in intermix zones may increase fire risk to local communities and reduce suppression abilities for future wildfire events.

WILDLIFE 2 – Lynx - Management activities may change denning habitat, foraging habitat, travel cover and suitable habitat.

WILDLIFE 6 –- Northern goshawk – The fires have greatly reduced potential goshawk habitat within the fire perimeter. Goshawks are not likely to occupy stands where the tree canopy has been lost. Goshawks may utilize under burned stands adjacent to unburned stands. Thinning in green stands may reduce canopy closure in foraging areas or impact nest trees.

WILDLIFE 7 – Black Backed Woodpecker - Removing burned trees may reduce suitable habitat for black-backed woodpeckers.

WILDLIFE 15 – Pileated Woodpecker - Management activities may reduce suitable pileated woodpecker habitat by removing large snags and smaller foraging trees.

TIMBER 3 – Logging System Feasibility – In addition to feasibility concerns created by loss of timber value and merchantability specification, limitations imposed by available transportation facilities will determine which from of logging system can be used.

ECONOMIC 4 – Funding for Resource Rehabilitation Activities – Without timber harvest funding may not be available to complete watershed and land restoration and rehabilitation activities. Even if timber harvesting is performed, rehabilitation activities outside of the sale boundaries will need funding from appropriated sources.

ROADS 1 – Access needs for Land Management and Public Use - Road closures may reduce access for future land management and public recreational use. The amount of roads needed to manage a given area could be reduced with changes in logging systems. Decommissioning some of these roads would improve the hydrologic function of the watershed, but may increase logging costs. Road systems provide for faster and less expensive access to the forest for management activities. The wildfires of 2000 have changed the type and frequency of access for land management.

REC 3 – Noxious Weed Spread - Off-road and off-trail human, stock, and snowmobile travel could spread noxious weeds into relatively weed-free areas.

Figure 2.1.13. Driving Issues. *Fifty-six of the Consolidated Issue Statements were identified as relevant to driving the development of alternatives.*

Remaining issues, identified as: (1) design criteria, (2) for effects disclosure, or (3) already decided, are displayed in Appendix B.

2.1.4 Issues Eliminated from Further Study

Of the 95 consolidated internal and external issue statements, 24 were considered "Beyond the Scope" of the project and eliminated from further study. These issues ranged from requests for national level assessments to identification of resource impacts and monitoring not pertinent to the scope of the Post Burn Project. Many of these issues are relevant to National Forest management but must be resolved at Forest, Regional, or National levels. Examples of these issues are displayed in Figure 2.1.14.

Issues Beyond the Scope
BESCO 1 – National Level Assessment
BESCO 2 – National Fire Plan Implementation
BESCO 3 – Regional Level Assessment
BESCO 8 – Conservation Strategies for TES
BESCO 12 – Logging on Public Lands
BESCO 16 – Grizzly Consultation Strategy

Figure 2.1.14. Issues Beyond the Scope. *Twenty-four issues were considered"Beyond the Scope" of the project and eliminated from further study*

A list of all issues and issue tracking is displayed in Appendix B. Detailed information on public involvement, issues identification and coding, and content analysis are in the Post Burn EIS Project File.

2.1.5 Environmental Justice

On February 11, 1994, President Clinton issued an "Executive Order on Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations." (Executive Order 12898). This Executive Order is primarily concerned with disproportionate effects on minority or low-income populations. In April 1998, the U.S. Environmental Protection Agency issued "Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis."

Census Bureau 2000 data indicates an estimated 8.1 percent minority population for Sanders County, 5.4 percent minority population for Mineral County, and an 6.0 percent minority population for Missoula County, well below the 50 percent threshold for identifying minority populations.

The U.S. Census "Model-Based Income and Poverty Estimates for Sanders, Mineral and Missoula Counties estimated 19.8 percent, 20.3 percent, and 15.3 percent of all ages in these counties (respectively) live in poverty as of 1997. No areas of low-income populations were identified in these counties.

No issues concerning Environmental Justice were identified during internal and external scoping for this project.

2.2 Alternative Design Criteria

In order to avoid developing alternatives that were not environmentally, technically or economically feasible, "Design Criteria" were developed to limit the scope of alternatives within known resource constraints, Forest Plan Standards, and laws and regulations. These constraints served as a basis for resource protection or enhancement when developing all of the action alternatives.

Design Criteria were developed from resource information and issues displayed in the Burned Area Assessment (USDA Forest Service 2001), field reconnaissance, and from review of current Forest Plan direction, and pertinent laws and regulations governing management of Federal lands.

The Design Criteria served as a "Coarse Filter" for developing alternatives. For example, in a situation where the effects of the fires of 2000, combined with the effects of past disturbances, left conditions that did not provide opportunities for salvage harvest within economic and environmental constraints, salvage would not be considered, yet watershed restoration would. Where the predicted effects of an action exceeded standards set by policy, law or regulation, the action was not proposed unless the effects of that action could be mitigated.

The Design Criteria helped avoid additional resource impacts in some areas by directing management away from those areas, or by directing restoration efforts toward those areas. The Design Criteria thus helped to focus the location of activities and to minimize the time

and energy spent developing alternatives that could not be implemented.

In concert with the Design Criteria, the Key Issues served as a "Fine Filter," helping to package the actions to reflect internal and public concerns, resource conditions within the areas that could be managed, and to determine the effects of those activities.

Because of an overlying need to conduct watershed restoration activities at a larger scale, all alternatives retained the overall strategy for confining vegetation treatments to within the fire perimeters (except for St. Louis Creek), and conducting watershed restoration activities at a larger watershed scale.

2.2.1 Forest Plan Design Criteria

If any activities were proposed, the action alternatives would be designed to meet the Goals, Objectives, and Standards of the Lolo National Forest Plan (Figure 2.2.1). With exceptions, most activities would be restricted to suitable Management Area allocations.

Design Criteria for Forest Plan

Restrict activities, except for watershed restoration and associated activities (e.g. road closures) to areas allocated as suitable within the Forest Plan.

Restrict timber salvage and harvest to suitable Management Areas. Salvage activities could only occur within unsuitable MAs (e.g. MAs 19 and 27) if compatible with the standards of that Management Area.

Figure 2.2.1. Design Criteria for Forest Plan. *The action alternatives would be designed to meet the Goals, Objectives, and Standards of the Lolo National Forest Plan.*

2.2.2 Minerals Design Criteria

If any activities were proposed, the action alternatives would be designed to minimize disturbance to, or rehabilitate known mine sites that contain unstable soils, toxic substances, or are contributing to detrimental water quality and aquatic habitat conditions. See Figure 2.2.2.

Design Criteria for Minerals

Avoid increases to stream peak flow rates where increased rates could destabilize mine tailings and wastes that encroach upon stream banks and riparian areas.

Restore, remove, or stabilize mines, mine tailings, and mine wastes where they continue to have negative effects on water quality and aquatic habitat.

Figure 2.2.2. Design Criteria for Minerals. *The action alternatives would be designed to minimize disturbance to, or rehabilitate known mine sites.*

2.2.3 Soils Design Criteria

If any activities were proposed, alternatives would be designed to meet Region 1 Soil Quality Standards, to minimize disturbance to soils, or rehabilitate known detrimental soil conditions. See Figure 2.2.3.

Design Criteria for Soils

Implement soil stabilization measures; including contour felling, mulching, planting, and seeding on areas of high burn severity or disturbance where long-term productivity has been affected.

Minimize ground based timber harvest and salvage on severely burned or sensitive soils unless the effects of those activities could be mitigated with timing or other means.

Minimize ground based timber harvest and salvage on LSI Units 15JB, 30MA, 30QA, 64MA, and 64QA unless the effects of those activities could be mitigated with timing or other means.

Limit tractor logging to slopes of 35 percent or less. In high soil burn severities, limit tractor logging to slopes of 30 percent or less.

Avoid developing major log landings on slopes greater than six percent. Utilize existing roads and disturbed areas for landings where possible.

Minimize developing landings on areas with high soil burn severity unless the effects of those activities could be mitigated with timing or other means.

Avoid re-disturbing areas where post burn suppression and BAER rehabilitation activities have occurred unless those activities were not sufficient to restore or protect the soil resource. Re-rehabilitate disturbed areas that were previously rehabilitated as soon as possible.

Prohibit timber harvest and other ground disturbing activities (except for restoration activities) in areas with 15 percent or more of the area in a detrimental soil disturbance condition until past conditions have been mitigated to below 15 percent.

Prohibit timber harvest and other ground disturbing activities (except for restoration activities) in areas of high and mosaic soil burn severities where cumulative detrimental soil disturbance exceeds 10 percent.

In harvested stands provide for Course Woody Debris levels that protect soils from future high intensity fires and from loss of soil productivity.

Figure 2.2.3. Design Criteria for Soils. *The action alternatives would be designed to meet Region 1 Soil Quality Standards.*

2.2.4 Visual Resources Design Criteria

If any activities were proposed, the action alternatives would be designed to minimize disturbance to the visual resource, or improve known visual resource problems in areas of low or moderate scenic integrity (Figure 2.2.4).

Design Criteria for Visual Resources

Minimize road construction and skyline yarding in areas identified as having High or Moderate Scenic Integrity.

Avoid designing harvest and salvage units that do not blend with natural vegetation patterns and landforms (e.g. straight unit edges).

Figure 2.2.4. Design Criteria for Visual Resources. *The action alternatives would be designed to minimize disturbance to the visual resource.*

2.2.5 Heritage Resources Design Criteria

If any activities were proposed, the action alternatives would be designed to minimize impacts to known heritage sites or to enhance interpretation and protection of those sites (Figure 2.2.5).

Design Criteria for Heritage Resources

Avoid timber harvest and salvage, road development, watershed and land restoration activities where those activities may impact known heritage sites, unless the effects of those activities could be mitigated.

Interpret known heritage resources where interpretation could be used as a means to protect, educate, enhance or mitigate effects to those resources.

Figure 2.2.5. Design Criteria for Heritage Resources. *The action alternatives would be designed to minimize impacts to known heritage sites.*

2.2.6 Roadless and Unroaded Design Criteria

If any activities were proposed, the action alternatives would be designed to minimize impacts to Inventoried Roadless Areas (Figure 2.2.6).

Design Criteria for Inventoried Roadless Areas and Unroaded Areas

No activities of any kind would occur within Inventoried Roadless Areas.

Vegetation Treatments could occur within Unroaded Areas where consistent with long-term land management goals.

Temporary roads could be constructed within unroaded areas where consistent with long-term land management goals.

Unneeded roads that could affect Inventoried Roadless Areas and unroaded areas adjacent to Inventoried Roadless Areas would be closed or decommissioned where consistent with other long-term land management goals.

Figure 2.2.6. Design Criteria for Inventoried Roadless Areas and Unroaded Areas. *The action alternatives would be designed to minimize impacts to Inventoried Roadless Areas.*

2.2.7 Water and Hydrologic Resources and Fish and Aquatic Resources Design Criteria

If any activities were proposed, the action alternatives would be designed to minimize impacts to or restore hydrologic resources and aquatic habitat.

To protect water quality and fisheries resources, several Design Criteria were identified to ensure minimal impacts to stream banks and riparian areas, and to minimize the potential for erosion and sediment transport from road and vegetation related management activities. See Figure 2.2.7.

These Design Criteria included restrictions on activities within Riparian Habitat Conservation Areas, limiting road development, requiring use of Best Management Practices in road management and harvest, and avoidance of areas heavily impacted by the fires of 2000 or previous land uses.

Design Criteria for Water Quality and Native Fisheries

Riparian Habitat Conservation Areas (RHCAs)

If Riparian Vegetation Extends further than the defined Riparian Habitat Conservation Area (RHCA) buffer width, the RHCA would be extended to include all riparian vegetation.

No Activities would occur within RHCAs except for activities intended to improve riparian conditions including but not limited to: road reconstruction and BMPs, road closures, road decommissioning, culvert removals, soil stabilization, stream rehabilitation, and riparian planting.

Landings (e.g. for helicopter operations) could be constructed within RHCAs only if no other alternatives are available within identified economic and resource constraints, and impacts could be mitigated.

No Harvesting Activities would occur within 300 feet of Perennial Fish Bearing Streams.

No Harvesting Activities would occur within 150 of Perennial Non-Fish Bearing Streams.

No Harvesting Activities would occur within 50 feet of Intermittent Streams.

No Harvesting Activities would occur within 150 feet of Ponds, Lakes, or Wetlands > 1 Acre in Size.

No Harvesting Activities would occur within 50 feet of Seasonally Flowing Streams, Intermittent Streams, Landslide Prone Areas, or Wetlands < 1 Acre in Size in Non-Priority Watersheds.

No Harvesting Activities would occur within 100 feet of Seasonally Flowing Streams, Intermittent Streams, Landslide Prone Areas, or Wetlands < 1 Acre in Size in Priority Watersheds (Trout Creek and Ninemile Creek).

No fuel storage or equipment refueling would occur within RHCAs or Streamside Management Zones (SMZs)

New Road Development

Road development needed for vegetation management or watershed restoration would be limited to Temporary Roads. No Long-Term Specified Roads would be constructed.

New road development would be minimized and restricted to gentle side slopes, ridge tops and high elevation areas. Roads would not be constructed in RHCAs.

All temporary roads would be obliterated, recontoured, seeded and covered within one season of use.

Road Decommissioning, Reconstruction, and Closures

Best Management Practices (BMPs) would be applied to all roads used for accessing treatment areas in addition to roads identified for reconstruction or travel restrictions.

Harvesting Activities

All Harvest Activities would follow prescribed BMPs.

Fuels Treatment Activities

No fire lines would be constructed within RHCAs.

No prescribed fire ignition would occur within RHCAs.

Fire could be allowed to back into riparian areas that have not previously burned and where severity could be minimized.

Prohibit slash disposal or burning of slash within RHCAs or in other areas where these activities could have detrimental impacts upon water quality.

Figure 2.2.7. Design Criteria for Water Quality and Native Fisheries. *The action alternatives would be designed to minimize impacts to or restore hydrologic resources and aquatic habitat.*

2.2.8 Infrastructure and Improvements Design Criteria

If any activities were proposed, the action alternatives would be designed to minimize new road development and bring roads needed for long-term land management up to standards meeting Best Management Practices. See Figure 2.2.8. Road systems that cause impacts to wildlife, hydrologic, and fisheries resources would be improved or removed so those impacts were no longer significant in nature. Roads not needed for long-term land management would be decommissioned. Travel restrictions would be placed on roads if needed to mitigate for seasonal impacts to other resources.

Design Criteria for Infrastructure and Improvements

Existing roads needed for long-term land management would be brought up to Best Management Practice standards.

Well established, primary access routes (arterial and collector roads) would be managed to provide access to the National Forests without significantly changing access patterns unless the routes posed significant resource impacts that could not be mitigated.

Existing roads not needed for long-term land management would be decommissioned where the roads impacted other resources including water quality, fisheries, wildlife security, roadless, visuals, and maintenance costs.

Decommissioning would reflect long-term management and reentry needs. Road recontouring would be used where appropriate to protect other resource needs and where long-term land management would not be necessary for 40 years.

Natural vegetative recovery would be used to determine impacts that roads have on other resources.

Seasonal travel restrictions would be placed on roads and areas to reduce seasonal impacts to other resources. Travel restrictions could be for short-term or long-term periods.

Figure 2.2.8. Design Criteria for Infrastructure and Improvements. *The action alternatives would be designed to bring roads needed for long term land management up to standards meeting Best Management Practices.*

2.2.9 Vegetation and Forest Resources Design Criteria

If vegetation management activities were proposed, the action alternatives would be designed to reduce insect risks, enhance old growth, improve stand structure, and protect

residual stands and regeneration from fire damage in selected stands (Figure 2.2.9).

Design Criteria for Vegetation and Forest Resources

Insect Risk Reduction

Commercial thinning to reduce the risk of bark beetle predation would be achieved through thinning from below with some combination of crown thinning when thinning from below does not achieve the target residual basal area. The combination of these cutting methods provides for retention of the largest, healthiest trees while reducing overstocked conditions and bark beetle risk.

The target residual basal area of commercial thinning for bark beetle risk reduction treatments would be approximately 100 square feet per acre for all forest types except lodgepole pine, which would be 60 square feet per acre. These target levels are 20 square feet per acre below stocking levels determined by research to be high risk.

Old Growth Enhancement and Protection

No live old growth trees, as defined by R1 Old Growth Criteria, would be harvested or cut. All live old growth trees would be retained for biodiversity, legacy, and habitat.

Stand Structure

Regeneration harvests would be restricted to sites where salvage of dead trees would result in openings, which would function as shelterwood, seed tree, or clearcut silvicultural systems.

Prescribed Fire Activities

Prescribed fire treatments would protect residual overstory in commercially thinned stands. Some activities would be incorporated to achieve this including: (1) yarding tops to landings, (2) fuel pullbacks for leave tree and snag protection, and (3) slashing sub-merchantable saplings and small pole timber.

Prescribed fire and mechanical slash treatment methods would be used as little as possible in areas of post burn conifer regeneration (natural regeneration) in order to protect the regeneration and avoid the expense and risk of establishing conifers.

Figure 2.2.9. Design Criteria for Vegetation and Forest Resources. *The action alternatives would be designed to reduce insect risks, enhance old growth, improve stand structure, and protect residual stands and regeneration from fire damage.*

☐ 2.2.10 Threatened, Endangered, and Sensitive Plants Design Criteria

If any activities were proposed, the action alternatives would be designed to minimize impacts to or restore habitat for Threatened, Endangered, and Sensitive (TES) Plant Species. See Figure 2.2.10.

Design Criteria for TES Plant Species

Avoid management activities in areas where known populations of TES plant species exist unless those activities may be mitigated.

Design timber harvest treatments to maintain habitat for species requiring filtered sunlight.

Maintain buffers around known populations.

Figure 2.2.10. Design Criteria for TES Plant Species. *The action alternatives would be designed to minimize impacts to or restore habitat for Threatened, Endangered, and Sensitive (TES) Plant Species.*

☐ 2.2.11 Noxious and Invasive Plant Species Design Criteria

If any activities were proposed, the action alternatives would be designed to minimize the potential for expanding existing noxious weed populations or introducing new noxious weed species (Figure 2.2.11). Existing populations would be reduced through noxious weed management measures.

Design Criteria for Noxious and Invasive Plant Species

Manage known weed populations through treatments including herbicide, mechanical, and prevention.

Minimize management activities in areas where weed populations do not presently exist unless the risk for introducing noxious weeds could be mitigated.

Manage motorized vehicle access in areas where existing weed populations may be spread into adjacent areas free of weeds.

Figure 2.2.11. Design Criteria for Noxious and Invasive Plant Species. *The action alternatives would be designed to minimize the potential for expanding existing noxious weed populations or introducing new noxious weed species.*

☐ 2.2.12 Wildlife Design Criteria

If any activities were proposed, the action alternatives would be designed with consideration of all wildlife species. Conflicts with wildlife habitat would be avoided through design rather than through mitigation after design. See Figure 2.2.12.

Design Criteria for Wildlife

Big Game

Maintain or increase elk security through use of road decommissioning, road closures and travel restrictions.

Open road densities would be decreased in order to meet security needs.

Black Backed Woodpecker

No harvesting activities would occur where nest locations had been identified.

Protect 80% of potential black backed woodpecker habitat identified at the Forest level.

Lynx

No harvest treatments would occur within lynx foraging habitat.

Open road densities would be decreased in order to meet security needs.

Old Growth Dependent Species

No live old growth trees, as defined by R1 Old Growth Criteria, would be harvested or cut. All live old growth trees would be retained for biodiversity, legacy, and habitat.

At least 8 percent old growth would be retained in each of the Ecosystem Management Areas (EMAs).

Figure 2.2.12. Design Criteria for Wildlife. *The action alternatives would be designed with consideration of all wildlife species.*

2.2.13 Recreation Design Criteria

If any activities were proposed, the action alternatives would be designed with consideration of recreation use patterns and levels. See Figure 2.2.13.

Design Criteria for Recreation

Well established, primary access routes (arterial and collector roads) would be managed to provide access to the National Forests without significantly changing access patterns unless these routes pose significant resource impacts that could not be mitigated.

Dispersed recreation areas would be maintained unless contributing to resource impacts on wildlife, hydrologic and fisheries resources.

Firewood cutting, mushroom picking, and other recreational uses would be considered during identification of road closures, timber harvest units, and watershed restoration projects.

Figure 2.2.13. Design Criteria for Recreation. *The action alternatives would be designed with consideration of recreation use patterns.*

2.2.14 Economic Design Criteria

If any activities were proposed, the action alternatives would be designed with consideration of economic viability (Figure 2.2.14). Timber harvest units would be designed to follow existing criteria for yarding distances. Merchantability would be adjusted to meet the economic feasibility of harvesting fire damaged and defected timber and to consider deterioration over the project planning period. Where stand volumes and size would not meet determined standards, harvest activities would not be proposed. Watershed restoration activities would be proposed at reasonable levels that could be achieved with agency funds or through challenge-cost-share, grants, and other non-Forest Service sources, or within a reasonable time period for achieving restoration goals.

Design Criteria for Economics

Logging Systems

Tractor skidding on maximum slope of 35%.

Skyline yarding maximum distance of 1500 feet.

Helicopter maximum downhill elevation difference of 1500 feet and maximum uphill difference of 1000 feet between log landings and harvest units.

Helicopter maximum flight distance of 1 mile with average of ½ mile flight distance.

Helicopter yarding requires adequate openings in timber canopy for safe log removal.

Minimum harvest volume of 2.0 mbf/acre for tractor skidding.

Minimum harvest volume of 2.5 mbf/acre for skyline and helicopter.

Harvesting to occur from existing road systems with limited temporary road construction.

Product Recovery

For initial salvage opportunity identification, burn mortality guidelines for lodgepole pine and Douglas-fir will be if ½ bole circumference is burned, consider the tree dead. For harvest contracts, tree is dead only if crown is dead.

Avoid areas of severe burn intensity – hard checking already occurring and may have limited feasibility.

Whitewood species of Alpine Fir (AF), Grand Fir (GF) and smaller diameter Lodgepole Pine (LP) an Engleman Spruce (ES) will quickly lose merchantability. In severely burned areas, only consider trees 9 inches diameter at breast height (dbh) and larger.

Ponderosa pine develops sap rot very quickly and blue staining is already beginning to occur, resulting in loss of merchantability and value.

Salvage of burned trees should occur within 3-year period or loss of value may be substantial.

Watershed Restoration

Prioritize watershed restoration projects so that they would meet resource needs and reflect funding availability.

Figure 2.2.14. Design Criteria for Economics. *The action alternatives would be designed with consideration of economic viability.*

2.3 Description of Proposed Alternatives

Six alternatives were designed to reflect the range of issues and resource conditions and the purpose and need of the project (Figure 2.3.1). Two of these alternatives (Alternatives #3 and #6) were eliminated from detailed analysis. The rationale for eliminating these two alternatives is explained in Section 2.5, Alternatives Considered but Eliminated From Detailed Study.

Proposed Alternatives

Alternative #1 – No Action
Alternative #2 – Restoration and Recovery with No Vegetation Treatments
Alternative #3 – Restoration and Recovery with Non-Commercial Vegetation Treatments ***(eliminated)***
Alternative #4 – Restoration and Recovery with Vegetation and Fuels Treatments and Salvage in drier-low elevation habitats. Emphasis on Protecting Linkages and Corridors and Wildlife Habitat
Alternative #5 – Restoration and Recovery with Vegetation, Fuels Treatments and Salvage
Alternative #6 – Proposed Action ***(eliminated)***

Figure 2.3.1. Proposed Alternatives. *Six alternatives were designed to reflect the range of issues and resource conditions, and to meet the purpose and objectives of the project.*

2.3.1 Alternative #1 – No Action

Alternative #1 serves as a baseline for the project and displays existing resource conditions. Under the "No Action" Alternative, ongoing Forest Management would continue. Previously authorized projects, roads and facility maintenance, and other "normal" Forest management activities would remain ongoing. Resources identified for restoration, rehabilitation, or recovery, would remain untreated under this alternative. Natural restoration processes would recover areas impacted by the fires and previous land uses. Roads open for motorized vehicle use would remain open.

This alternative would not preclude Forest management activities identified under previous decisions, nor would this alternative preclude the potential for activities identified under future decisions.

2.3.2 Alternative #2 - Restoration and Recovery with No Vegetation Treatments

Alternative #2 responds to the public's request for an alternative that focuses on rehabilitating soil, water and fisheries resources impacted by the fires of 2000 and previous land uses. It highlights the grouping of both internal and public issues that address concerns relating to water quality and effects associated with proposed timber harvest. This alternative focuses primarily on the first portion of the Purpose and Need: **"Restoration and Recovery of Watersheds".** It also features the second and third portion of the Purpose and Need: **"Restoration and Recovery of the Land"** and **"Working with People and Communities**". No timber salvage, harvesting, or fuels treatments would occur within this alternative (Maps 2.3.1-1a and 1b, 2.3.1-2a and 2b, 2.3.1-3a and 3b in Appendix A).

Alternative #2 highlights Lolo National Forest Plan Goals Nos. 4, 7, and 8 and specifically addresses hydrologic improvements needed for Water Quality Limited streams by proposing no harvest or salvage activities that could have short term detrimental impacts to water quality. No management activities would occur in Inventoried Roadless Areas in this Alternative. Only road closures and watershed restoration related activities would occur in areas qualifying as "unroaded".

This alternative does not address long term vegetation restoration needs associated with past fire suppression and stand manipulation. This alternative does not address salvage of burned timber. In order to respond to the public concern regarding the introduction (planting) of non-native tree genotypes, this alternative does not address needs for reestablishing "at-risk" tree species in areas where regeneration does not occur. This alternative does address travel management, spraying for noxious weeds, and

the need for protection of heritage resources exposed by the fires of 2000.

This alternative would rely entirely upon allocated funding sources such as the Mine Reclamation Fund administered by the State of Montana, National Fire Plan funds, and Deferred Maintenance, Soils and Water, and Forest Road Maintenance budgets to complete restoration and recovery work. Proposed activities would not be supplemented with Timber Sale proceeds. Challenge cost share funds from non-federal agencies and non-profit conservation organizations would be important to implement this alternative in an expedient manner.

Figure 2.3.2 summarizes the activities that would be included in this alternative. It also displays the grouping of issues used to drive the development of this alternative. A detailed description of these activities is included in Section 2.3.5, Alternative Treatment Descriptions.

Alternative #2 - Activities

Restoration and Recovery of Watersheds

Activities	Quantity	Driving Issues
Soil Stabilization	1262 acres	SOIL 1
Riparian Planting	38 acres	SOIL 1 WATER 2
Dam Rehabilitation with Stream Restoration	1 dam	FISH 4
Mine Reclamation with Stream Restoration	4 mines	MINER 1 FISH 1 WATER 5 WATER 6
Trail Stabilization	1 mile	HYDRO 5 HYDRO 3
Road Reconstruction/BMPs with Allocated Funds	279 miles	ROADS 2 HYDRO 5 ROADS 3 HYDRO 3
Culvert Removals and Replacements with Stream Restoration	108 culverts	ROADS 2 FISH 4 WATER 6 HYDRO 5
Road Closures and Decommissioning	228 miles	WLF 5 WLF 8 ROADS 2 FISH 1 WATER 5 WATER 6 HYDRO 3 HYDRO 4
Gravel Source Development and Reclamation	1 site	ROADS 2 HYDRO 5 ROADS 3 HYDRO 3

Restoration and Recovery of the Land

Activity	Quantity	Driving Issues
Weed Spraying along Roads	503 miles (1829 acres)	ECO 6 REC 3
Area Snowmobile Travel Management Restrictions	34613 acres	REC 3
Road Seasonal (Gated) Travel Management Restrictions	11 miles	REC 3 ROADS 2 FISH 1 WATER 5 WATER 6 HYDRO 3 HYDRO 4

Working with People and Communities

Activity	Quantity	Driving Issues
Heritage Site Interpretation and Interpretation Routes	3 sites 39 miles	CULT 1

Figure 2.3.2. Alternative #2. *This alternative responds to the public's request for an alternative that focuses solely on rehabilitating resources impacted by the fires of 2000 and previous land uses such as minerals extraction and road development.*

2.3.3 Alternative #4 - Restoration and Recovery with Vegetation and Fuels Treatments and Salvage in Dry – Low Elevation Habitats. Emphasis On Protecting Linkages, Corridors and Wildlife Habitat

Alternative #4 responds to the public's request for an alternative that focuses on the "ecological" restoration and rehabilitation of Forest resources. This alternative also responds to the public's request for an alternative that emphasizes the protection of unroaded and roadless areas, and linkages and corridors essential to big game populations and the recovery of Sensitive, Threatened and Endangered species. This alternative highlights the grouping of issues that address concerns relating to water quality, ecosystem processes, and forest fragmentation. This alternative focuses on the first two portions of the Purpose and Need: **"Restoration and Recovery of Watersheds"** and **"Restoration and Recovery of the Land"**. It features **"Working with People and Communities"** (Maps 2.3.2-1a and 1b, 2.3.2-2a and 2b, 2.3.2-3a and 3b. 2.3.3-4a and 4b in Appendix A).

Within this alternative the treatments described in Alternative #2 would carry forward. Additional land restoration activities would also occur. Vegetation management, including commercial thinning and salvage, and fuels treatments would occur on the lower elevation, drier habitats referred to as Vegetation Response Unit #2 (VRU 2). No vegetation management would occur within the higher elevation, cooler, moister habitats (VRUs 3-5) considered to be "within their ecologically historic range" for fuels and wildfire. No management activities would occur in Inventoried Roadless Areas in this Alternative. Only road closures, watershed restoration, and limited vegetation management activities would occur within areas that qualify as "unroaded". No temporary roads would be developed for vegetation management activities. The effectiveness of linkages and corridors would be maximized through implementation of travel restrictions on collector road systems that bisect major ridges.

Alternative #4 highlights Forest Plan Goals Nos. 4, 7, and 8, and more specifically addresses ecosystem processes. This alternative addresses long term restoration needs associated with past fire suppression and stand manipulation within the lower elevation-drier habitats. This alternative does not address salvage of burned timber except where it coincides with vegetation restoration needs. This alternative does address regeneration of "at-risk" species, travel management, weed spread, and heritage site protection.

This alternative would mostly rely upon allocated funding sources for completing restoration and recovery work. In limited areas, proposed activities would be supplemented with Timber Sale proceeds. Challenge cost share funds would continue to be important to supplementing limited Forest Service allocations within this alternative.

Figure 2.3.3 summarizes the activities that would be included within this alternative. It also displays the issues used to drive the development of this alternative. A detailed description of these activities is included in Section 2.3.5, Alternative Treatment Descriptions.

Alternative #4 - Activities

Restoration and Recovery of Watersheds

Activities	Quantity	Driving Issues
Soil Stabilization	1262 acres	SOIL 1
Riparian Planting	38 acres	SOIL 1 WATER 2
Dam Rehabilitation with Stream Restoration	1 dam	FISH 4
Mine Reclamation with Stream Restoration	4 mines	MINER 1 FISH 1 WATER 5 WATER 6
Trail Stabilization	1 mile	HYDRO 5 HYDRO 3
Road Reconstruction/BMPs completed with Allocated Funds	191 miles	ROADS 2 HYDRO 5 ROADS 3 HYDRO 3
Road Reconstruction/BMPs completed with Timber Sale Proceeds	107 miles	ROADS 2 HYDRO 5 ROADS 3 HYDRO 3
Culvert Removals and Replacements with Stream Restoration	108 culverts	ROADS 2 FISH 4 WATER 6 HYDRO 5
Road Closures and Decommissioning	225 miles	WLF 5 WLF 8 ROADS 2 FISH 1 WATER 5 WATER 6 HYDRO 3 HYDRO 4
Gravel Source Development and Reclamation	1 site	ROADS 2 HYDRO 5 ROADS 3 HYDRO 3

Restoration and Recovery of the Land

Activity	Quantity	Driving Issues
Commercial Thinning and Salvage in Burned and Unburned VRU 2	1892 acres	VEG 1 VEG 2 VEG 4 VEG 5 ECO 2 FIRE 1 FIRE 2 ECONO 4 WLF 9
Timber Salvage in Insect Killed Timber Adjacent to Fire Perimeters in VRU 2	41 acres	ECO 3 VEG 2 TIMBE 1
Planting "at-risk" Species	12916 acres	VEG 5 TIMBE 7
Weed Spraying along Roads	521 miles (1895 acres)	ECO 6 REC 3
Area Snowmobile Travel	34613	REC 3

Management Restrictions	acres	
Road Seasonal (Gated) Travel Management Restrictions	14 miles	REC 3 ROADS 2 FISH 1 WATER 5 WATER 6 HYDRO 3 HYDRO 4
Road Yearlong (Gated) Travel Management Restrictions	20 miles	REC 3 ROADS 2 FISH 1 WATER 5 WATER 6 HYDRO 3 HYDRO 4
Prescribed Burning and Fuels Reduction Treatment	934 acres	VEG 4 VEG 5 SENS PLANT 1 ECO 7 WATER 1 FIRE 1 FIRE 4
Working with People and Communities		
Activity	Quantity	Driving Issues
Heritage Site Interpretation and Interpretation Routes	3 sites 39 miles	CULT 1

Figure 2.3.3. Alternative #4. *Alternative #4 responds to the public's request for an alternative that focuses on the "ecological" restoration and rehabilitation of Forest resources.*

2.3.4 Alternative #5 - Restoration and Recovery with Vegetation, Fuels Treatments and Salvage

This alternative is a modification of the Proposed Action with adjustments made to the scale and location of proposed activities based on site-specific knowledge derived from resource condition evaluations. This alternative responds to the public's request for an alternative that focuses on both the restoration and rehabilitation of Forest resources and the provision of jobs and commodities. This alternative highlights Forest Plan Goals Nos. 1, 4, 7, and 8. This alternative strives to reach a balance among all of the issues by focusing on all three portions of the Purpose and Need: **"Restoration and Recovery of Watersheds"**, **"Restoration and Recovery of the Land"**, and **"Working with People and Communities"** (Maps 2.3.3-1a and 1b, 2.3.3-2a and 2b, 2.3.3-3a and 3b, 2.3.3-4a and 4b in Appendix A).

Within Alternative #5, most of the treatments (e.g. watershed and land restoration related activities) described within Alternatives #2 and #4 would carry forward; however, additional vegetation management including timber salvage would occur in order to help fund water and land restoration activities and meet local communities' needs for forest products. Several of the travel restrictions (gated roads) described in Alternative #4 would not occur in this Alternative.

In this alternative, vegetation management, including commercial thinning and salvage, would occur on the lower elevation, drier habitats referred to as Vegetation Response Unit #2 (VRU2). Salvage would also occur within limited areas of the higher elevation, cooler, moister habitats (VRUs 3-5) where other resource concerns (e.g. soils, water quality, and wildlife habitat) would not be severely impacted. No management activities would occur in Inventoried Roadless Areas in this Alternative. Road closures, watershed restoration, and vegetation management activities, however, would occur within areas that qualify as "unroaded". Temporary roads would be developed in some areas outside of the Roadless and unroaded boundaries to implement vegetation management activities.

This alternative would rely on both allocated funding sources and Timber Sale proceeds to complete restoration and recovery work. Challenge cost share funds from non-federal agencies and non-profit conservation organizations would help supplement limited Forest Service allocations on some activities. Because of timber sale activities, proposed watershed and land restoration activities could be completed in a more expedient manner in some locations.

The following figure summarizes the activities that would be included within this alternative (Figure 2.3.4). A detailed description of these activities is included in Section 2.3.5, Alternative Treatment Descriptions.

Alternative #5 - Activities		
Restoration and Recovery of Watersheds		
Activities	Quantity	Driving Issues
Soil Stabilization	1262 acres	SOIL 1

Riparian Planting	38 acres	SOIL 1 WATER 2
Dam Rehabilitation with Stream Restoration	1 dam	FISH 4
Mine Reclamation with Stream Restoration	4 mines	MINER 1 FISH 1 WATER 5 WATER 6
Trail Stabilization	1 mile	HYDRO 5 HYDRO 3
Road Reconstruction/BMPs completed with Allocated Funds	163 miles	ROADS 2 HYDRO 5 ROADS 3 HYDRO 3
Road Reconstruction/BMPs completed with Timber Sale Proceeds	123 miles	ROADS 2 HYDRO 5 ROADS 3 HYDRO 3
Culvert Removals and Replacements with Stream Restoration	108 culverts	ROADS 2 FISH 4 WATER 6 HYDRO 5
Road Closures and Decommissioning	225 miles	WLF 5 WLF 8 ROADS 2 FISH 1 WATER 5 WATER 6 HYDRO 3 HYDRO 4
Gravel Source Development and Reclamation	1 site	ROADS 2 HYDRO 5 ROADS 3 HYDRO 3

Restoration and Recovery of the Land

Activity	Quantity	Driving Issues
Commercial Thinning and Salvage in Burned and Unburned VRU 2, 3 and 4	2470 acres	VEG 1 VEG 2 VEG 4 VEG 5 ECO 2 FIRE 1 FIRE 2 WLF 9
Planting "at-risk" Species	12916 acres	VEG 5 TIMBE 7
Weed Spraying along Roads	509miles (1851 acres)	ECO 6 REC 3
Area Snowmobile Travel Management Restrictions	34613 acres	REC 3
Road Seasonal (Gated) Travel Management Restrictions	14 miles	REC 3 ROADS 2 FISH 1 WATER 5 WATER 6 HYDRO 3 HYDRO 4
Prescribed Burning and Fuels Reduction Treatment	1686 acres	VEG 4 VEG 5 SENS PLANT 1 ECO 7 WATER 1 FIRE 1 FIRE 4

Working with People and Communities

Activity	Quantity	Driving Issues
Timber Salvage in Burned VRU 2, 3 and 4	2296 acres	TIMBE 1 ECON 3 ECON 4 ECON 5 FIRE 1 FIRE 4 VEG 3 TIMBE 8 TMBE 1
Timber Salvage in Insect Killed Timber Adjacent to Fire Perimeters in VRU 2, 3 and 4	79 acres	ECO 3 TIMBE 1
Temporary Road Construction to Harvest Units	1.7 miles	TIMBER 3 TIMBE 8 TIMBE 1 ECON 3 ECONO 4
Heritage Site Interpretation and Interpretation Routes	3 sites 39 miles	CULT 1

Figure 2.3.4. Alternative #5. *Alternative #5 strives to reach a balance among all the issues by focusing on all three portions of the Purpose and Need.*

2.3.5 Alternative Treatment Descriptions

Although the proposed activities would vary by amount, and location (see Figures 2.3.2, 2.3.3, and 2.3.4), treatments are expected to be similar in nature throughout all of the alternatives. The following paragraphs provide a description of the treatments including (1) where (in general) the treatments would occur, (2) what they would include, (3) how they would be funded, and (4) when (years) they would be expected to occur. The following paragraphs also describe what the treated areas are intended to look like after completion of the treatment activities.

Although subject to variation at the time of contract preparation and offering (market dependent), timber harvest activities, including commercial thinning, salvage of insect killed timber, and salvage of burned timber, would be implemented through various timber sale contracts.

Watershed and land restoration activities associated with timber sale areas would be incorporated into the sale contract where practical. In Alternative #4, approximately six sale contracts would be used to implement timber harvest and associated activities (Figure 2.3.5). In Alternative #5, approximately eight sale contracts would be used (Figure 2.3.5). To ensure that vegetation management and watershed restoration activities that are funded by the timber sales were economically feasible under market conditions, some variations of these sales could occur. Variations to the sales displayed in Figure 2.3.5 could include combining sales, creating optional harvest units, or creating multiple sales out of any one larger sale.

Watershed and land restoration activities not coinciding with timber sales would be completed under various service contracts. Restoration activities would be prioritized by watershed and completed as funding permitted.

Timber Sales

Alternative #4

Sale Name	Sale Size	Acres Treated	Approximate Volume
9-Mile	Large	596	3.7 mmbf
Alpine	Small	91	0.8 mmbf
St. Louis	Small	41	0.3 mmbf
Siegel	Small	34	1.4 mmbf
Landowner	Large	341	1.7 mmbf
Flat Creek	Large	830	4.9 mmbf

Alternative #5

Sale Name	Sale Size	Acres Treated	Approximate Volume
9-Mile	Large	1127	8.3 mmbf
Alpine	Large	972	9.2 mmbf
St. Louis	Small	79	0.5 mmbf
Siegel	Large	278	1.7 mmbf
Pine Creek	Small	50	0.2 mmbf
Sunrise	Small	19	0.2 mmbf
Landowner	Large	654	4.2 mmbf
Flat Creek	Large	1666	12.6 mmbf

Figure 2.3.5. Timber Sales. *Timber harvest activities, including commercial thinning, salvage of insect killed timber, and salvage of burned timber, would be implemented through various timber sale contracts.*

More detailed information on each activity is in the Post Burn EIS Project File.

■ Restoration and Recovery of Watersheds

❑ *Soil Stabilization*

Soil stabilization activities are proposed on approximately 1262 acres of the Ninemile, Alpine, and Flat fires (see Maps 2.3.1-1a, 2.3.2-1a, 2.3.3-1a, Appendix A). The treated acreage would remain consistent throughout Alternatives #2, #4, and #5.

Because of steep slopes, unstable soils, high burn severities, and previous land use impacts, soil stabilization efforts were identified for protection of long term soil productivity and water quality. Because of soil conditions, some areas preclude any other management activities (timber harvest). Other areas do not preclude activities yet require mitigation measures to prevent further detrimental impacts.

Soil stabilization would include: (1) seeding and planting of areas at high risk to erosion, (2) mulching of exposed soils, (3) contour felling of standing trees to create sediment barriers, and (4) the placement of woody debris (tops and limbs) to improve ground cover and ensure long term nutrient recycling and soil productivity.

Immediately following soil stabilization activities, the structural features (fallen trees, mulching straw wattles) would be obvious. Within 3-5 years these areas would be well regenerated with grass and forbs, brush, and young trees, and appear to resemble the surrounding burned areas.

Soil stabilization activities would be funded by appropriated allocations from the National Fire Plan, and Forest Soils and Water accounts. Where timber harvesting occurred, contour felling and woody debris placement would be conducted as part of harvest operations. Activities would be expected to occur within approximately 2 years.

❑ *Riparian Planting*

Riparian planting would occur on approximately 38 acres of the Ninemile and Flat fires (see Maps 2.3.1-1a, 2.3.2-1a, 2.3.3-1a, Appendix A). The treated acreage would remain consistent throughout Alternatives #2, #4, and #5.

In areas of high burn severity, unstable stream banks, or lacking vegetation (root or seed sources), riparian planting would ensure long-

term stream bank stability, stream shading, and maintenance of historic riparian vegetative conditions.

Riparian planting would include grass seeding, relocating rootstock, or planting areas with deciduous cuttings (e.g. willow, dogwood, alder, cottonwood). Seed, rootstock, or cuttings would be obtained from nearby riparian areas outside of the burn perimeter. Cuttings and rootstock would be placed into the stream bank, floodplains, or moist soils where native riparian vegetation had not re-sprouted following the fires.

Immediately following riparian planting, newly planted willows, alder, cottonwood and other brush species would not be very evident. Within 2 to 3 years however, these plants would become well established and help to stabilize stream banks and provide riparian habitat.

Riparian planting would be funded by appropriated allocations from the National Fire Plan. Activities would be expected to occur within approximately 2 years.

❑ ***Dam Site Rehabilitation and Stream Restoration***

Although two abandoned dams (historically used for mining) are located within the project area, only one of these dam sites can be rehabilitated without severely disrupting streambed stability. The Flat Creek dam, located north of Hall Gulch, was identified as feasible for rehabilitation and stream restoration activities. Because the dam spillway contains a large drop, fish movement between the upper and middle segments of Flat Creek has been impeded.

Dam site rehabilitation at the Flat Creek site would include removing portions of the concrete walls and spillway of the dam, reestablishing the natural pool-riffle ratio (gradient) of the stream, placing woody debris and large boulders within the stream channel, reshaping sediment trapped behind the dam, and seeding and planting riparian vegetation upon the disturbed site. The total disturbed area would encompass approximately 10 acres and 1/2 mile of stream. The treated acreage would remain consistent throughout Alternatives #2, #4, and #5.

Immediately following dam site rehabilitation, the stream channel would appear freshly restored, with newly created pools and riffles obvious within the stream channel. Areas adjacent to the stream, and within the old dam pool, would be seeded, mulched, and planted with riparian vegetation. Stream connectivity would be restored. After 3 to 5 years the site would appear vegetated with riparian plants, grasses, shrubs, and small trees.

Dam site rehabilitation would be funded by appropriated allocations from the National Fire Plan, Fisheries, and Forest Soils and Water accounts. Activities would be expected to occur within approximately 10 years.

❑ ***Mine Reclamation with Stream Restoration***

Mine reclamation would occur at several abandoned mine sites within the Ninemile Creek and Trout Creek drainages. The treated acreage would remain consistent throughout Alternatives #2, #4, and #5.

In the Ninemile Creek drainage, reclamation work would be completed on: (1) the abandoned "Joe Waylett" mine within St. Louis Creek, (2) abandoned placer tailings within Eustache Creek, and (3) abandoned placer tailings at the confluence of Mattie V Creek and Ninemile Creek. Initially, the "Joe Waylett" mine reclamation project would be the largest, encompassing approximately 83 acres and ¾ mile of stream. Reclamation work on Eustache and Mattie V Creeks would encompass approximately 2 acres and ½ mile of stream.

In the Trout Creek drainage, reclamation work would be completed on abandoned placer tailings within Windfall Creek. This project would encompass approximately 40 acres and ½ mile of stream.

At each site, mine reclamation would be phased over five to ten consecutive years including: (1) site mapping and chemical sampling, (2) restoration design, (3-4) implementation, and (5-7) monitoring. Reclamation work would include removing and containing contaminated soils, restoring stream channel gradients and floodplains, recontouring waste piles, placing woody debris within stream channels and on disturbed soils, and vegetating exposed soils.

Immediately following mine reclamation, adjacent stream channels would appear freshly restored with newly created pools and riffles

obvious within the stream channel. Areas adjacent to the stream and within the reclaimed area would appear freshly disturbed. After 3 to 5 years the sites would appear vegetated with riparian plants, grasses, shrubs, and small trees.

Mine reclamation would be funded by appropriated allocations from the Mine Reclamation Fund administered by the State of Montana, and Forest Minerals and Geology, Fisheries, and Soils and Water accounts. Additional funding would be appropriated from other federal and state agencies associated with mine reclamation.

❑ ***Trail Stabilization and Stream Restoration***

Trail stabilization would occur on the first mile of Trail No. 418 (West Fork Burnt Creek) in the Ninemile Creek drainage where the trail surface continues to contribute sediment to a stream channel. The treated length would remain consistent throughout Alternatives #2, #4, and #5.

Trail stabilization would include replacing existing water bars to improve trail surface drainage and armoring water bar outlets. Minor tread realignment would also be completed to reduce steep trail grades into the stream crossing. Stream rehabilitation work would be completed at the trail crossing to restore the natural stream gradient and prevent future head cutting.

Immediately following stabilization activities, the stream crossing would appear freshly disturbed with obvious pools and riffles and woody debris. The trail tread would appear newly constructed and cross drains would appear obvious. Within 3 to 5 years the trail edges and crossing would be well vegetated.

Trail stabilization would be funded by appropriated allocations from the National Fire Plan and Forest Trails and Recreation accounts. Activities would be expected to occur within approximately 2 years.

❑ ***Road Reconstruction with Best Management Practices (BMPs)***

Reconstruction, maintenance, and installation of Best Management Practices are proposed on roads throughout the entire project area and on routes into and out of the project area. The treated mileage would vary by alternative (see Figures 2.3.2, 2.3.3, and 2.3.4).

Road reconstruction activities would include a variety of treatments intended to reduce the delivery of sediment from road prisms, improve fish passage at culvert locations, reduce weed spread, and bring the roads to Best Management Practice (BMP) standards. In most situations, these treatments would only be applied to roads intended for long-term Forest access. Best Management Practices would also be applied to any roads intended for timber haul.

Reconstruction would include: (1) narrowing road widths to meet original design standards, (2) installing drain dips and other surface water diversions, (3) installing ditch relief culverts, (4) replacing undersized or improperly positioned culverts, (5) applying gravel surfacing to road segments constructed on poor soils or near streams, (6) applying dust abatement chemicals, (7) armoring culvert inlets and outlets, (8) installing sediment filters between streams and road fills, (9) spraying for weeds within the road prism, and (10) installing road-guide signs. Some road segments would be realigned where road/stream impacts could not be reduced by other means.

Following reconstruction, some roads would appear newly disturbed, and in some instances, the driving surfaces would be much narrower. Rock armoring, surface drains (cross-belts, drain dips) and culverts would be more obvious until roadside vegetation became reestablished.

Road reconstruction activities would be funded by appropriated allocations from the National Fire Plan, Deferred Maintenance, and Forest Roads Maintenance accounts. Where timber haul would occur, reconstruction would be financed by timber generated revenue and would occur prior to or along with timber harvest. Where timber harvest would occur, road reconstruction activities would be expected to be completed within approximately 2 years. Where timber haul would not occur, reconstruction activities would be funded entirely from appropriations and would be expected to occur within 2 to 10 years.

❑ ***Culvert Removals and Replacements***

Culvert removals and replacements would occur at 108 locations throughout the project area.

Removing or replacing undersized and improperly positioned culverts that currently prevent fish passage would restore connectivity between stream segments. The number of culverts treated would remain consistent throughout Alternatives #2, #4, and #5.

In most situations, culvert removals and replacements would occur along with road closures, decommissioning and reconstruction activities. Of the 108 locations identified for culvert upgrades or removals, 32 would be considered as "high priorities" for improving fish passage on major stream tributaries. On roads needed for long term access, replacements may occur prior to reconstructing other road portions if funding is not available to complete all of the identified work.

Culvert removals and replacement would be designed to reconnect stream segments, improve spawning habitat, and stabilize stream banks and bottoms. New culverts would be designed to accommodate 100-year flow events, match natural stream gradients, and provide natural bottom characteristics. Where culverts are removed, the stream channel, floodplain, and banks would be restored to a natural configuration, gradient, and alignment.

Following culvert replacement, the road and stream crossing area would appear freshly disturbed, with new surfacing, rock armoring, ditch relief, and mulching on disturbed soils. Following culvert removals, the streams would appear more natural, containing pools and riffles, newly planted willows, alder, cottonwood and other brush species, and coarse woody debris where they were once lacking.

Culvert replacement and removal would be funded by appropriated allocations from the National Fire Plan, Deferred Maintenance, and Forest Roads Maintenance accounts. Where timber haul would occur, culvert work would be funded as part of road reconstruction and be financed by timber generated revenue. It would occur prior to or commensurate with timber harvest. On roads not needed for timber haul, culvert replacement or removal activities would be funded entirely from appropriations and would be expected to occur within 2 to 10 years.

❑ ***Road Decommissioning***

Road decommissioning would occur throughout the project area. The treated length would vary by alternative (see Figures 2.3.2, 2.3.3, and 2.3.4).

Nearly half (95 miles) of the road closures would occur on roads that are presently open and accessible for public vehicle travel. About half (93 miles) would occur on roads that are presently gated or restricted to public access. The remaining closures would occur on roads that are already inaccessible because of travel restrictions and vegetation growth.

The majority of the road closures would occur within the Ninemile and Trout Creek drainages. Use agreements with the Bonneville Power Administration (BPA) for power line access limit closure opportunities within the Flat, Johnson, and First Creek drainages.

Most of the closures would occur on local roads rather than on primary Forest travel routes (collector or arterial roads). However, one established route within the Eustache Creek drainage (FR #97, Ninemile-Pardee Road) would be fully recontoured to reduce sediment delivery near critical fish spawning habitat. This road would be closed between its intersection with FR #412 and Devil's Creek. An alternative driving route via FR #9920 (presently gated yearlong) would be opened seasonally to provide "loop" driving access between the Ninemile and Flat Creek drainages.

Road decommissioning would be designed to reduce sediment delivery and risk of road prism failure, and to eliminate culvert barriers to migrating fish populations. Road decommissioning would also be designed to reduce weed spread, improve wildlife security and visual quality, and to reduce maintenance costs on unneeded roads. Closure work would be completed on roads no longer needed for land management or on roads not needed for the next 20 to 40 years.

Closure levels would be compatible with future management reentry needs. For example, a road that is not needed for the next 20 years (but needed afterward) may be placed "in storage". In this situation, culverts on the road would be removed and the road would be scarified and seeded. The road prism would remain on the landscape in a benign condition but available for use without extensive earthwork in the future.

Where a road may not be needed for any present or future access, the road may be fully recontoured. The landscape would be returned to its natural shape, form and appearance.

Road closures would include a combination of the following treatments: (1) scarification of road surfaces in order to improve water infiltration and reestablishment of vegetation, (2) construction of water bars to prevent surface erosion, (3) removal of culverts and reshaping of stream crossings, (4) recontouring of all or segments of the road prism, (5) seeding and planting of grass, brush, and trees, and (6) spraying for weeds within the road prism prior to and following decommissioning. Figure 3.14.1 and Table 3.14.1 illustrate these treatments.

In areas where the public desires non-motorized trail access, a "pathway" would be retained along the road surface. These informal trails would not be maintained and would eventually become vegetated without use.

Immediately following road closure or decommissioning, the road template would appear as a heavily disturbed, roughened area. Woody debris, and other scattered material would be obvious. Within 2 to 3 years, grasses, forbs and small trees would be well established and the area would appear as a linear opening. Within 5 to 10 years (depending upon location), the area would become heavily brushed in or grown in with young trees.

Road closures and decommissioning would be funded by appropriated allocations from the National Fire Plan, and Forest Roads Maintenance accounts. Where timber haul would occur, road closures would be financed by timber revenue. Closures would occur immediately following timber harvest. On roads where timber haul did not occur, closures would be funded entirely from appropriations. In these situations, closures would be expected to occur within 2 to 10 years.

❑ ***Gravel Source Development***

The development and use of one gravel source would occur within the Ninemile Creek drainage near the confluence of Mattie V Creek and Ninemile Creek. The source is located near abandoned placer dredging tailings. Gravel source development would remain consistent throughout Alternatives #2, #4, and #5.

The need for an abundant quantity of road gravel to decrease the potential for surface erosion has escalated since the fires exacerbated conditions for surface runoff and the potential for erosion. The selected source is appropriate because of its: (1) central location, (2) absence of toxins and heavy metals, (3) buffer from stream channels, (4) location in an already managed area, and (5) location being not visible from established road systems. Because the site (approximately 40 acres) had been used (but not fully reclaimed) approximately 15 years ago as a gravel source, there is also an opportunity to complete restoration work after use for this project.

Source development would include spraying for noxious weeds, removal of grass, brush, and trees, excavation of tailings, crushing and stock piling of aggregate, and hauling on an existing access road. Following gravel haul, the site would be graded to a natural contour, seeded with native grasses, and planted with shrubs and tree species appropriate to the site. A one-acre area would be retained for stockpiled gravel that would be available for future road maintenance operations. The access road would remain closed to public travel following pit development and use.

Gravel source development would be funded by appropriated allocations from the National Fire Plan, Deferred Maintenance, and Forest Roads Maintenance accounts. If timber haul would occur, source development would be funded as part of road reconstruction and be financed by timber generated revenue. Development would occur prior to or along with timber harvest. Development and reclamation of the gravel source area would be expected to occur within 2 years except for the stockpile site, which would remain in place for approximately 10 years.

■ **Restoration and Recovery of the Land**

❑ ***Commercial Thinning***

Commercial thinning would occur on unburned and burned acres. The treated acreage would vary by alternative (see Figures 2.3.2, 2.3.3, and 2.3.4).

Depending on location, commercial thinning of lightly burned and unburned timber would be completed using tractor, skyline, or helicopter yarding methods. Under these treatments,

smaller, suppressed, and closely spaced trees would be removed in order to reduce ladder fuels, reduce tree competition and the risk of bark beetle infestations, and to feature larger desired tree species of Douglas-fir, western larch, and ponderosa pine. Trees that were under stress, or had died from the fires would be salvaged during commercial thinning operations if not needed as snags and coarse woody debris. In some cases, thinning treatments would be used to enhance the potential for stands to reach old growth conditions in the lower elevation, drier habitats. Following thinning, prescribed fire may be used to reduce ground fuels in treated stands that contained larger western larch, Douglas-fir, and ponderosa pine trees capable of surviving prescribed fire.

Following commercial thinning, the treated areas would remain forested. Although the stands would contain fewer mid-sized and smaller diameter trees, the larger trees would appear more dominant. Within two to three years following thinning and prescribed burning activities, grasses, forbs, and brush species would dominate the understory (Figure 2.3.6).

Before Thinning

After Thinning

Figure 2.3.6. Commercial Thinning. *Following commercial thinning activities, these areas would remain forested. Although the stands would contain fewer mid-sized and smaller diameter trees, the larger trees would appear more dominant.*

Commercial thinning would be completed as a part of timber sale contracts and be financed by timber generated revenue. Timber sale activities would be expected to be completed within approximately 3 years.

❑ ***Salvage of Insect Killed Timber***

Salvage of insect killed timber would occur on approximately some unburned acres outside of the fire perimeters. These acres were originally identified for salvage treatments (prior to the fires) in the "Draft Environmental Assessment (EA) for the Siegel Pass – St. Louis Salvage Timber Sale. The treated acreage would vary by alternative (see Figures 2.3.2, 2.3.3, and 2.3.4).

The salvage of insect-killed timber would be completed using either tractor or skyline yarding methods. Under these treatments, dead lodgepole pine and Douglas-fir would be removed in order to recover economic value and reduce future fuel accumulations. Some larger "reserve" snags and patches of smaller dead trees would be retained for vertical structure, and snag replacement. Most live trees that are growing under and alongside the dead trees would be left standing. Some smaller diameter green trees would be removed as post and poles.

Following salvage activities, these areas would appear much more open (Figure 2.3.7).

Before Salvage

After Salvage

Figure 2.3.7. Salvage of Insect-Killed Timber. *Following salvage activities, these areas would appear much more open.*

Salvage of insect killed timber would be completed as a part of timber sale contracts and be financed by timber generated revenue. Timber sale activities would be expected to be completed within approximately 3 years.

❑ ***Planting "at-risk" Species***

Regeneration monitoring and planting would occur on some burned areas. The treated acreage would vary by alternative and by need identified

during monitoring.

Areas burned with moderately-high to high severities would be planted where natural regeneration is absent or insufficient to meet Forest Plan direction and where "species-at-risk" were not naturally reestablishing on habitats indicative of those species. Burned areas would be monitored for 1 to 3 years (depending upon habitat type) in order to track regeneration. In areas lacking regeneration, desired "species-at-risk", including ponderosa pine and western larch, would be planted. Seedlings would be produced from seed collected from nearby trees growing on similar habitat types, aspects, and elevations. Planting would be completed by hand placement of "plug" or "bare root" seedlings. Shade cards would be used on harsher sites lacking woody debris or other material effective for protecting the seedlings from sunscald.

Immediately following planting, these areas would continue to appear un-forested. Within 10 to 15 years, however, they would appear as thick sapling sized stands, and within 20 to 30 years as solid young forests.

Regeneration monitoring and planting would be funded by appropriated allocations from the National Fire Plan. Monitoring and planting would be expected to occur within 2 to 7 years.

❑ ***Noxious Weed Treatments***

Integrated weed management, including active weed control, is tiered to the Big Game Winter Range and Burned Area Weed Management EIS (USDA Forest Service 2001). Alternative D of that EIS will be implemented in the Post Burn project area. It includes restoration with prescribed fire, cultural controls, biological controls, herbicide application, education, and prevention. Under the Post Burn Project, noxious weed treatments would occur on roads identified for reconstruction or closure, the gravel source, and on haul routes for timber sales. Weed treatments would be designed to reduce existing noxious weed populations and the potential establishment of new populations. The treated areas would vary by alternative, depending on the mileage of road reconstruction and closures and need determined by existing weed populations (see Figures 2.3.2, 2.3.3, and 2.3.4).

Treatments would occur in the location of existing populations and weed risk (determined by slope aspect, soil conditions, habitat types, etc.). Weed treatments would include: (1) spraying of appropriate herbicides on established populations, (2) retaining roadside vegetation and shading, (3) seeding and planting disturbed soils, (4) mulching to improve grass germination, and (5) fertilization. Both ground based spraying and aerial spraying would occur according to guidelines described within the *Lolo National Forest Big Game Winter Range and Burned Area Weed Management EIS* (USDA Forest Service 2001).

Weed spraying would be timed according to road reconstruction, decommissioning, and haul activities. In most instances, spraying would occur prior to road reconstruction and decommissioning activities. Where access was limited, spraying may occur at the same time as road decommissioning. Within 7 days of soil disturbance, weed prevention measures including seeding, mulching and fertilization would be implemented. Timing of noxious weed treatments would be coordinated with activities and guidelines identified in the *Lolo National Forest Big Game Winter Range and Burned Area Weed Management EIS* (USDA Forest Service 2001).

Noxious weed treatments would be funded by appropriated allocations from the National Fire Plan, and Forest Roads Maintenance accounts. Where timber haul would occur, weed treatments would be financed by timber generated revenue. Spraying would occur immediately before reconstruction and timber haul. On roads where timber haul would not occur, spraying would be funded entirely from appropriations. In these situations, treatments would be expected to occur within 2 to 10 years.

❑ ***Area Snowmobile Travel Management Restrictions***

Yearlong area travel management restrictions for snowmobiles would be placed on approximately 34,613 acres of National Forest System Lands within the fire perimeters. Area snowmobile travel restrictions would remain consistent throughout Alternatives #2, #4, and #5.

Due to the loss of physical and vegetative barriers, (including brush, trees, and coarse woody debris) the potential for unobstructed off-

road snowmobile travel is high within the burned areas. Restricting snowmobiles from traveling off road would help prevent weed spread and disturbance of wildlife and impacts to Inventoried Roadless Areas. It would also help ensure the safety of snowmobile users in burned areas. Although existing restrictions are in place for Off Highway Vehicle (OHV) use, these regulations do not prevent use of snowmobiles off Forest Roads (USDA Forest Service 2001).

Area Snowmobile Travel Restrictions would be displayed on the Forest Travel Plan for a minimum of 5 years or until vegetation growth and falling snags reduced the ability for off road snowmobile travel. Snowmobile use on open roads and designated travel routes within the fire perimeters would still be permitted.

Area snowmobile travel management restrictions would be funded by the National Fire Plan, and Forest Roads and Law Enforcement accounts.

❑ Road (Gated) Travel Management Restrictions

Travel restrictions would be applied to several roads. The restricted lengths would vary by alternative (see Figures 2.3.2, 2.3.3, and 2.3.4).

Gates would be used to restrict vehicle travel on specific road segments during various times of the year to prevent rutting and displacement of sensitive soils or disturbance to wildlife.

Within Alternatives #2, #4, and #5, a seasonal motorized vehicle restriction (April 1 to June 15) would be placed on the Ninemile-Siegel Road (FR #412) between the intersection of Ninemile-Pardee Road (FR #97) and Siegel Pass to reduce rutting and erosion during the spring. Another seasonal restriction (October 15 to June 15) would be placed on the Ninemile-Pardee (Eustache Creek) Road (FR #97) between Devils Creek and Keystone Ridge to reduce rutting, erosion and wildlife disturbance. The lowest segment of FR #97 would be decommissioned to reduce road-stream impacts. Both seasonal restrictions would be on established public recreation routes. An alternative route, FR #9920, would be opened seasonally to allow for the loop driving experience between Flat Creek and Ninemile Creek.

Within Alternative #2, motorized vehicle restrictions would be placed on several established public recreation routes (Figure 2.3.8).

Alternative #2 – Road Travel Restrictions

Road	Restriction	Location
Ninemile-Siegel FR #412	Seasonal – "J "	Intersection FR #97 to Siegel Pass
Ninemile- Pardee FR #97	Seasonal – "E"	Devils Creek to Keystone Ridge
Siegel-Eustache FR #9920	Seasonal – "J "	Siegel Pass to Intersection FR #97

Figure 2.3.8. Alternative #2 – Road Travel Restrictions. *Within Alternative #2, seasonal motorized vehicle restrictions would be placed on several well traveled routes.*

Within Alternative #4, motorized vehicle restrictions would be placed on several established public recreation routes that bisect potential linkage zones (Figure 2.3.9).

Alternative #4 – Road Travel Restrictions

Road	Restriction	Location
Soldier FR #18102	Yearlong – "A"	Entire Road
Ninemile-Siegel FR #412	Seasonal – "J "	Intersection FR #97 to Siegel Pass
Ninemile- Pardee FR #97	Seasonal – "E"	Devils Creek to Keystone Ridge
Siegel-Eustache FR #9920	Seasonal – "E "	Siegel Pass to Intersection FR #97
First Cr. FR #536	Yearlong – "A"	Intersection FR #7882 to Alpine Divide
9-Mile – First Cr. FR #5475	Yearlong – "A"	Intersection FR #5520 to Alpine Divide
Verde-Windfall FR #450	Yearlong – "B"	Intersection FR #7796 to Windfall Creek
Sunrise FR #7789	Yearlong – "B"	Intersection FR #17421 to Ohio Creek
Snowshoe FR #388	Seasonal – "E"	Intersection FR #7813 to Intersection FR #61268

Figure 2.3.9. Alternative #4 – Road Travel Restrictions. *Within Alternative #4, yearlong motorized vehicle restrictions would be placed on several well established public recreation routes that bisect potential linkage zones.*

Within Alternative #5, motorized vehicle restrictions would be placed on fewer routes than in Alternative #4, but would still affect several popular driving routes (Figure 2.3.10).

Alternative #5 – Road Travel Restrictions

Road	Restriction	Location
Soldier FR #18102	Seasonal – "E"	Entire Road
Ninemile-Siegel FR #412	Seasonal – "J "	Intersection FR #97 to Siegel Pass
Ninemile- Pardee FR #97	Seasonal – "E"	Devils Creek to Keystone Ridge
Siegel-Eustache FR #9920	Seasonal – "J "	Siegel Pass to Intersection FR #97

Figure 2.3.10. Alternative #5 – Road Travel Restrictions. *Within Alternative #5, seasonal motorized vehicle restrictions would be placed on fewer routes.*

In Alternative #5, an existing yearlong restriction on Siegel-Eustache Road #9920 would be changed to a seasonal restriction (April 1 to June 15) to provide for a secondary driving loop to compensate for the loss of access on the Ninemile-Pardee Road (FR #97) in Eustache Creek. This same road would be changed to a seasonal restriction (October 15 to June 15) in Alternative #4.

Installation of gates to implement road travel restrictions would be funded by appropriated allocations from the National Fire Plan, and Forest Roads Maintenance accounts. Where timber haul would occur, gate installations would be financed by timber generated revenue. Gate installation would occur during road reconstruction prior to timber haul. On roads where timber haul would not occur, gate installation would be funded entirely from appropriations. In these situations, gates would be installed within 2 to 5 years.

❑ ***Fuels Reduction and Prescribed Burning***

Fuels reduction and prescribed burning would occur in several areas. The treated acreage would vary by alternative depending upon unit position and burn perimeter (see Figures 2.3.2, 2.3.3, and 2.3.4).

In general, the burn perimeters would coincide with harvest unit perimeters where post harvest fuels treatments were needed. In two locations (Siekrest Gulch-Flat Fire and Burnt Fork-Ninemile Fire), burn perimeters would vary from unit perimeters. In Siekrest Gulch, fuels treatments would be expanded to encompass National Forest System Lands that surround private residential properties. In Burnt Fork (Ninemile Creek drainage), burn perimeters would be expanded beyond the units to defensible geographic locations on nearby ridges.

Fuels treatments would include slashing (lop and scatter), piling and broadcast burning. Prescribed burning would be completed with a combination of hand and aerial ignition techniques. Following salvage and commercial thinning activities, prescribed burning would be used to reduce ground fuels generated from the tops and limbs of harvested trees. In these instances, burns would take place in the spring or fall when moisture conditions allow for desired fuels consumption at minimal risk to soils and leave trees.

Following prescribed burning, the forest floor would appear black for a short time. Groups of small diameter, understory trees that had been killed by the fire would remain standing for several years. Some mid-size trees would appear red and could die within the year following the burn, and the trunks of the larger diameter trees would appear black on the lower 5 to 10 feet. Due to a nutrient flush from the burn, grasses, forbs, and brush would quickly sprout to form a green understory.

Several years following the burn, these stands would appear more open. Although the stands would contain fewer mid-sized and smaller diameter trees, the larger trees would appear more dominant (Figure 2.3.11).

Before Burning

After Burning

Figure 2.3.11. Prescribed Burning. *Prescribed "ecosystem" burning would reduce existing ground fuels, and kill small diameter, understory trees.*

Fuels reduction and prescribed burning would be funded by fuels reduction and ecosystem maintenance accounts. Where timber harvest would occur, prescribed burning would be financed by timber generated revenue. Treatments would occur following timber harvest within 3 to 5 years.

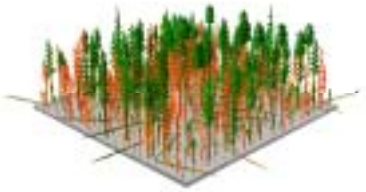
■ Working with People and Communities

❑ *Timber Salvage in Burned Areas*

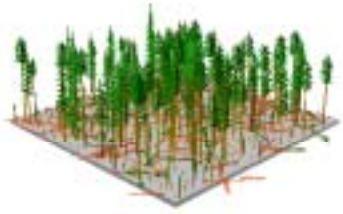
Timber salvage in burned areas would occur across several areas. The treated acreage would vary by alternative (see Figures 2.3.2, 2.3.3, and 2.3.4).

The salvage of burned and insect killed trees would be completed using a variety of tractor, skyline, and helicopter yarding methods. Standing dead trees with merchantable value would be removed from areas that burned at low to high severities in order to recover economic benefits and reduce fuels. Within the salvage units, some larger "reserve" snags and some trees damaged by fire or infested by insects would be retained for vertical structure, snag replacement, and long term nutrient recycling. Smaller, non-merchantable trees would either be left standing for wildlife habitat and future nutrient recycling, felled to provide ground protection and soil stabilization, or treated with prescribed fire in order to reduce future wildfire intensity.

Following salvage, the treated areas would appear more open, yet would still blend with the surrounding burned landscape. Depending on the post-salvage fuels treatment, these areas would contain moderate numbers of small diameter standing and down dead trees, large snags, and scattered unburned trees (Figures 2.3.12 and 2.3.13).

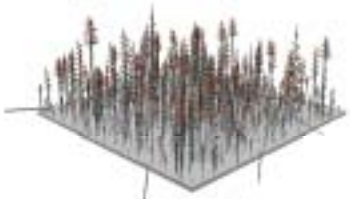


Before Salvage

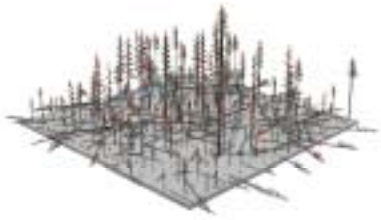


After Salvage

Figure 2.3.12. Salvage in Low to Moderate Severity Burns. *Larger snags and all unburned trees would be retained.*



Before Salvage



After Salvage

Figure 2.3.13. Salvage in High Severity Burns. *These areas would retain moderate numbers of small diameter standing and down dead trees, and large snags.*

Timber salvage would be completed as a part of timber sale contracts and be financed by timber generated revenue. Timber sale activities would be completed within approximately 3 years.

❑ ***Temporary Road Construction***

Approximately 1.7 miles of temporary road would be constructed to access timber harvest units in only one alternative, Alternative #5 (See Figure 2.3.14).

Temporary roads would be constructed to minimal standards. These roads would only be constructed on ridge top locations and gentle side slopes to minimize their potential to impact water quality. As part of the initial road clearing, slash removed from the right-of-way would be placed in a windrow below the excavated soil so that it could be replaced on the recontoured surface following use. After less than one season (following unit harvest), the road would be fully recontoured. Recontouring efforts would include replacing soil back onto the road prism to return the ground to its natural contour, placing slash and woody debris on the disturbed area, and seeding and fertilizing the disturbed area.

Following use, the road would appear as a linear opening. Within 10 to 15 years (depending on location), the area would become heavily brushed in or grown in with young trees.

Temporary road construction and closure would be completed as a part of timber sale contracts and be financed by timber generated revenue.

Alternative 5 Temporary Roads

Proposed Road	Miles	Legal	Reason
T18121ext	0.15	T17R24S30	Access unit 920, 1150
T19253ext	0.06	T17R25S22	Access unit 221
T5472ext	0.17	T17R24S22	Access unit 107, 110
Tunit150	0.40	T17R24S29	Access unit 150
Tunit704	0.11	T15R27S13	Access unit 704
Tunit904	0.81	T17R24S30	Access unit 904

Figure 2.3.14. Alternative 5 Temporary Roads. Approximately 1.7 miles of temporary road would be constructed to access timber harvest units in only one alternative, Alternative #5.

❑ ***Heritage Site Interpretation and Interpretation Routes***

Heritage Site Interpretation would occur at 3 sites and along approximately 39 miles of Forest roads. Interpretation would remain consistent throughout Alternatives #2, #4, and #5 (Maps 2.3.1-3a and 3b, 2.3.2-3a and 3b, 2.3.3-3a and 3b in Appendix A).

Several sites including "Old Town", "Martinez", "Flat-Dam", and "Landowner Lookout" would be featured in interpretive brochures and roadside signs. Additional signing would be used to interpret the Ninemile Historic Mining District, and historic mining activities along FR #412 and FR #250.

Cultural resource protection would include the installation of interpretive signs and "tread lightly" signs at historic features, and the development of brochures to provide an interpretive history of the sites and structures.

Signs would appear at high use locations near historic sites, or at locations along Forest roads. The brochure would be made available at local Forest administrative offices.

Interpretation would be funded by appropriated allocations from the National Fire Plan, Heritage program and Forest Roads Maintenance accounts. Interpretative signs and brochures would be completed within 2 to 5 years.

■ 2.4 Mitigation Measures and Monitoring Requirements

☐ 2.4.1 Mitigation Measures

Where potential impacts to resources were predicted, environmental protection measures would be employed to mitigate the effects of conducting activities.

Table 2.4.1 displays mitigation measures that would be used to reduce the effects of each action.

Table 2.4.1. Mitigation Measures. *Where potential impacts to resources were predicted, environmental protection measures would be employed to mitigate the effects of conducting activities.*

Resource	Mitigation Measure ID	Mitigation Measure Description	Alternative
Soils			
	SOILS-M-1	Best Management Practices (BMPs) for Forestry and Streamside Management Zone Law would be applied to all harvest, road, and trail activities.	Alt. #4, Alt. #5
	SOILS-M-2	Where activities occur on mosaic or high severity burned areas, a field review would be conducted by a qualified soils specialist prior to implementing activities to identify potential avoidance areas. When avoidance would not be possible, erosion control measures including straw bales, wattles, silt fences, etc. would be installed before ground disturbing activities. Erosion control measures would be left in place for one growing season or until no evidence of pedestaling, rills, or surface soil movement was evident. On mosaic or high severity burned areas require winter logging on all tractor yarded harvest units where possible.	Alt. #2, Alt. #4, Alt #5
	SOILS-M-3	Coarse Woody Debris would be kept on site to meet objectives for long term soil productivity as specified within "The Woody Debris Resource on the Lolo National Forest", 1996.. The guide recommends retention of 5-10 tons per acre of woody debris larger than 3 inches diameter on habitat type groups 2 and 3 (VRU2): 12 to 33 tons per acre on habitat type group 4 (VRU3); and 12 to 25 tons per acre on habitat type group 5 (VRU4).	Alt. #2, Alt. #4, Alt. #5
	SOILS-M-4	Ground based activities would be restricted to a dry operating season generally between June 15 and September 15 Ground based winter activities will follow identified BMP direction for activities during snow cover and/or frozen ground conditions. On LSI Units 15JB, 30MA, 30QA, 64MA, and 64QA ground based activities would be suspended if snow cover and depth of frozen soils are not able to protect the soil from visual evidence of compaction, puddling, and displacement (2509.18.2 WO Amendment 2509.18-91-1). Operations outside of the specified conditions may only occur on a case-by-case basis following consultation with a qualified soils specialist.	Alt. #2, Alt. #4, Alt #5
	SOILS-M-5	Landings of 1 acre or more would be located on slopes less than 6 percent, where soil mass movement is low and surface soil coarse fragment cover is 15 percent or less.	Alt. #4, Alt. #5
	SOILS-M-6	As soon as possible following the completion of harvest operations, not to exceed one year, landings would be recontoured to the original surface contour, ripped, and grass seeded with an approved Lolo native seed mix and fertilized.. Coarse woody debris would be spread on site to provide for long-term soil productivity as specified within "The Woody Debris Resource on the Lolo National Forest", 1996. The guide recommends retention of 5-10 tons per acre of woody debris larger than 3 inches diameter on habitat type groups 2 and 3 (VRU2); 12 to 33 tons per acre on habitat type group 4 (VRU3); and 12 to 25 tons per acre on habitat type group 5 (VRU4). Following burning, burn piles would be scattered across the landing, ripped, seeded, and fertilized similar to the remainder of the area.	Alt. #4, Alt. #5
	SOILS-M-7	Tractor yarding would be limited to those areas with slopes less than 35 percent, this may include some areas with lengths less than 150 feet with slopes greater than 35 percent.	Alt. #4, Alt. #5
	SOILS-M-8	Tractor yarding on high soil burn severity areas would be limited to those areas with slopes less than 30 percent. This may include some areas with lengths of less than 100 feet with slopes greater than 30%.	Alt. #4, Alt. #5
	SOILS-M-9	In skyline yarding operations, the leading end of the log would be suspended.	Alt. #4, Alt. #5
	SOILS-M-10	Where there is visual evidence of compaction on skid trails, they would be scarified to a depth of 4 inches. Skid trails would be water barred, slash would be scattered across their surfaces, and where appropriate, seeded.	Alt. #4, Alt. #5
	SOILS-M-11	Where the road prism is unvegetated, road decommissioning would include recontouring to match the natural slope gradient or ripping to a minimum depth of 6 to 18 inches and seeding with Lolo approved grass species. . Coarse woody debris would be spread on site to provide for long-term soil productivity as specified within "The Woody Debris Resource on the Lolo National Forest", 1996. The guide recommends retention of 5-10 tons per acre of woody debris larger than 3 inches diameter on habitat type groups 2 and 3 (VRU2); 12 to 33 tons per acre on habitat type group 4 (VRU3); and 12 to 25 tons per acre on habitat type group 5 (VRU4). Weed free mulch would be applied to exposed soils within 25 feet of reclaimed stream crossings.	Alt. #2, Alt. #4, Alt. #5
	SOILS-M-12	Erosion control measures such as straw bales, wattles, silt fences; hydro mulching, etc. would be in place before and during ground disturbing activities. Erosion control measures would remain in place and functional for a minimum period of one growing season.	Alt. #2, Alt. #4, Alt. #5
	SOILS-M-13	Where hydrophobic conditions exist in areas of mosaic or high soil burn severity in	Alt. #2, Alt. #4,

Resource	Mitigation Measure ID	Mitigation Measure Description	Alternative
		harvest units or sensitive soil rehabilitation areas, and where practical, soils would be scarified to a depth of 4 inches. Coarse woody debris would be spread on site to provide for long term soil productivity as specified within "The Woody Debris Resource on the Lolo National Forest", 1996. The guide recommends retention of 5-10 tons per acre of woody debris larger than 3 inches diameter on habitat type groups 2 and 3 (VRU2); 12 to 33 tons per acre on habitat type group 4 (VRU3); and 12 to 25 tons per acre on habitat type group 5 (VRU4). . Where scarification is not practical, and on slopes greater than 30 percent, or where slumping is occurring, soils would be seeded with an approved Lolo Native seed mix and mulched if the live effective ground cover is not at least 60 percent of the sites natural capability after the second growing season following the fires.	Alt. #5
Visual Resources			
	VIS-M-1	The Forest Landscape Architect would be involved with the layout and marking of all units that lie within Partial Retention and Retention or visible from Interstate 90 to insure that visual quality would be maintained during implementation of this project.	Alt. #4, Alt. #5
	VIS-M-2	Leave trees in all timber harvest or salvage units would be left in an irregular pattern to mimic natural vegetation patterns.	Alt. #4, Alt. #5
	VIS-M-3	Some live trees in units visible from the identified viewpoints, regardless of health and vigor, would be left in order to soften the visual effects of harvesting and to maintain a "presence" of natural processes on the landscape according to approved silvicultural prescriptions.	Alt. #4, Alt. #5
	VIS-M-4	Skyline corridor widths would be kept to a minimum width, not to exceed 12 feet wide, in all units visible from the identified viewpoints to reduce the visual effects of straight lines created by skyline corridors.	Alt. #4, Alt. #5
Heritage Resources			
	CUL-M-1	Any artifact or structure located during reconnaissance or project implementation would be left undisturbed and reported to the Forest Archeologist immediately.	Alt. #2, Alt. #4, Alt. #5
	CUL-M-2	A 50-foot "no-activity" buffer would be flagged around Sites 24mo572 and 24mo29 in Unit 110 on the Ninemile Sale and around Site 24mo070 in Unit 715 on the Siegel Sale. No harvesting, skidding or yarding would be permitted within the no-activity zone. Trees would be directionally felled away from the no-activity zone to avoid site disturbance. Post-harvest burning would not be allowed to occur within the no-activity zone.	Alt. #4, Alt. #5
	CUL-M-3	Heritage protection information would be included on interpretive signs and brochures.	Alt. #2, Alt. #4, Alt. #5
Water and Hydrologic Resources and Fish and Aquatic Resources			
	HYDRO-M-1	Montana Best Management Practices for Forestry would be met as a minimum, including provisions of the Streamside Management Zone Law. All activities would comply with Lolo National Forest Best Management Practices. MT DNRC approval would be requested if variances to Montana BMPs were needed.	Alt. #2, Alt. #4, Alt. #5
	HYDRO-M-2	Montana Streamside Protection Act (SPA) 124 Permits would be obtained for any activity that would disturb stream channels. U.S. Army Corps of Engineers 404/401 Permits would be obtained for any activities involving stream channels and wetlands.	Alt. #2, Alt. #4, Alt. #5
	HYDRO-M-3	Boundaries of wetlands and RHCAs would be flagged to exclude ground-based equipment and other activities.	Alt. #2, Alt. #4, Alt. #5
	HYDRO-M-4	Erosion control measures would be inspected and maintained on a recurrent basis until the site was stabilized to ensure their effectiveness. Additional inspections and maintenance would occur following high rainfall events and prior to fall and spring runoff to ensure their effectiveness.	Alt. #2, Alt. #4, Alt. #5
	HYDRO-M-5	When variances would be granted for use of helicopter landings within the RHCA, the following measures would be required: 1) Erosion control measures including both a slash filter windrow and silt fence would be installed between the landing site and stream. Silt fences would be maintained for the duration of landing operations and a least one growing season following rehabilitation of the landing. 2) Log landing and decking operations would be kept as far away from the stream as possible. (e.g. in Trout Creek area operations would be confined to the area nearest FR 250). 3) Landing rehabilitation activities would include scarification to a depth of 12 inches, placement of 8-12 tons/acre of Coarse Woody Debris, mulching of the site, seeding with an approved grass mix, and planting of approved tree and brush species. 4) No slash burning operations would be permitted within the RHCA. All waste would be removed to an approved burn site or chipped and hauled to an approved waste site. 5) Clearing of and use of Landing and decking areas would be kept to the minimum size possible to meet safety regulations for log landing.	Alt. #4, Alt. #5

Resource	Mitigation Measure ID	Mitigation Measure Description	Alternative
		6) Fueling or servicing of the helicopter would be prohibited within RHCA landings.	
	HYDRO-M-6	If debris or slash were to enter a stream, it would be removed by hand immediately whenever there is a potential for blockage of the stream or crossing structure, or if the stream has the ability to transport such material.	Alt. #2, Alt. #4, Alt. #5
	HYDRO-M-7	On temporary roads, sediment-buffering devices would be installed below all fill slopes within 300 feet of streams or drainage crossings where appropriate.	Alt. #5
	HYDRO-M-8	All temporary roads would be obliterated, re-contoured, seeded, and cover added within one season of completion of use.	Alt. #5
	HYDRO-M-9	Slash filter windrows would be placed on relief culvert outlets that are within 300 feet of a waterway.	Alt. #2, Alt. #4, Alt. #5
	HYDRO-M-10	Cross drain spacing would be approximately 500 feet for road grades between 0 and 3 percent, and approximately 300 feet or less for grades between 3 and 10 percent.	Alt. #2, Alt. #4, Alt. #5
Air Quality			
	AIR-M-1	Detailed burning plans would be developed for all prescribed burning. Contingency plans, developed as part of the burn plan, would address measures deployed under situations of fire escape.	Alt. #4, Alt. #5
	AIR-M-2	All burning would be conducted under the constraints set by the Montana Air shed Group. Prescribed burning would only occur when approved. Constraints that are more restrictive may be placed on burning if predicted forecasts are different from actual weather.	Alt. #4, Alt. #5
Infrastructure and Improvements			
	ROADS-M-1	Pathways would be provided for on roads that would be decommissioned. Pathways at least 18 inches in width would be left unscarified or recompacted and free of slash and debris that could impede foot travel. Pathways would not be left within 300 feet of streams or on stream crossings.	
	ROAD-M-2	Where culverts are removed, fill crossings would be recontoured to a stable slope angle approximating natural undisturbed stream banks adjacent to the site, and fills would be seeded and mulched with an approved Lolo seed mix. On designated streams, an approved filtration device free of nylon string or netting would be installed to minimize the amount of sediment delivery. Such devices would be maintained and cleaned at an established interval until the site was stabilized. An adequate floodplain, stream gradient, pools, riffles, woody debris and other characteristics of the natural stream channel would be restored.	Alt. #2, Alt. #4, Alt. #5
	ROAD-M-3	During culvert removals, approved measures would be used to trap sediment mobilized in, or delivered to the stream channel. Such measures may consist of using filter cloth stretched across the stream below the crossing to trap sediments created during culvert removal, or diverting water from the project site through an approved and lined channel.	Alt. #2, Alt. #4, Alt. #5
	ROAD-M-4	Slash filter windrows installed on fill slopes to prevent fill material from entering streams would be installed according to approved methods outlined within "Construction Cost and Erosion Control Effectiveness of Filter Windrows on Fill Slopes" by MJ Cook and JG King (USDA-FS, Research Note INT 335, November 1983).	Alt. #2, Alt. #4, Alt. #5
	ROAD-M-5	New culverts and bridges would be sized to accommodate the 100-year flood, including associated bed load and debris. Crossings would be constructed and maintained to prevent diversion of stream flow out of the channel and down the road in the event of crossing failure.	Alt. #2, Alt. #4, Alt. #5
	ROAD-M-6	Fish passage would be provided for at all road crossings on existing and potential fish bearing streams.	Alt. #2, Alt. #4, Alt. #5
	ROAD-M-7	Water drafting sites would be located and used in a manner to avoid adverse effects to native fish and instream flows. Drafting would be conducted in a manner that would not retard or prevent attainment of Riparian Management Objectives.	Alt. #2, Alt. #4, Alt. #5
	ROAD-M-8	Where roads were newly disturbed, erosion control measures and drainage structures would be in place as soon as possible on incomplete roads that are subject to erosion, after construction, or upon completion of operations. These measures would be in place prior to fall or spring runoff.	Alt. #2, Alt. #4, Alt. #5
	ROAD-M-9	Road reconstruction, construction and closures would be postponed during wet periods if, as a result, erodible material could enter streams. .	Alt. #2, Alt. #4, Alt. #5
	ROAD-M-10	In areas where the road fills are within 25 feet of a stream channel (perennial or intermittent) and the road would be used for haul and is to be reconstructed, filtration devices would be required to be installed between the toe of the fill and the stream channel where practical.	Alt. #2, Alt. #4, Alt. #5
	ROAD-M-11	In areas where haul would occur on roads within 300 feet of perennial streams or where residences were close to roads, dust abatement measures such as water, calcium or magnesium chloride would be applied during dry periods.	Alt. #4, Alt. #5
	ROAD-M-12	Materials removed as aggregate from the Mattie V gravel source as well as materials moved or relocated for site reclamation will be routinely monitored and tested for the	Alt. #2, Alt. #4, Alt. #5

Resource	Mitigation Measure ID	Mitigation Measure Description	Alternative
		presence of contaminates such as mercury. Monitoring and testing procedures will be included within operating plans as appropriate.	
Vegetation and Forest Resources			
	VEG-M-1	Salvage harvests will meet the snag and woody debris retention guides established for the Lolo National Forest.	Alt. #4, Alt. #5
	VEG-M-2	Application of standard timber sale contract clauses, particularly C6.4 Conduct of Logging, which addresses resource and residual timber protection by requiring directional felling, pre-approved skid trails and landings, logs yarded with leading edge free of the ground, and skyline corridor spacing; as well as the provisions under B6.0 Operations. These provisions would be used to protect conifer regeneration (or natural regeneration) during salvage harvests where the salvage of dead trees occurred in openings which function as shelterwood, seed tree, or clearcut silvicultural systems.	Alt. #4, Alt. #5
	VEG-M-3	Dead trees will be defined in timber sale contracts as those trees (other than western larch) with no green needles. Douglas-fir, Engleman spruce, lodgepole pine, and ponderosa pine having green needles, but with boring dust in bark crevices or around the base of boles from insect attacks, will be marked for removal by Forest Service personnel during contract administration prior to harvest. Amman and Cole (1983) and Gibson (RO entomologist conversation) conclude that finding boring dust in bark crevices, or around the base of an infested tree – and particularly if it is found completely around the tree's circumference – is conclusive evidence that the tree has been infested by a sufficient number of beetles that it cannot survive. If winter operations would include harvest of western larch, marking of larch by Forest Service personnel will designate cut or leave trees.	
Threatened, Endangered, and Sensitive Plants			
	BOT-M-1	Maintain overstory canopy of approximately 60 percent in suitable areas of Units 180 and 280, specifically in those areas that have enough soil, ninebark, and northerly aspects for clustered ladyslipper habitat.	Alt. #4, Alt. #5
	BOT-M-2	Maintain 100-foot buffers for ground disturbance around known clustered ladyslipper populations. Do not disturb ninebark and other shrubs near populations.	Alt. #4, Alt. #5
	BOT-M-3	Burning ninebark shrub populations near known clustered ladyslipper populations would be avoided.	Alt. #4, Alt. #5
	BOT-M-4	No direct ignition would occur in areas of known clustered ladyslipper populations.	Alt. #4, Alt. #5
	BOT-M-5	Re-survey suitable areas in Units 180 and 280 for additional clustered ladyslipper populations prior to harvest treatments.	Alt. #4, Alt. #5
	BOT-M-6	Surveys for sensitive plant species will continue during harvest unit layout and project implementation. If any additional populations are located, the Forest Botanist will be notified, and mitigation will occur as necessary. This could include unit boundary adjustments to exclude populations, alternative harvest methods to minimize ground disturbance, buffers around populations, adjustments in harvest to meet prescriptions for sensitive plant habitats.	Alt. #2, Alt. #4, Alt. #5
Noxious and Invasive Plant Species			
	WEED-M-1	All equipment that would be used off road would be washed prior to moving into the project area. All equipment would be inspected and approved before operations would begin.	Alt. #2, Alt. #4, Alt. #5
	WEED-M-2	Existing roads that would be used in conjunction with project activities would be mowed, or sprayed prior to equipment be moved into the area so that seed bearing noxious weeds are removed from the roadway.	Alt. #2, Alt. #4, Alt. #5
	WEED-M-3	Road clearing would be kept to a minimum to maintain shaded conditions along road rights-of-way.	Alt. #2, Alt. #4, Alt. #5
	WEED-M-4	Funding for noxious weed treatments on roads that are not within the timber sale boundary would be listed in priority based on the following criteria: 1. Treatment of roads scheduled for closures. 2. Main roads outside of the sale areas. 3. Areas adjacent to private landowners with active weed control programs.	Alt. #4, Alt. #5
	WEED-M-5	Chemical treatments would be with the following herbicides, as approved for use in the Final Environmental Impact Statement for Noxious Weed Management on the Lolo National Forest (USDA Forest Service 1991), the Superior Ranger District Noxious Weed Herbicide Treatment Program Environmental Assessment (USDA Forest Service 1997), and the Lolo National Forest Big Game Winter Range and Burned Area Weed Management EIS (USDA Forest Service 2001): picloram (Tordon), 2,4-D, Glyphosate (Roundup or Rodeo), and dicamba. Herbicides would be applied as directed by the Lolo National Forest Plan Amendment 11, and product label requirements.	Alt. #2, Alt. #4, Alt. #5
	WEED-M-6	Road ditches leading into intermittent and perennial streams would be flagged as no-spray zones and would not be sprayed with a Picloram based herbicide.	Alt. #2, Alt. #4, Alt. #5
	WEED-M-7	Where appropriate Lolo Native Grass Seed Mixes would be used in all areas except where it has been determined there is a high possibility that weeds may be more	Alt. #2, Alt. #4, Alt. #5

Resource	Mitigation Measure ID	Mitigation Measure Description	Alternative
		competitive. Other Lolo Grass Seed mixes will be used in these locations.	
Wildlife			
Black-Backed Woodpecker	WLF-M-1	Proposed harvest stands in potential black-backed woodpecker habitat would be surveyed again each spring before harvesting begins. If black-backed woodpecker nests were located, then the nest tree would remain and a reserve patch would be marked around the nest tree. Clumps of reserve trees would be left in all regeneration stands. The clump around the nest tree could be used as one of the reserve clumps. The size and number of reserve trees and clumps would be designated for each stand in the harvest prescription.	Alt. #4, Alt. #5
Big Game Hunting Season	WLF-M-2	There would be no activities behind closed gates during hunting season. When activities were proposed, the wildlife biologist would be consulted on a case by case basis to determine the effects of these activities.	Alt. #2, Alt. #4, Alt. #5
Big Game Winter Range	WLF-M-3	There would be no activities on big game winter range from December 1 through May 15. When activities were proposed, the wildlife biologist would be consulted on a case-by-case basis to determine the effects of these activities.	Alt. #2, Alt. #4, Alt. #5
Snags and Old Growth	WLF-M-4	The Lolo National Forest Plan Dead and Down Woody Debris Habitat Component Guidelines (United States Forest Service 1997) would be followed where they are applicable. Additional guidelines would be implemented for salvage and intermediate harvest in smaller diameter burned stands. The primary guideline for snag retention would be to keep as many of the large snags that existed before the fires as possible while still providing for human safety. Some of the burned stands are small diameter lodgepole pine that re-burned following the 1910 fire. These stands had few large snags before the fire and because of the small average diameter in the stand; there are no additional large snags. Because of lack of large snags, clumps of snags will be retained in harvest units instead. The specific snag and woody debris guidelines are listed in the prescription for each stand.	Alt. #4, Alt. #5
Live Old Growth Trees	WLF-M-5	Live trees in harvest units that meet Region 1 Old Growth Criteria would be retained. The harvest prescription would provide detailed descriptions for each stand.	Alt. #4, Alt. #5

2.4.2 Monitoring Measures

Monitoring would be used to: (1) determine whether the original objectives of the activities were met, (2) determine the need for additional action, and (3) educate and assist in designing future projects.

Monitoring and evaluation would compare the end results to those projected under the project Purpose and Need, and to the Goals Objectives, and Standards of the Lolo National Forest Plan.

For this project, monitoring would be conducted in accordance with the requirements outlined on pages V-2 thru V-13 of the Lolo National Forest Plan. Forest Plan monitoring, done on a sample basis, would also determine the overall effectiveness of the project and effectiveness of mitigation efforts.

Monitoring for sale activities would occur during and immediately following sale implementation. All unit layout, marking, road closures, construction, reconstruction, maintenance, and harvest operations would be monitored by Forest Service representatives to ensure compliance with specifications.

Monitoring for watershed restoration activities would occur during and immediately following these activities. An extended monitoring plan would also be implemented to examine trends associated with road closure effectiveness and water quality protection.

Generally, three types of monitoring would be used to evaluate the activities (Figure 2.4.1).

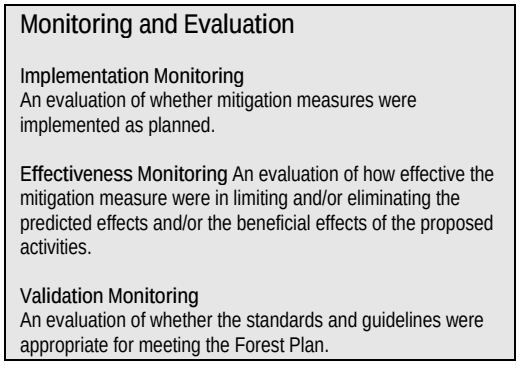


Figure 2.4.1. Monitoring and Evaluation. *Generally, three types of monitoring would be used to evaluate the activities.*

Because not all proposed activity areas could be monitored, representative areas would be identified for each of the proposed activities and sampled. The results of the data and

interpretations from the sample sites would be extrapolated to similar areas and activity types.

Project level monitoring on the Lolo National Forest would coincide with the "R1/R4 National Fire Plan (NFP) Adaptive Management and Monitoring Efforts" being conducted by Regions 1 and 4 (USDA Forest Service 2001). Monitoring information collected by the Lolo National Forest would be made available to support Regional monitoring efforts. Most monitoring completed under this program will be ongoing for 4 to 5 years.
Funding for monitoring would be allocated through the Lolo National Forest annual budgetary process. All validation monitoring items have been designed to meet projected Forest budgets. Implementation monitoring items for watershed restoration, road decommissioning and reconstruction, weed spraying, and soil stabilization activities funded by the National Fire Plan have been assessed in preliminary cost estimates and reserved as part of the funding allocation. National Fire Plan Funding cost estimates are in the Post Burn EIS Project File.

■ BAER Monitoring Measures

Post fire monitoring for activities completed under the Burned Area Emergency Restoration Plan are documented within the Lolo National Forest Fires of 2000, BAER Monitoring Progress Report (USDA Forest Service 2001). Monitoring measures include site specific assessment of the effectiveness of road closures, culvert replacements, and soil stabilization activities completed under BAER. Monitoring for these activities would continue for approximately 3 years. Information obtained from BAER monitoring would supplement monitoring for activities completed under this EIS.

Approximately $31,600 was allocated to the Lolo National Forest for monitoring BAER restoration activities. As of June 2002, $18,850 had been utilized, indicating that adequate funding was available for completing remaining monitoring needs.

■ Forest Plan Monitoring Measures

Forest Plan monitoring would be conducted in accordance with the requirements outlined in Chapter V of the Lolo National Forest Plan. Monitoring requirements are displayed in Table V.1 on page V-6 through V-13 of the Plan. Monitoring strategies are displayed by resource. The results of Forest Plan Monitoring are documented annually in the Lolo National Forest Plan Monitoring and Evaluation Report.

In addition to the monitoring process, the Forest Supervisor, District Rangers, and Staffs collectively visit sample project sites on an annual basis. During these "on-the-ground" visits, project implementation is reviewed, critiqued and assessed within the context of Forest Plan goals, standards and monitoring items. This direct "management team" involvement develops a shared, forest-wide understanding of Forest Plan intent, and provides information on effective ways to achieve that intent.

■ Minerals Monitoring Measures

The evaluation of mine restoration and stabilization activities would be based on criteria outlined by Forest Plan Monitoring Item 8-1 and by monitoring requirements for Soils, Hydrologic, and Aquatic Resources. Individual monitoring plans would be developed for each site and documented in the Mine Site Restoration Plan. Monitoring reports would be developed on an annual basis.

■ Soils Monitoring Measures

The evaluation of soil effects would be based on criteria outlined by Forest Plan Monitoring Item 4-3 as described in Forest Service Manual 2554, Soil Quality Monitoring (FSM 2500, R1 Supplement No. 2500-99-1, USDA Forest Service 1999), and in the Woody Debris Resource on the Lolo National Forest (USDA Forest Service 2001). See Figure 2.4.2.

Soils Monitoring

At least two tractor, two Skyline and two Helicopter vegetation management activities in the VRU2 areas within the high, moderate and mosaic soils burn severity areas would be monitored. Soils would be monitored for rill erosion, pedestals, and gullies. Photo points would be established and photos taken before during and after implementation of the proposed activity.

At least two sites in each of the moderate and mosaic soil burn severity areas would be monitored for compaction. Samples would be collected for bulk density.

Three proposed burn activity areas would be monitored for soil scorching using visual observations and photo points.

A soil loss plot established in 2001 would continue to be monitored annually for 5 years to determine measurable soil movement in high severity burn areas.

At least one of each type/level of road closure would be monitored for pedestals, gullies, rills and compaction .

At least one of each type/level of road closure would be monitored for erosion mitigation where applicable.

Watershed restoration activities would be monitored to determine whether objectives for soil stabilization and site rehabilitation had been met.

Photos would be taken of contour felling to display effectiveness.

Figure 2.4.2 Soils Monitoring Procedures. *The evaluation of soil effects would be based on criteria outlined by the Forest Plan.*

■ Visual Resource Monitoring Measures

The evaluation of effects on the Visual Resource would be based on criteria outlined by Forest Plan Monitoring Item 10-1 and as described within Forest Service Handbook 462, National Forest Landscape Management System Volume 2, Chapter 1, and within Agricultural Handbook 701, Landscape Aesthetics: A Handbook for Scenery Management. See Figure 2.4.3.

Visual Resources Monitoring

Critical viewing points, established during project design and identified in Section 3.8.6, would be used to monitor the change in visual appearance.
Viewing points would be used to assess the change in visual patterns in harvest units and for areas where road closures and watershed restoration activities had been performed.

Visual monitoring would be prioritized for areas where unit design was consulted on during layout.

Photo monitoring points would be established to document visual conditions prior to implementation, during implementation, immediately following implementation, and three to five years following implementation. Photo monitoring would be coordinated with monitoring requirements for other resources.

Figure 2.4.3. Visual Resources Monitoring. *The evaluation of effects on the Visual Resource would be based on criteria outlined by the Forest Plan.*

■ Heritage Monitoring Measures

The evaluation of effects on the Heritage Resources would be based on criteria outlined by Section 106 of the National Historic Preservation Act (Figure 2.4.4). Sites determined eligible for listing on the National Register of Historic Places, would be monitored for direct and indirect effects from project activities.

Heritage Resources Monitoring

Sites 24mo572 and 24mo29 in Unit 110 on the Ninemile Sale and Site 24mo070 in Unit 715 on the Siegel Sale would be monitored during and immediately following harvest activities to ensure compliance with established mitigation measures for site protection.

Heritage interpretation sites and brochures would be inspected annually to conduct needed maintenance and repairs. Signs would monitored for cleanliness and readability.

Figure 2.4.4. Heritage Resources Monitoring. *The evaluation of effects on the Heritage Resources would be based on criteria outlined by Section 106 of the National Historic Preservation Act.*

■ Water and Hydrologic Resources and Fish and Aquatic Resources Monitoring Measures

The evaluation of effects on water quality, aquatic habitat, and fish populations would be based on criteria outlined by Forest Plan Monitoring Items 2-1 through 2-3, and 4-1 through 4-2 (Figure 2.4.5).

Water and Aquatic Resource Monitoring

Stream temperatures in selected streams would be monitored on a continuous basis during the summer months for a 5 year period.

Water quality and aquatic habitat conditions would be monitored under individual Mine Reclamation Plans for St. Louis Creek and the Flat Creek CERCLA site. Data would be shared with EPA and State Agencies.

Longitudinal profiles would be established above and below selected bridge and culvert installations and removals to determine gradient adjustments for a 5 year period.

Crest stage gauges installed in 2000 would continue to be monitored for approximately 5 years.

When harvest activities would occur in watersheds with high ECAs, monitoring would be conducted to ensure that Forest Plan Standard #19 is met.

Treatment activities, including timber harvest, road development and watershed restoration, would be monitored during and following activities in select areas based on proximity to stream channels and other high-risk areas.

Fish populations and habitat monitoring would be completed for 5 years above and below an area where riparian harvest had occurred on adjacent private lands to assess cumulative effects.

Fish population and habitat inventories would be completed on Johnson Creek to determine fish population reestablishment. R1/R4 sampling criteria would be used to

assess percent surface fines, stream bank stability and habitat quality.

Selected sites and stream reaches would be monitored for fish populations and habitat before and after removal and replacement of culverts to determine whether objectives for establishing fish connectivity were achieved.

Gravel source site reclamation would be monitored for 3 years to assess the potential for water routing, pooling, and ponding.

Figure 2.4.5. Water and Aquatic Resource Monitoring. *The evaluation of effects on water quality, aquatic habitat, and fish populations would be based on criteria outlined by the Forest Plan.*

■ Fire, Fuels and Air Quality Monitoring Measures

The evaluation of fire, fuels and air quality would be based on criteria outlined by Forest Plan Monitoring Items 11-1 through 11-3. See Figure 2.4.6.

Fire, Fuels, and Air Quality Monitoring

All prescribed burning would follow approved prescribed burn plans and would be implemented so that every effort is made to achieve air quality standards and allow for good smoke dispersion. Air quality would be monitored and evaluated during the burning activities and during Forest Plan monitoring.

Burn plans and detailed burn prescriptions would be developed with input from a certified silviculturist. Fuel and soil moisture conditions would be monitored prior to burning to ascertain that the burning window was within prescription objectives for protection of soil quality and fuels reduction.

Figure 2.4.6. Fire, Fuels and Air Quality Monitoring. *The evaluation of fire, fuels and air quality would be based on criteria outlined by the Forest Plan.*

■ Infrastructure and Improvements Monitoring Measures

The evaluation of the effectiveness of road closures, reconstruction and Best Management Practices would be based on criteria outlined by Forest Plan Monitoring Items 7-1 through 7-4. Refer to Figure 2.4.7.

Infrastructure Monitoring

Monitoring would be conducted under the deferred maintenance plan schedule to determine the effectiveness of road closures and gate installations and to correct or repair vandalism.

Culvert replacements would be monitored under the deferred maintenance plan schedule to assess stability and proper function and to determine if energy dissipaters were functioning adequately.

Areas disturbed during road reconstruction, closures and installation of BMPs would be monitored following one growing season to ensure regeneration success and need for additional seeding.

Areas disturbed during road reconstruction, closures and installation of BMPs would be monitored for one year to determine needs for additional soil stabilization measures.

Temporary sediment devices (e.g. sediment fence) would be monitored during use to ensure effectiveness or need for repairs. These devices would also be monitored following activities to determine suitability for removal.

Annual inspections would be completed as part of routine road maintenance and during sale activities before the winter and following large rainfall events to assess need for emergency repairs or improvement of BMPs.

Figure 2.4.7. Infrastructure Monitoring. *The evaluation of the effectiveness of road closures, reconstruction and Best Management Practices would be based on criteria outlined by the Forest Plan.*

■ Vegetation and Forest Resources Monitoring Measures

The evaluation of vegetation management would be based on criteria outlined by Forest Plan Monitoring Items 3-1 through 3-16 (Figure 2.4.8).

Vegetation and Forest Resources Monitoring

Silvicultural prescriptions for each unit would require that Lolo National Forest Plan standards be met. A certified silviculturist would assure compliance with the prescriptions during sale preparation, contract administration, and post-harvest activities. Timber sale administration would monitor contractor performance of snag retention.

Regeneration success in harvested areas and unharvested areas would be monitored and additional reforestation treatments would be implemented until stands met certification standards identified in silvicultural prescriptions.

Transects would be completed in burned areas to determine regeneration success and species composition. Where "at-risk" species were not establishing in selected habitat types, planting would occur.

Figure 2.4.8. Vegetation and Forest Resources Monitoring. *The evaluation of vegetation management would be based on criteria outlined by the Forest Plan.*

■ Threatened, Endangered, and Sensitive Plants Monitoring Measures

The evaluation of effects would be based on criteria outlined by the Lolo National Forest Sensitive Plant Survey Strategy (USDA Forest

Service 2000) (Figure 2.4.9). Areas with known TES plant populations would be monitored prior to and following harvest and prescribed burning activities.

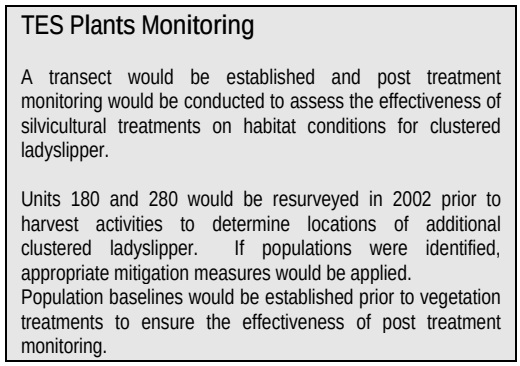


Figure 2.4.9. TES Plants Monitoring. *The evaluation of effects would be based on criteria outlined by the Lolo National Forest Sensitive Plant Survey Strategy.*

■ Noxious and Invasive Plant Species Monitoring Measures

The evaluation of the effectiveness of noxious weed treatments would be based on criteria outlined by the Big Game Winter Range and Burned Area Weed Management EIS (USDA Forest Service 2001), and by the Noxious Weed Management EIS (USDA Forest Service 1991). Refer to Figure 2.4.10. Monitoring would be conducted during treatments for effects on non-target species and for efficacy of treatments. Additional information on monitoring for noxious and invasive plant species is outlined within the above documents.

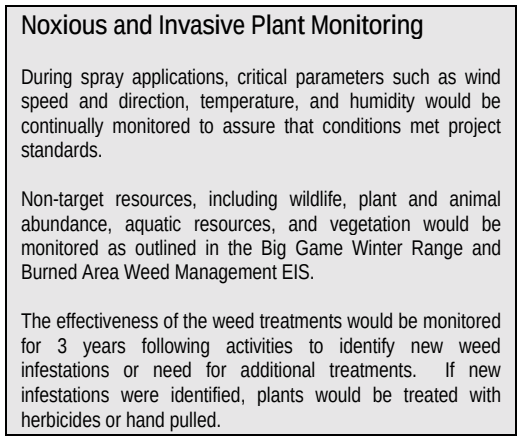


Figure 2.4.10. Noxious and Invasive Plant Monitoring. *The evaluation of the effectiveness of noxious weed treatments would be based on criteria outlined by the Big Game Winter Range and Burned Area Weed Management EIS (USDA Forest Service 2001), and by the Noxious Weed Management EIS (USDA Forest Service 1991.*

■ Wildlife Monitoring Measures

The evaluation of effects on wildlife would be based on criteria outlined by Forest Plan Monitoring Items 1-1 through 1-6 as described within Forest Service Manual 2672. See Figure 2.4.11.

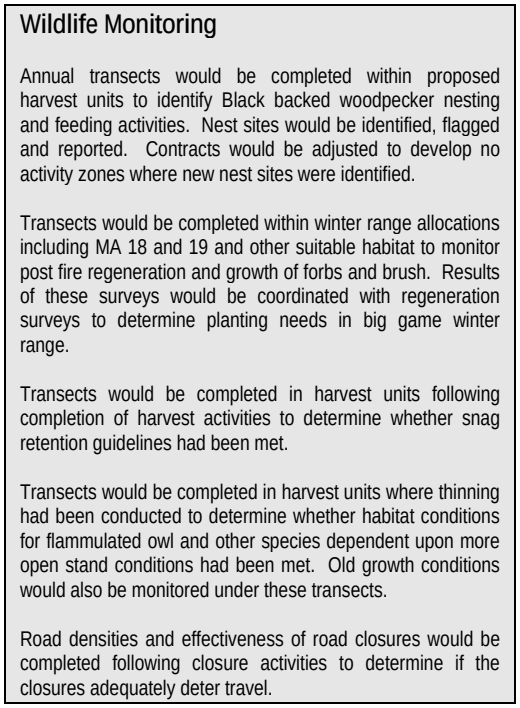


Figure 2.4.11. Wildlife Monitoring. *The evaluation of effects on wildlife would be based on criteria outlined by the Forest Plan.*

■ 2.5 Alternatives Considered but Eliminated from Detailed Study

During the review of internal and public issues, and development of alternatives, several variations to alternatives were considered by the Post Burn Interdisciplinary Team. Of the various alternatives considered, two alternatives were developed but eliminated from detailed study after closer assessment.

☐ 2.5.1 Alternative #3 - Restoration and Recovery with Non-Commercial Vegetation Treatments

Alternative #3 was drafted in response to the public's request for an alternative focusing on restoration and rehabilitation of forest resources without the sale of forest products that further private commercial gain from public lands. This alternative focused on the first two portions of the Purpose and Need: **"Restoration and Recovery of Watersheds"**; and **"Restoration and Recovery of the Land".** This alternative also featured the third component of the Purpose and Need: **"Working with People and Communities"**. Vegetation management and fuels treatments would have occurred within this alternative; however, only non-commercial activities would be used to achieve land management goals. Associated by-products of land management (e.g. commercial saw logs) would be left on site as coarse woody debris, used for off-site watershed and land restoration, or decked for use under the personal firewood collection program. No commercial "timber sales" would have been offered under this alternative.

The **"Restoration and Recovery of Watersheds"** activities were carried directly from Alternative #2 with no further modifications. This portion of this alternative was, therefore, a duplication of purpose and need.

Restricting vegetation and fuels treatments to non-commercial activities presented significant physical and economic limitations in response to the **"Restoration and Recovery of the Land"** purpose and need. The commercial thinning and nearly all of the prescribed burning activities of Alternatives #4, #5, and #6 were not directly transferable to Alternative #3. For instance, the commercial thinning could not be conducted without the timber sale. Most of the prescribed burning would be dependent upon timber harvests preparing the sites for burning. The following discussion clarifies the physical and biological reasons for eliminating Alternative #3 from further analysis.

First, non-commercial thinning to reduce bark beetle risk associated with overly dense (overstocked) live stands of host tree species, (without selling the thinned saw log sized product) would not be economically feasible, effective, or practical. There would be no economically realistic method to remove the thinned saw log material from the site non-commercially. The cost of removing the logs or trying to cut, pile and burn them would also be cost prohibitive.

Thinning and leaving the saw log sized material would have other complications. Cut saw logs, left on site, would attract Douglas-fir beetles and *Ips* species of bark beetles, which reproduce in fresh slash. This could increase bark beetle populations and increase the risk of future infestations in the thinned stands and adjacent stands. Increased bark beetle caused tree mortality is already a problem; this treatment would exacerbate the problem. Doing no thinning at all would also increase the potential for bark beetle epidemics by the perpetuation of the high-risk stand conditions.

Thinning live saw log-sized trees and leaving the commercial material in the forest would not meet Lolo National Forest Plan goals and standards, especially for commercially (timber) suitable management areas. Forest Plan Goal #1 is to "provide a sustained yield of timber and other outputs at a level that will help support the economic structure of local communities and provide for regional and national needs." In addition, a major goal for timber suitable management areas is to "provide for healthy stands of timber." This would not be achieved by leaving logs that would increase the risk of beetle infection in the treated and adjacent stands.

Removal of saw log-sized fire-killed trees is viewed as a method of protecting soils in VRU 2 from potential adverse effects that could occur when large downed woody debris burns for long durations. Leaving this commercial saw log material in VRU2 would eliminate this potential benefit.

Attempting to prescribe burn overly dense saw log sized live stands to meet the **"Restoration and Recovery of the Land"** purpose and need would also be impractical. Closed canopy stands present difficult prescribed burn conditions. The shading effects of a closed tree canopy cause ground level fuels to retain moisture later into the spring. When the fuel bed is sufficiently dried, the fuel bed conditions are dry across much larger areas than the targeted treatment

area. This makes control of the prescribed fire much more difficult and costly.

In many years, by the time the fuel bed dries to prescribed burn parameters, the associated live understory vegetation has greened (increased fuel moistures from leaf emergence) to the point of greatly hindering fire spread.

A closed canopy also retards the beneficial effects of wind in carrying a prescribed fire across the target area while also more rapidly transporting heat through the canopy and dispersing smoke. Achieving understory brush and conifer removal objectives while protecting the overstory is much more difficult under a closed canopy. A fire hot enough to obtain understory objectives can quickly increase to a level, which exceeds acceptable levels of overstory mortality.

Additional stand replacement fire is not warranted in the post burn analysis area because the year 2000 wildfires replicated the historic levels of stand replacement fires and most of the non-lethal fires. Of the remaining non-lethal fire needs, or ecosystem maintenance burning to restore historic conditions, the primary need is in unburned stands or portions of stands in VRU 2. Most of these areas are eliminated by small size, juxtaposition to protected areas, northerly aspects, which present difficult prescribed fire control, or closed canopies. Only two sites, one in the Flat Fire, and one in the Ninemile Fire were identified in this alternative. These same sites are proposed for treatment in Alternatives #4, #5, and #6.

2.5.2 Alternative #6 – Proposed Action

Alternative #6 was drafted and presented to the public as the Proposed Action (see Chapter 1). This alternative was developed to respond to all of the land management opportunities identified within the *Lolo National Forest Burned Area Assessment (BAA)* (USDA Forest Service 2001). This alternative focused on all three portions of the Purpose and Need: **"Restoration and Recovery of Watersheds"**. **"Restoration and Recovery of the Land"**, and **"Working with People and Communities"**.

Within this alternative, vegetation management, including commercial thinning and salvage, would have occurred on the lower elevation, drier habitats referred to as Vegetation Response Unit #2 (VRU 2). Salvage would also have occurred within the higher elevation, cooler, moister habitats (VRUs 3-5) burned at moderate-high and high fire severities. Temporary roads would have been developed for vegetation management activities.

Although most of the activities identified within this alternative were feasible, additional field evaluations and analysis completed in the summer of 2001 determined some areas impractical to treat due to economic, social, and environmental constraints. Other opportunities, preliminarily identified using mapping, aerial photo interpretation, and Geographic Information System (GIS) technology were found to be inaccurate, therefore eliminating the possibility for action.

Internal, and public issues, "narrowed the field" for meeting the Purpose and Need, and helped to establish alternative "Design Criteria". The Design Criteria highlighted actual resource limitations (e.g. water quality, soils stability, wildlife security, economics) and helped to narrow the feasibility for alternatives. Alternative #6 did not meet the Design Criteria for resource protection in some areas.

2.6 Description of Relevant Past, Present, and Reasonably Foreseeable Future Actions Not Part of the Proposed Action

A variety of past actions has left the project area's resources in their present condition. Many of these actions have been related to human use of the land including logging, mining, grazing and transportation development. Others have been related to forest management, including fire suppression.

The management of both private lands and public lands within the project area is ongoing. Because of the fires, restoration work identified under the Burned Area Emergency Response Plan continues. Other management activities, including planting, pre-commercial thinning,

prescribed burning, and timber harvest, also continue in the project area.

2.6.1 Past Actions

Prior to Euro-American settlement, aboriginal inhabitants interacted with the resource setting in various ways, including periodic burning of the landscape to improve hunting, signal tribal movements, and maintain open transportation corridors through the forest. The imprint of these activities is less obvious on the landscape today due to almost 120 years of fire suppression, stand manipulation, and Euro-American development.

The most evident past actions include logging, mining, and road development.

■ Past Harvesting on National Forest Lands

Prior to the establishment of the Forest Reserves in 1905, many of the lower elevations of the project area were logged for mine and railroad timbers. Within the Ninemile Creek drainage, an extensive railroad network facilitated logging by Anaconda Copper Mining Company (ACMC). Within Flat, Johnson, and Trout Creeks, logging provided timbers to the Northern Pacific Railroad and local mining operations. Most logging activities were clearcut or high-grade systems where the larger, select trees were removed and skidded by mule, horse, oxen, or steam winch.

Following the establishment of the Forest Reserves, and later the Forest Service, logging continued at various intensities. Records available on the Lolo National Forest indicate timber sales throughout the project area between 1951 and 2001 (see Table 2.6.1 and Maps 2.6.1a and 2.6.1b). Logging activities between the 1950s and 1980s included both clearcut and selective systems where in some cases the larger, select trees were removed, and in other cases, a mix of trees was removed. Recent logging activities have included commercial thinning or selective cutting where the larger, select trees are left on site for forest health. Timber harvest that has occurred within the past 10 years (1990s to 2000) has been primarily oriented toward improving forest health, reducing visual effects from past logging, and providing small sale opportunities for the local job market. Additional information on Forest Service timber sales is displayed in Appendix D and in the Post Burn EIS Project File.

The effects of past logging on National Forest System lands are relevant to forest health, water quality and runoff timing, wildlife habitat, and landscape fragmentation where forest stands are threatened by insects, encroachment by less desirable species, or fire, and where wildlife nesting, foraging, and security continues to be affected by changes in forested conditions.

Table 2.6.1. Past Harvesting on National Forest Lands. *Records available on the Lolo National Forest indicate timber stand management throughout the project area between 1930 and 2001.*

HARVEST ACTIVITY	TREATMENT ACRES BY DECADE								TOTAL ACRES
	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2001	
Regeneration Harvest	0	0	808	7790	7065	3061	1616	0	20340
Intermediate Harvest	0	0	909	3369	3342	606	1130	14	9370
Reforestation	217	42	200	3400	9616	8646	5914	2951	30986
Stand Improvement	0	0	0	963	1666	527	267	295	3718
Fuels Treatments	0	0	389	1687	7056	7649	6117	8823	31721

■ Past Harvesting on Adjacent Private Lands

The majority of the private land within the Project Area Boundary had been managed prior to the fires of 2000 with both selective logging and clearcut logging practices.

In the Ninemile Drainage approximately 320 acres of a private patented mining claim had been clearcut at the mouth of Martina Creek. Selective logging had also been performed on 320 acres of private land at the mouth of Burnt Fork Creek. This second parcel was also selectively salvage logged following the fires, with operations being completed in the fall of 2001. Several patented mining claims along Ninemile Creek, near the confluence of Sawpit Creek and Nugget Creek, had also been high-grade logged in the past 5 years. Larger private land ownerships in Bird, Marion, and Little Bear Creeks had been selectively logged in the past, but have not had recent harvest activities.

Following the Flat Fire, salvage logging was conducted on approximately 900 acres of private industrial lands located in Idaho and Welch Gulches. Salvage operations were completed on these lands using a mixture of helicopter, skyline and tractor yarding methods. Most of the areas were left in a clearcut condition.

In the Trout Creek drainage, approximately 200 acres of private ground located near the mouth of the drainage were selectively harvested in 1999. The majority of this area was left in a seed tree condition. No harvesting on private land has been conducted since the fires in this drainage.

The effects of past logging on private land are relevant to forest health, water quality and runoff timing, wildlife habitat, and landscape fragmentation where forest stands are threatened by insects, encroachment by less desirable species, or fire, and where wildlife nesting, foraging, and security continues to be affected by changes in forested conditions.

■ **Grazing**

Four grazing allotments (approximately 50,427 acres) located within and adjacent to the Project Area have received grazing activity in the recent past (see Maps 2.6.2a and 2.6.2b). Active allotments include the Fire Creek and Sunrise allotments (approximately 9,367 acres). Both of these are outside the fire perimeters.

Both allotments within the project boundary are currently inactive. The Josephine-Butler allotment (approximately 5,871 acres) consists of one pasture and is located within the fire perimeters. Following the fires, the Josephine-Butler allotment was postponed indefinitely until range surveys determine that the area can support grazing again. The Upper Ninemile allotment (approximately 35,180 acres) has been inactive since 1991. Grazing may begin on this allotment again in two years. Additional information on grazing allotments is in Appendix D and the Post Burn EIS Project File.

The grazing allotments permit only low numbers of cows and are only used for short periods of time. Therefore, their impact on other resources is limited.
The effects of past grazing are relevant to forest health, soil stability, water quality and runoff timing, riparian area stability, wildlife habitat, and weed spread.

■ **Mining**

Although less obvious because of vegetation re-growth, mining has played a significant role in the history of the project area riparian areas. Between the 1860s and 1950s, much of the Ninemile, Flat, and Trout Creek drainages received both placer and lode mining. Additional information on past mining is displayed in Chapter 3 and within the Post Burn EIS Project File.

The effects of mining are relevant to aquatic health and hydrologic function where stream channels and banks are diverted by tailing piles, fish connectivity is impeded by diversions and dams, and toxic mine wastes continue to affect water quality.

■ **Road Development**

Road development remains one of the most obvious past activities in the project area. In most cases, early pathways, roads, and railroad corridors developed for mining and logging followed the path of least resistance, some very close to streams. Eventually, many of these routes became Forest Service system roads. Prior to use of diesel-electric engines, the railroads were a frequent source of wildfire ignitions.

Between the 1950s and 1970s, road building accelerated as timber harvesting increased in the project area. Many roads constructed during this period were intended to be abandoned, rather than become part of the system. Low standard "Jammer" roads, originally designed for short-reach cable logging and thus closely spaced on the hillside (250 to 700 feet apart), left some drainages with very high road densities. Where these roads bisect streams and draws, lack vegetation, or where vegetation was burned off by the fires of 2000, they are more prone to erosion and delivery of sediment to nearby streams. Where undersized culverts and road fills bisect streams, obstructions to fish passage and increased potential for fill failure exists.

In the last 10 years (1990s to 2000), very few new roads have been constructed. These are well located and engineered to minimize resource impacts. Road management has also increased within the project area. Best Management

Practices (BMPs) have been installed in various locations, improved road maintenance has reduced sediment delivery to nearby channels, and roads no longer needed have been closed. Due to budget constraints, road improvement activities such as these have been limited. Detailed information on Forest roads is displayed in the Post Burn EIS Project File.

The effects of roads are relevant to public recreation and land management. They are also relevant where roads continue to impact weed spread, water quality, fisheries habitat and connectivity, and wildlife security.

■ **Utility Development**

Utility development within the project area has been limited to overhead power lines. No gas or oil facilities are located on National Forest System Lands within the project area. A recent proposal (1998) to locate a fuel transportation facility (Yellowstone Pipeline) through the Ninemile Creek drainage was not selected as an alternative (USDA Forest Service 1999). One microwave tower is located northwest of Siegel Pass and is accessed by approximately ½ mile of road. This facility is served by a power line, which follows the Ninemile-Siegel Road (FR #412) from Montana Highway 135.

The Bonneville Power Administration (BPA) high voltage transmission line is the largest utility located within the project area. This power line (constructed in the 1980s) bisects First, Johnson, and Flat Creeks and is accessed by numerous road segments.

The effects of access roads and power line clearing, and the power line itself are relevant to weed spread, erosion and sediment delivery, wildlife disturbance, and logging safety and feasibility.

■ **Trail Reconstruction**

In the Ninemile Creek drainage, portions of the Burnt Fork and Reservation Divide trails were reconstructed following the fires of 2000. Reconstruction activities included tread improvement, installation of water bars, and rehabilitation of trail right-of-way damaged during fire suppression activities.

Additional work has been identified under this project to improve a stream crossing and reduce sediment delivery on the Burnt Fork Trail.

In the Trout Creek drainage, reconstruction work was completed in 2001 on the Trail Lake Trail. Reconstruction activities on this trail included tread improvement, installation of water bars, and trail clearing.

The effects of trail improvements are relevant to public recreation access, weed spread, water quality, and wildlife security.

■ **Mushroom and Special Product Harvest**

Prior to the fires of 2000, special products harvested from the project area included Christmas greenery (removal of green limbs only) and beargrass collection. Individual permits were also issued for personal Christmas tree cutting and firewood gathering.

Immediately following the fires, during 2001, personal and commercial mushroom picking accelerated within the fire perimeters. During the peak gathering period, portable toilet facilities were placed near camps and high use areas to reduce water contamination. In 2001, the Lolo National Forest issued 1,931 permits, both commercial and personal use, for an estimated total of 62,389 pounds.
The effects of these activities are relevant to public access, weed spread, soil stability, water quality, and wildlife disturbance.

■ **Tree Planting**

Immediately following the fires of 2000, existing tree plantations (areas previously planted) were seeded or replanted to reestablish forest stands on previously harvested areas (see Maps 2.6.3a and 2.6.3b). Both seeds and seedlings were provided from locally collected National Forest seed sources within similar elevation ranges and habitat types. Seed and seedlings included Douglas-fir, ponderosa pine and western larch tree species.

Within the Ninemile Fire, approximately 10 acres were planted in the fall of 2000 and approximately 357 acres were planted in 2001. Within the Flat and Landowner Fires, approximately 90 acres were planted and approximately 100 acres were seeded in the fall of 2000. During 2001, another 275 acres of

burned plantations were planted within these fire perimeters.

The effects of tree planting are relevant to vegetation health, and future forest productivity.

■ **Noxious Weed Treatments**

Past noxious weed treatments within the project area have been limited to ground based spraying of Forest roads, grazing allotments and private lands.

In the Ninemile Creek drainage, a grazing allotment between Ninemile Creek and Foothills Road has received spot spraying between the mid 1970s and the present. Roads associated with the Eustache Saddle and Red Devil Timber Sales were sprayed in 1996 and 1997. Most of the roads used for fire access in 2000 were sprayed for noxious weeds in the summer of 2001. Noxious weed spraying and monitoring have also occurred on approximately 320 acres of private land for the past 10 years or more.

In the First Creek drainage, weed spraying was completed on all open roads during 1999. Where post treatment monitoring displayed additional weed populations, follow up spot treatments were completed in 2000.

The effects of weed spraying are relevant to wildlife habitat, protection of sensitive, rare, threatened and endangered plant species, biodiversity, water quality, soil stability, and vegetation health.

■ **Prescribed Burning**

Historically, prescribed burning within the project area has been primarily used for site preparation following timber harvest activities. Within the past 5 years, however, prescribed burning has been used within the project area for wildlife winter range improvements (see Maps 2.6.5a and 2.6.5b).

Most recently, 900 acres of the Old Town and Blue Ridge timber sales in the Ninemile Creek drainage were prescribe-burned. These were primarily understory burns within stands harvested to improve open ponderosa pine stand conditions. Prescribed burning for urban interface and wildlife habitat was completed on approximately 2000 acres outside of the project area in 1999.

In the Trout, Eddy and Deep Creek drainages, prescribed burns were conducted for wildlife winter range improvements in the springs of 1999, 2000, and 2001.

In the Siegel Creek drainage, prescribed burning was also conducted for wildlife winter range improvements in 1999, 2000 and 2001. This burning will continue to be performed as opportunities arise as documented within the Cutoff Ecosystem Maintenance Burning EA (USDA Forest Service 2000).

The effects of prescribed burning are relevant to vegetation health, wildlife habitat, weed spread, water quality, air quality, and fuel conditions.

■ **Fire Suppression and Disturbance**

In addition to the effects of the fires themselves, fire suppression activities resulted in the disturbance of many areas (see Maps 2.6.6a and 2.6.6b).

Fire suppression activities included: (1) the use of open roads leading into and within the fire perimeters, (2) reopening roads previously vegetated prior to the fires for use as fire lines and access routes, (3) construction of dozer lines, (4) construction of hand lines, (5) clearing for safety zones, (6) use of helicopter landings, and (7) use of openings and meadows for staging equipment and personnel. Approximately 320 acres were disturbed by fire line construction and fire suppression activities (Figure 2.6.1).

Fire line Construction and Rehabilitation

Suppression Type	Miles	Acres
Hand and Control Line	32.89 miles	15.96 acres
Dozer Lines	61.09 miles	133.28 acres
Roads	78.29 miles	170.84

Figure 2.6.1 Fire line Construction and Rehabilitation. *Approximately 320 acres were disturbed by fire line construction.*

Streams and ponds near to the fires were used as dip sites for helicopters and for drafting of fire suppression water. Chemical retardant drops were also made in the fire perimeters. Approximately 770,000 gallons of retardant

where delivered to the four fires within the project area. Additional information on the contents and effects of fire retardants is discussed in Chapter 3 and 4 of this document.

Fire suppression efforts also included fuels reduction activities such as slashing of understory fuels in order to reduce flame length, and pre-ignition treatments such as back firing from established control lines. Both of the latter two treatments are included within the total fire severity descriptions and acres of areas burned (depending upon severity of burn) in Chapter 3.

Rehabilitation of areas disturbed during fire suppression activities was completed immediately after the fires, and in most cases, by fire suppression personnel. Restoration of hand lines included: (1) placing water bars on the hand lines to prevent surface erosion, (2) recontouring fire hand lines in proximity to streams and sensitive resources, and (3) seeding disturbed surfaces with winter wheat to reduce erosion until native seeds and roots within the soil germinated or sprouted.

Restoration of dozer lines and unclassified and classified roads that were vegetated prior to the fires included: (1) scarification or recontouring of the disturbed area, (2) placement of slash over the disturbed area, (3) seeding the disturbed area with winter wheat to reduce erosion until native seeds and roots within the soil germinated or sprouted. Stream crossings, including locations where culverts existed, were removed and recontoured to approximate the natural slope position.

Where open roads were used for fire suppression purposes, dust abatement, including water and magnesium or calcium chloride were used to reduce development of surface fines which could lead to increased runoff and road surface damage. Post fire maintenance, including surface blading was also completed on roads that would remain open following the fires. Post fire road treatments are described in detail in Chapter 3.14.

Additional information on fire suppression activities is displayed in Appendix D.

■ Post Fire and Burned Area Emergency Rehabilitation (BAER)

Immediately following the fires of 2000, rehabilitation was completed on fire lines, safety zones, and other areas disturbed during fire suppression activities. Suppression restoration activities included: (1) water barring and seeding hand lines, (2) scarifying (and in some situations, recontouring), placement of debris, mulching, and seeding of dozer lines, (3) scarifying, placement of debris, seeding, and planting of safety zones, and (4) restoration of sites used for staging equipment and personnel.

Following these activities, emergency restoration activities were begun in order to stabilize the burned areas and prevent catastrophic impacts to water quality, soils, and road resources within the burned areas. This emergency work included: (1) removal of undersized culverts and fills on classified and unclassified roads, (2) scarification of road surfaces, (3) recontouring of roads, (4) replacement of undersized culverts on classified roads, (5) installation of Best Management Practices on classified roads, (6) contour felling, mulching, and (7) riparian planting. Most of this work was completed in the fall of 2000 and the summer of 2001 (Figure 2.6.2). Additional work, including culvert replacements, will continue in the summer of 2002. Detailed information on these activities is included within the Post Burn EIS Project File and Burned Area Emergency Rehabilitation Project File.

Burned Area Emergency Rehabilitation Treatments

Treatment Type	Quantity Treated
Land Treatments	
Jammer Road Fill Removal	63 crossings
Jammer Road Surface Treatments	27 miles
Jammer Road Recontouring	8 miles
Log Erosion Barriers	115 acres
Shrub Planting	4 miles
Erosion Control Seeding	3703 acres
Erosion Control Straw Wattles	400 feet
Channel Treatments	
Restore Capacity	4000 feet
Road and Trail Treatments	
Road Fill Removal	38 crossings
Road Surface Drainage	54 miles
Road Recontouring	7 miles
Road Culvert Replacement	24 culverts
Trail Water Bars	232 waterbars
Trail bed Drainage	5 miles
Trail Hazard Signs	2 signs

Trail Hazard Tree Removal	13 miles
Cultural Treatments	
Heritage Site Protection	1 site
Heritage Site Survey	1 survey
Monitoring and Evaluation	
Survey and Assessment	2 documents
Stream Discharge	1 mile
Runoff Dispersion Treatments	3 surveys
Grass Seeding Effectiveness	3 surveys
Shrub Planting Effectiveness	2 surveys
Stream Morphology	12 miles
Water Quality Survey	14 samples
Hillslope Treatment Effectiveness	1 survey
Seral Tree Planting Effectiveness	1 survey
Weed Survey	1 survey

Figure 2.6.2 Burned Area Emergency Rehabilitation. *Emergency restoration activities were begun in order to stabilize the burned areas and prevent catastrophic impacts to water quality, soils, and road resources within the burned areas.*

The effects of these activities are relevant to soil stability, weed spread, water quality, fisheries habitat and connectivity, and wildlife security.

2.6.2 Present and Reasonably Foreseeable Future Actions

■ Harvesting on National Forest Lands

Two timber sales are planned or presently active within the project area (Figure 2.6.3 and Map 2.6.7). Both are occurring within the Ninemile Creek drainage.

Ongoing Timber Sales

Shapes and Feathers Timber Sale

Sale includes patch shelterwood, irregular shelterwood and commercial thinning on approximately 232 acres. Units are designed to improve aesthetics of past harvesting. Sale also includes road closures and BMPs on existing roads. Some units are located within the Alpine Fire Perimeter.

Starkhorse Timber Sale

The majority of this sale is located outside of the Post Burn project area in the Ninemile Creek drainage, however approximately 10 acres of harvesting are located within the Post Burn project area including small round wood and post and pole removal in Bird Creek.

Figure 2.6.3. Ongoing Timber Sales. *Three timber sales are planned or presently active within the project area.*

The effects of these and future sales on National Forest System lands are relevant to forest health, water quality and runoff timing, wildlife habitat, and landscape fragmentation where forest stands are threatened by insects, encroachment by less desirable species, or fire, and where wildlife nesting, foraging, and security continues to be affected by changes in forested conditions.

■ Harvesting on Adjacent Private Lands

No additional harvesting is occurring or foreseen in the project area. Most of the private land within the project area was salvage logged immediately after the fires (PCTC, personal communication).

The effects of ongoing and future harvesting on private land are relevant to forest health, water quality and runoff timing, wildlife habitat, and landscape fragmentation where forest stands are threatened by insects, encroachment by less desirable species, or fire, and where wildlife nesting, foraging, and security continues to be affected by changes in forested conditions.

■ Precommercial Thinning on National Forest Lands

Precommercial thinning includes the removal of less dominant or less desirable tree species and lopping and scattering the cut limbs and boles. Most of the trees cut are between five and fifteen feet tall, and 1 to 4 inches in diameter. All work is done by hand, without mechanical disturbance of the areas treated.

Approximately 55 acres of plantations located in the Ninemile Drainage will be precommercially thinned in 2002. Another 100 acres are proposed to be thinned in the next three years.

The effects of ongoing and future precommercial thinning are relevant to forest health, future timber stands, wildlife habitat, and fuels.

■ Grazing

No grazing is anticipated in the next two years. Grazing activities on the Ninemile Allotment have been suspended until post-fire monitoring of the area can be completed and it is determined that grazing would be possible without effects on other resources.

The effects of ongoing and future grazing are relevant to forest health, soil stability, water quality and runoff timing, riparian area stability, wildlife habitat, and weed spread.

■ **Mining**

Although several Plans of Operation are valid, no mining operations are presently occurring on National Forest System lands within the project area. Ongoing placer mining on private land within the Trout Creek drainage is, however, anticipated to continue.

In the Trout Creek drainage, four Plans of Operation are in place or are being reviewed by the Forest at this time. Three mine operations are in the Deep Creek watershed and one is along the banks of Trout Creek.

Because of the loss of vegetation, erosion in some areas could increase the potential for release of mineral matter, such as gold, that will concentrate in placer deposits. Therefore, additional minerals exploration is anticipated in the future, especially within areas burned by the fires of 2000.

It is expected that this could occur in several of the drainages that have favorable diagnostics and mineral ratings. All minerals development would be assessed by the Forest and require approved Plans of Operations.

In the Flat Creek drainage, ongoing mine waste sampling and cleanup efforts associated with the Iron Mountain Mine will continue. It is anticipated that a large mine waste cleanup project will be planned within the next 10 years in this drainage. This project would likely include removal and confinement of arsenic-laden tailings, and restoration of the stream channel and riparian areas.

The effects of ongoing and future mining and mine site reclamation are relevant to aquatic health and hydrologic function where stream channels and banks are diverted by tailing piles, fish connectivity is impeded by diversions and dams, and toxic mine wastes continue to affect water quality.

■ **Road Development**

No road development is occurring on National Forest System or private lands within the project area, other than road BMP work associated with ongoing National Forest timber sales. Road maintenance activities, including road grading, drainage repairs, and roadside brushing, are the only activities anticipated on Forest roads in the near future.

The effects of road development are relevant to public recreation and land management. It is also relevant where roads continue to impact weed spread, water quality, fisheries habitat and connectivity, and wildlife security.

■ **Utility Development**

No utility development is ongoing or anticipated in the project area. Maintenance that requires access on existing roads is the only activity anticipated. Future development would require additional environmental analysis and permitting.

The effects of ongoing maintenance and future development of utilities are relevant to weed spread, erosion and sediment delivery, wildlife disturbance, and logging safety and feasibility.

■ **Trail Reconstruction and Development**

No trail reconstruction or development is occurring or proposed within the project area. Maintenance activities, however, are expected to increase in areas where the fire burned across existing trail systems.

The effects of trail improvements are relevant to public recreation access, weed spread, water quality, and wildlife security.

■ **Mushroom and Special Product Harvest**

Special products harvested from the project area, including Christmas greenery (removal of green limbs only) and Beargrass collection, are anticipated to continue within areas not burned by the fires of 2000. These activities require annual permitting on a case-by-case basis. Individual permits may also be issued for personal Christmas tree cutting and firewood gathering.

Firewood removal is anticipated to increase after 3 to 5 years. Due to the results of monitoring of these activities in 2001, additional “no-firewood cutting” signs will be installed near riparian areas and law enforcement efforts will be increased to prevent damage to riparian areas.

Mushroom picking is also anticipated to continue within the fire perimeters, permitted on a case-

by-case basis. In 2002, 102 permits had been issued as of June, 2002, for an estimated total of 190 pounds. Only one of those permits for 2002 was for commercial use. Due to the results of monitoring of these activities in 2001, campsites will be relocated away from riparian areas. Depending upon use levels, portable sanitary stations will be installed again in high use areas.

The effects of these activities are relevant to public access, weed spread, soil stability, water quality, and wildlife disturbance.

■ **Tree Planting and Reforestation**

In the Flat and Landowner fires, approximately 1000 acres of plantations and severely burned areas will be replanted. This work will be completed in the spring of 2002.

In the Ninemile drainage, approximately 500 acres of burned plantations will be planted in the spring of 2002. An additional 1600 acres of severely burned areas will be planted between 2002 and 2005.

In the Siegel Creek drainage, approximately 80 acres of severely burned areas will be planted in the spring of 2002.

Seedlings will be provided from locally collected National Forest seed sources within similar elevation ranges and habitat types. Seed and seedlings included Douglas-fir, ponderosa pine and western larch tree species (see Maps 2.6.3a and 2.6.3b).

The effects of tree planting are relevant to vegetation health, and future forest productivity.

■ **Site Preparation Treatments**

Site preparation treatments, including hand scalping and application of hexazinone herbicides around tree seedlings would occur on approximately 325 acres in the Flat and Landowner Fires (see Maps 2.6.3a and 2.6.3b).

These activities are being conducted in order to reduce vegetative competition around plantation seedlings planted to replace trees lost to fire in 2000. Site treatments would occur between 2002 and 2009.

Additional information on these treatments is located in the Lolo Forest-Wide Site Preparation and Reforestation Environmental Assessment (USDA Forest Service 2001).

■ **Noxious Weed Treatments**

Approximately 7,545 acres of the project area will be treated for noxious weeds under the Lolo National Forest Big Game Winter Range and Burned Area Weed Management EIS (USDA Forest Service 2001) (see Maps 2.6.4a and 4b).

In the Ninemile and Alpine Fires, approximately 4,741 acres will be sprayed using aerial and ground based equipment. Roadside spraying on established haul routes of the Shapes and Feather Timber Sale will also continue for the next three to five years. Approximately five acres in the McCormick Creek drainage, used as helispots for the Shapes and Feather sale, will also be sprayed and monitored.

Approximately 500 acres of private land and County road right-of-way adjacent to the Ninemile Fire perimeter or affected by fire suppression activities will also be sprayed. Weed management activities on private and county lands are being implemented under the Ninemile Weed Management Area Plan (Montana Department of Land Resources and Environmental Sciences, 2001). Weed management efforts on National Forest System lands and private and County lands will be coordinated through the Ninemile Weed Management Area Plan (Montana Department of Land Resources and Environmental Sciences 2001).

In the Flat Fire, approximately 2,005 acres of National Forest System lands will be sprayed using aerial and ground based equipment. Spraying within the fire perimeter will occur on areas allocated to MAs 18 and 19, big game winter range.

Approximately 240 acres of private land and County road right-of-way adjacent to the Flat Fire perimeter or affected by fire suppression activities will also be sprayed. Weed management activities on private and county lands are being implemented under the Flat Creek Weed Management Area Plan (Montana Department of Land Resources and Environmental Sciences 2001). Weed management efforts on National Forest System lands and private and County lands will be

coordinated through the Flat Creek Weed Management Area Plan.

Approximately 799 acres will be sprayed on the Landowner Fire. These areas are also considered to be high value big game winter range.

It is anticipated that spraying of winter range areas will occur over the next three years.

The effects of weed spraying are relevant to wildlife habitat, protection of sensitive, rare, threatened and endangered plant species, biodiversity, water quality, soil stability, and vegetation health.

■ Prescribed Burning

In the Ninemile Creek drainage, it is anticipated that approximately 100 acres would be prescribe-burned for site preparation in units of the Shapes and Feathers timber sale. These activities would occur within the perimeter of the Alpine Fire.

Prescribed ecosystem burning may also occur in the next two or three years on identified big game winter range in the Trout Creek and Siegel Creek drainages. These activities would occur outside of the fire perimeters (see Maps 2.6.5a and 5b).

The effects of prescribed burning are relevant to vegetation health, wildlife habitat, weed spread, water quality, air quality, and fuel conditions.

■ Post Fire and Burned Area Emergency Rehabilitation

BAER watershed restoration activities and monitoring will continue through 2002 and conclude in 2003. Restoration activities will include the replacement of several large culverts in the Ninemile Creek drainage and road stabilization work in the Flat Creek and Johnson Creek drainages. Detailed information on these activities is included within the Post Burn EIS Project File and Burned Area Emergency Rehabilitation Project File.

The effects of these activities are relevant to soil stability, weed spread, water quality, fisheries habitat and connectivity, and wildlife security.

Additional information on past, ongoing, and reasonably foreseeable activities is in Appendix D and in the Post Burn EIS Project File.

■ 2.7 Summary Comparison of the Activities, the Predicted Achievement of the Project Objectives and the Predicted Environmental Effects of All Alternatives

□ 2.7.1 Introduction

The effects of the alternatives on the human environment vary according to the location and quantity of activities proposed in each alternative. The alternatives can be compared quantitatively and qualitatively by: (1) their activities, (2) how they meet the Purpose and Need, (3) their response to the driving issues, and (4) their effects on individual resources.

The summary comparison of the alternatives provides a clear basis of choice between alternatives for the Forest Supervisor and the public. The comparison of alternatives is supplemented by information on existing resource conditions displayed in Chapter 3, and by detailed analysis of the effects of the alternatives on each resource as displayed within Chapter 4 and within the Specialist Reports documented in the Post Burn EIS Project File.

□ 2.7.2 Comparison of Alternative Activities

Because each alternative was designed to address various driving issues, the types and quantity of activities varies by alternative. The following table provides a comparison of the quantity of treatments that would occur under each alternative. This information provides a baseline for the ability for each alternative to meet the purpose and need of the project, the ability for the alternatives to respond to issues, and the effects of the alternatives on individual resources.

Table 2.7.1. Comparison of Alternative Activities. *The activities provide a baseline for the ability of each alternative to meet the purpose and need of the project, the ability for the alternatives to respond to issues, and the effects of the alternatives on individual resources.*

Comparison of Alternative Activities

Restoration and Recovery of Watersheds	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Soil Stabilization	0 acres	1262 acres	1262 acres	1262 acres
Riparian Planting	0 acres	38 acres	38 acres	38 acres
Dam Rehabilitation with Stream Restoration	0 dam 0 acres 0 mile stream	1 dam 10 acres ½ mile stream	1 dam 10 acres ½ mile stream	1 dam 10 acres ½ mile stream
Mine Reclamation with Stream Restoration (includes potential CERCLA qualified sites)	0 mines 0 acres 0 miles stream	4 mines 127 acres 2 ¼ miles stream	4 mines 127 acres 2 ¼ miles stream	4 mines 127 acres 2 ¼ miles stream
Trail Stabilization	0 miles 0 stream crossing	½ mile 1 stream crossing	½ mile 1 stream crossing	½ mile 1 stream crossing
Road Reconstruction and BMPs with Allocated $s	0 miles	279 miles	191 miles	163 miles
Road Reconstruction and BMPs with Timber Sale $s	0 miles	0 miles	107 miles	123 miles
Culvert Removals and Replacements with Stream Restoration (approximately 100 feet per culvert)	0 culverts 0 miles stream	108 culverts 2 miles stream	108 culverts 2 miles stream	108 culverts 2 miles stream
Road Closures and Decommissioning	0 miles (total)	228 miles (total)	225 miles (total)	225 miles (total)
Open to Scarified / Culverts Removed	0 miles	72 miles	70 miles	70 miles
Open to Recontoured	0 miles	26 miles	26 miles	26 miles
Gated to Scarified / Culverts Removed	0 miles	80 miles	80 miles	80 miles
Gated to Partially Recontoured / Culverts Removed	0 miles	2 miles	2 miles	2 miles
Gated to Recontoured	0 miles	13 miles	13 miles	13 miles
Partially Vegetated to Scarified / Culverts Removed	0 miles	21 miles	21 miles	21 miles
Partially Vegetated to Recontoured	0 miles	14 miles	14 miles	14 miles
Gravel Source Development and Reclamation	0 sites	1 site	1 site	1 site

Restoration and Recovery of the Land	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Commercial Thinning and Salvage in Burned and Unburned VRU 2, 3 and 4	0 acres	0 acres	1892 acres (only VRU 2)	2470 acres
Regeneration Monitoring & Planting “at-risk” Species	0 acres	0 acres	12916 acres	12916 acres
Road Travel Management Restrictions (Gated Roads)	0 miles (total)	11 miles (total)	34 miles (total)	14 miles (total)
Open to Yearlong A Restriction	0 miles	0 miles	13 miles	0 miles
Open to Yearlong B Restriction	0 miles	0 miles	7 miles	0 miles
Open to Seasonal E Restriction	0 miles	3 miles	11 miles	6 miles
Open to Seasonal J Restriction	0 miles	8 miles	3 miles	8 miles
Prescribed Burning and Post Harvest Fuels Treatment	0 acres	0 acres	934 acres	1686 acres
Weed Treatments Along Roads and Disturbed Areas	0 miles (0 acres)	503 miles (1829 acres)	521 miles (1895 acres)	509 miles (1851 acres)

Working with People and Communities	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Timber Salvage in Burned VRU 2, 3 and 4	0 acres	0 acres	0 acres	2322 acres

Comparison of Alternative Activities				
Timber Salvage of Insect-killed Timber Adjacent to Fire Perimeters	0 acres	0 acres	41 acres (only VRU 2)	79 acres
Temporary Road Construction	0 miles	0 miles	0 miles	1.7 miles
Heritage Site Interpretation and Interpretation Routes	0 sites 0 miles	3 sites 39 miles	3 sites 39 miles	3 sites 39 miles

2.7.3 Achieving the Purpose and Need

Because each alternative was designed to address various driving issues, the types and quantity of activities in each alternative provide different levels of meeting the purpose and need.

The following table displays the levels that each alternative meets the objectives of the purpose and need.

Table 2.7.2. Comparison of Achieving the Purpose and Need. *Because each alternative was designed to address various driving issues, the types and quantity of activities in each alternative provide different levels of meeting the purpose and need.*

Comparison of Achieving the Purpose and Need				
Objectives for Restoration and Recovery of Watersheds	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Improve hydrologic, riparian, and stream channel conditions including channel stability, drainage patterns, and runoff timing.	No – Watershed restoration, culvert removals and replacements, road reconstruction, and road closures would not occur. Ongoing BAER restoration would improve hydrologic, riparian, and stream channel conditions.	Yes – Riparian planting, dam rehabilitation, mine reclamation, trail crossing stabilization, culvert removals and replacements, road reconstruction, and road closures would be conducted to improve hydrologic, riparian, and stream channel conditions. These activities would be supplemented by ongoing BAER restoration and road maintenance activities.	Yes – Riparian planting, dam rehabilitation, mine reclamation, trail crossing stabilization, culvert removals and replacements, road reconstruction, and road closures would be conducted to improve hydrologic, riparian, and stream channel conditions. These activities would be supplemented by ongoing BAER restoration and road maintenance activities.	Yes – Riparian planting, dam rehabilitation, mine reclamation, trail crossing stabilization, culvert removals and replacements, road reconstruction, and road closures would be conducted to improve hydrologic, riparian, and stream channel conditions. These activities would be supplemented by ongoing BAER restoration and road maintenance activities.
Improve in-stream aquatic habitat including condition and connectivity in order to facilitate recovery of local native salmonids populations.	No – Watershed restoration, culvert removals and replacements, road reconstruction, and road closures would not be conducted. Ongoing BAER restoration and road maintenance would be used to improve in-stream habitat conditions and	Yes – Riparian planting, dam rehabilitation, mine reclamation, trail crossing stabilization, culvert removals and replacements, road reconstruction, and road closures would be conducted to improve in-stream habitat and	Yes – Riparian planting, dam rehabilitation, mine reclamation, trail crossing stabilization, culvert removals and replacements, road reconstruction, and road closures would be conducted to improve in-stream habitat and	Yes – Riparian planting, dam rehabilitation, mine reclamation, trail crossing stabilization, culvert removals and replacements, road reconstruction, and road closures would be conducted to improve in-stream habitat and

Comparison of Achieving the Purpose and Need

	connectivity.	connectivity. These activities would be supplemented by ongoing BAER restoration and road maintenance activities.	connectivity. These activities would be supplemented by ongoing BAER restoration and road maintenance activities.	connectivity. These activities would be supplemented by ongoing BAER restoration and road maintenance activities.
Protect soil properties and stability including risk to erosion, vegetative cover, soil organic content, and damaged soil surface layers in order to provide for long-term soil quality and site productivity.	No – Soil stabilization measures would not be conducted. Completed fire suppression restoration activities and ongoing BAER restoration and road maintenance would protect soil properties.	Yes – Soil stabilization measures would be conducted in areas of high burn severity. Road reconstruction, BMPs, road closures, and travel management restriction would be conducted to reduce erosion. These activities would be supplemented by completed fire suppression restoration activities, ongoing BAER restoration, and road maintenance activities.	Yes – Soil stabilization measures would be conducted in areas of high burn severity. Road reconstruction, BMPs, road closures, and travel management restriction would be conducted to reduce erosion. Design Criteria, Mitigation Measures, and Monitoring Methods would be used to protect soil properties during timber harvest. These activities would be supplemented by completed fire suppression restoration activities and ongoing BAER restoration.	Yes – Soil stabilization measures would be conducted in areas of high burn severity. Road reconstruction, BMPs, road closures, and travel management restriction would be conducted to reduce erosion. Design Criteria, Mitigation Measures, and Monitoring Methods would be used to protect soil properties during timber harvest. These activities would be supplemented by completed fire suppression restoration activities and ongoing BAER restoration.
Provide for a transportation system that better reflects current access needs and resource concerns, and reduces economic burdens associated with maintaining unneeded roads.	No – Road reconstruction, BMPs, road closures, and travel management restrictions would not occur. Ongoing road maintenance and BAER restoration projects would be used to manage the transportation system.	Yes – Road reconstruction, BMPs, road closures, and travel management restrictions would be conducted to improve the existing transportation system and reduce the effects of the system on other resources. These activities would be supplemented by ongoing road maintenance and BAER restoration projects.	Yes – Road reconstruction, BMPs, road closures, and travel management restrictions would be conducted to improve the existing transportation system and reduce the effects of the system on other resources. These activities would be supplemented by ongoing road maintenance and BAER restoration projects.	Yes – Road reconstruction, BMPs, road closures, and travel management restrictions would be conducted to improve the existing transportation system and reduce the effects of the system on other resources. These activities would be supplemented by ongoing road maintenance and BAER restoration projects.

Comparison of Achieving the Purpose and Need

Objectives for Restoration and Recovery of the Land	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Improve vegetation structure in order to reduce future fire intensity, reduce the potential for epidemic bark beetle infestations in "at-risk stands, improve habitat for flammulated owls, and enhance the potential for old growth forest conditions in low elevation drier forest habitats.	No – Commercial thinning, prescribed burning and other vegetation management activities would not be conducted to enhance stand density, structure, or composition.	No – Commercial thinning, prescribed burning, and other vegetation management activities would not be conducted to enhance stand density, structure, or composition.	Yes – Commercial thinning, prescribed burning, and salvage activities would be used to reduce stand densities, reduce fuels, and change composition in VRU 2 stands only.	Yes – Commercial thinning, prescribed burning, and salvage activities would be used to reduce stand densities, reduce fuels, and change composition in VRUs 2, 3 and 4 stands.
Minimize establishment and spread of non-native weed species to areas impacted by fire and fire suppression activities.	No – Weed control and management measures would not be implemented. Other Forest, County, State, and private weed control projects are relied upon to implement weed control and management.	Yes – Roadside spraying, road closures, and travel management restrictions would be used to control and manage weed species. These measures would be supplemented by other Forest, County, State, and private weed control projects. Weed management efforts described in the Big Game Winter Range and Burned Area Weed Management EIS would be tiered to with proposed roadside weed spraying.	Yes – Roadside spraying, road closures, and travel management restrictions would be used to control and manage weed species. These measures would be supplemented by other Forest, County, State, and private weed control projects. Weed management efforts described in the Big Game Winter Range and Burned Area Weed Management EIS would be tiered to with proposed roadside weed spraying.	Yes – Roadside spraying, road closures, and travel management restrictions would be used to control and manage weed species. These measures would be supplemented by other Forest, County, State, and private weed control projects. Weed management efforts described in the Big Game Winter Range and Burned Area Weed Management EIS would be tiered to with proposed roadside weed spraying.
Reestablish or promote "at-risk" ponderosa pine, western larch and whitebark pine tree species and other sensitive plant species.	No – Planting and forest restoration activities would be conducted to reestablish or promote "at-risk" species.	No – Planting and forest restoration activities would be conducted to reestablish or promote "at-risk" species. Only natural regeneration would be used. Commercial thinning would not be conducted to promote "at-risk" or sensitive species in established stands.	Yes – Regeneration monitoring, and planting would be conducted in order to reestablish "at-risk" species where natural regeneration is unsuccessful. Commercial thinning and salvage would also be conducted to promote "at-risk" or sensitive species only in established VRU 2 stands.	Yes – Regeneration monitoring, and planting would be conducted in order to reestablish "at-risk" species where natural regeneration is unsuccessful. Commercial thinning and salvage in VRUs 2, 3, and 4, would be conducted to promote "at-risk" or sensitive species in established stands.
Objectives for Working with People and Communities	**Alternative 1**	**Alternative 2**	**Alternative 4**	**Alternative 5**
Protect and interpret cultural and historical resources in order to: (a) reduce risk to, damage, or loss by human disturbance, (b) enhance awareness of unique local historic features.	No – Protection and interpretation would not be provided at known sites or along local historic routes. Brochures would not be written to interpret lost	Yes –Protection and interpretation would be provided at identified sites and along routes. Brochures would be written to interpret lost resources.	Yes –Protection and interpretation would be provided at identified sites and along routes. Brochures would be written to interpret lost resources.	Yes –Protection and interpretation would be provided at identified sites and along routes. Brochures would be written to interpret lost resources.

Comparison of Achieving the Purpose and Need

	resources.			
Provide forest products to support local communities that continue to be associated with commodity outputs from the National Forest.	No – Forest products or jobs would not be created.	Yes – Although no forest products would be provided, forest jobs would be provided for conducting watershed restoration activities.	Yes – Forest products and jobs would be provided through timber harvest. Forest jobs would also be provided for conducting watershed and land restoration activities.	Yes – Forest products and jobs would be provided through timber harvest. Forest jobs would also be provided for conducting watershed and land restoration activities.

2.7.4 Response to Driving Issues and Resource Concerns

Each alternative was designed to respond to particular groupings of the Driving Issues. Because the effects of the alternatives are resource associated, they are described by resource. The driving issues associated with each resource heading are listed so the effects on the issue can be compared. Resource and issue comparisons are described in order of resource headings displayed in Chapters 3 and 4.

■ Range of Alternatives

Issue - PLAN 8: Proposed Alternatives

Indicator: Range of Alternatives that Address Issues

Six alternatives were developed to respond to: (1) public and internal issues, (2) resource conditions, and (3) the purpose and need for conducting post burn activities.

Three alternatives were designed to specifically reflect public requests for alternative designs. They included: Alternatives #2, #3, and #4.

Alternative #1 would respond to the public's request for conducting no post burn management actions.

Alternative #2 would respond to the public's request for an alternative that: (1) focused on the "remediation of the effects of past human development", (2) is "completely focused on restoration" and (3) "proposes no commercial vegetation management activities" or "removal of forest materials from the project area."

Alternative #3 would respond to the public's request for an alternative that "would propose no commercial vegetation management activities, and where vegetation management activities were needed they would be conducted through non-commercial means".

Alternative #4 would respond to the public's request for an alternative that would maximize biodiversity and wildlife habitat and have minimal harvest in actual/potential linkages and corridors and ecosystem connectivity areas.

Alternative #5 was developed to respond to general public comments for the development of alternatives that provided forest products and jobs to local communities.

Alternative #6, the proposed action, would respond to all opportunities identified by the Lolo Burned Area Assessment

Alternatives #3 and #6 were not analyzed in detail because they failed to meet established Design Criteria and existing resource conditions, or were predicted to have effects that did not meet Forest Plan standards or other resource protection laws.

■ Minerals and Mining

Issue – MINER 1: Historic Mining Impacts on Water Quality

Indicator: Mine Reclamation Projects

Alternative #1 would not directly respond to the need for reclamation of historic and abandoned mine sites that are adversely affecting water quality and aquatic health.

Alternatives #2, #4, and #5, equally respond to the issue for mine reclamation by proposing

reclamation of four mine sites. Reclamation activities on sites determined to qualify under the CERCLA would be implemented following additional toxicity analysis.

Table 2.7.3. Comparison of Mine Reclamation Activities. *Alternatives #2, #4, and #5, equally respond to the issue for mine reclamation by proposing reclamation of four mine sites.*

Comparison of Mine Reclamation Activities

	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Joe Waylett Mine (St. Louis Creek)	Not Conducted	83 acres ¾ mile stream	83 acres ¾ mile stream	83 acres ¾ mile stream
Eustache Creek Placer Mine	Not Conducted	2 acres ½ mile stream	2 acres ½ mile stream	2 acres ½ mile stream
Mattie V Creek Placer Mine	Not Conducted	2 acres ½ mile stream	2 acres ½ mile stream	2 acres ½ mile stream
Windfall Creek Placer Mine	Not Conducted	40 acres ½ mile stream	40 acres ½ miles stream	40 acres ½ mile stream

■ Soils

Issue – SOILS 1: Fires impacts on Chemical, Physical and Biological Components of Soil

Indicator: Compaction
Indicator: Rutting
Indicator: Displacement
Indicator: Severely Burned Soils
Indicator: Surface Erosion
Indicator: Soil Mass Movement
Indicator: Coarse Woody Debris

All alternatives, would maintain long-term soil productivity. Under Alternative #1, the recovery of the soil resource from the effects of the 2000 wildfires would take longer because no restoration activities would occur.

Under Alternative #1, surface coarse woody debris could increase in the short term. The intensity of future wildfire could be greater in VRU 2 stands where fuel treatment was not conducted. Future intense wildfires could potentially volatilize several soil nutrients and decrease long-term soil productivity in these stands.

Alternatives #2, #4, and #5 would improve soil quality by decreasing the detrimental impacts to the physical, chemical and biological characteristics of the soil through proposed restoration activities. Short-term impacts to soil quality, including compaction, displacement and rutting in areas disturbed by restoration activities would be reduced by mitigation measures.

Alternatives #4 and #5 could have short-term detrimental impacts to soils associated with tractor and skyline yarding in harvest units. Soil compaction, displacement, and rutting would be reduced by implementation of mitigation measures that prohibit equipment operation on wet soils and by requirements for post harvest restoration on sites disturbed during harvest activities. Temporary roads constructed under Alternative #5 would be fully rehabilitated following use.

Prescribed burning treatment activities associated with Alternatives #4 and #5 could also have short-term detrimental impacts to soil mycorrhizae. These impacts would be reduced by burning during the spring or fall when wind speed, air temperature, and soil and fuel moisture conditions were within prescription for maximum protection of the soil resource.

With the implementation of mitigation measures, none of the short-term or long-term effects of Alternatives #2, #4, and #5 would exceed soil quality standards.

Table 2.7.4. Comparison of Effects on Soils. *With the implementation of mitigation measures, none of the short-term or long-term effects would exceed soil quality standards.*

Comparison of Effects on Soils

	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Maintain Short-Term Soil Productivity	No	Yes	Yes	Yes
Maintain Long-Term Soil Productivity	Yes	Yes	Yes	Yes
Percent Detrimental Soil Criteria (measured as average percent of activity areas)	12 % (total)	< 5 % (total)	< 5 % (total)	< 5 % (total)
Range of Coarse Woody Debris Remaining	3 to greater than 33 tons/acre	5 to 33 tons/acre	5 to 33 tons/acre	5 to 33 tons/acre
Harvest Activities on High Burn Severity Soils	0 acres	0 acres	20 acres	72 acres
Ground Based Yarding on Soils Susceptible to Compaction, Displacement, and Rutting	0 acres	0 acres	66 acres	410 acres

■ Visual Resources

Issue: (No Driving Issues Identified)

In many locations, the wildfires of 2000 reduced the visual contrasts created between old harvest units and the surround unharvested forest. The fires created large patch sizes that are more characteristic of naturally occurring vegetation patterns. Over time, these landscape-scale patterns would improve the scenic quality of the area.

Under Alternative #1, the natural patterns created by the fires would continue to evolve. In approximately ten to fifteen years, standing dead trees would rot and fall down, creating a variety of visual effects across the landscape. In locations where the fires burned hottest, large openings would be created. In areas where mixed fire severity occurred, a mosaic pattern with patchy openings would be visible. Additional tree mortality, caused by stress, insects and disease would create additional openings, initially appearing as stands of red-needled trees, and eventually turning to patches of dead, gray barked trees.

Where soil erosion and stream sedimentation continued, exposed ground surfaces would take a long time to vegetate. These areas would appear as obvious patches of lightly covered soils with weeds and other vegetation growing on them. Soil sedimentation problems and poor road drainage would also create negative visual effects.

Under Alternative #2, the visual effects of the forested and burned areas would be the same as for Alternative #1 except where watershed and land restoration activities occurred.

Under Alternatives #2, #4, and #5, watershed restoration activities would be visible from local forest roads but not from communities or State and Federal highways. Ground disturbance associated with the removal or replacement of culverts, would have short-term visual effects but would be vegetated with grass within one season of disturbance. Mulches, used for soil stabilization, would appear lightly colored and would be obvious within the short term. Grass and shrubs would generally cover the mulch within a year's time. Contour felling would create a horizontal linear effect of fallen trees in some areas. This would remain evident for three to five years, or until grass, brush, and young trees established themselves. Mine reclamation would have obvious short-term visual effects where earth moving and stream restoration activities occurred. In the long-term, created pools, riffles, and re-planted stream banks would appear more natural than the current condition. Road closures would also have short-term visual effects. The road templates would appear heavily disturbed with freshly placed woody debris and mulch. Within two to three years, grass, forbs, and small trees would be well established and the area would appear as a linear opening.

Under Alternatives #4 and #5, harvest units would be visible from forest roads. In some areas, skid trails, landings, and stumps would be

obvious during and immediately following harvest treatments. Some salvage units would appear much more open, however, retention of sub merchantable dead, remaining live trees, and large snags would allow these units to still blend with the surrounding burned forest. Thinned units would appear more open, yet would retain the appearance of a forested environment. Views from communities, and State and Federal highways would be limited, and salvage prescriptions would not significantly change the appearance of the burned stands. Mitigation methods would reduce visual effects on areas viewed from well-traveled routes.

All alternatives would meet the visual quality objectives (VQOs) allocated within the Lolo National Forest Plan.

■ **Heritage Resources**

Issue: (No Driving Issues Identified)

Alternative #1 would have no direct effects on the heritage resource. However, because no interpretive activities would occur under this alternative, there would be an increased potential for site disturbance or vandalism.

Alternatives #2, #4, and #5 would include watershed restoration activities that have the potential for direct, adverse effects to sites that may be eligible for listing on the National Register of Historic Places. Activities associated with reclaiming historic placer mine tailings or rehabilitation of the historic dam site in Flat Creek, would require Section 106 review and consultation with the Montana State Historic Preservation Office. Appropriate mitigation measures, including interpretation and development of brochures would be used to mitigate the adverse effects on these resources. Restoration activities that affect these sites would cause irreversible and irretrievable commitments of potentially eligible heritage resources.

Alternatives #4 and #5 would include one and two harvest units, respectively, that contain heritage sites. Adverse effects to these sites would be prevented through mitigation measures including “no-activity” buffer zones, and silvicultural prescriptions that would not significantly change the visual setting of the forested environment.

Interpretive actions included in Alternatives #2, #4, and #5 would increase public access to the history of the area and improve awareness of the area’s cultural importance. Interpretation may result in less vandalism of known heritage sites.

■ **Inventoried Roadless Areas and Unroaded Areas**

Issue - RDLES 1: Unroaded and Inventoried Roadless Areas

Indicator: Acres of Harvest in Inventoried Roadless Areas
Indicator: Miles of Road Construction in Inventoried Roadless Areas
Indicator: Acres of Harvest in Unroaded Areas
Indicator: Miles of Road Construction in Unroaded Areas

No activities are proposed in Inventoried Roadless Areas under any of the alternatives.

In Alternatives #2, #4, and #5, noise from watershed restoration activities, or helicopter yarding, felling and skidding, and log trucks could have short-term effects on the apparent remoteness of nearby Inventoried Roadless Areas. Openings created by harvest units in Alternatives #4 and #5 could also be visible from vistas within roadless areas.

Alternatives #2, #4, and #5 would have some beneficial effects on the remoteness of Inventoried Roadless Areas by closing or removing roads near the boundaries of the six roadless areas that lie within the project area.

Alternatives #2, #4, and #5 would add approximately 1860 acres (1 percent increase to project area) of unroaded land by fully recontouring roads in roaded areas. Other road closures, including scarifying and removing culverts, were not considered to fully remove traces of the road profile, and thus were not considered to add acreage to the unroaded base.

Alternatives #4 and #5 would have some effects on unroaded areas by implementing vegetation management activities, including salvage of burned timber and thinning of green timber in areas that have suitable Management Area allocations under the Forest Plan. Openings created by harvest units and landings, skid trails, and stumps could have an effect on the apparent

naturalness and natural integrity of these areas thus reducing their potential for being reallocated to Inventoried Roadless or Wilderness Areas under the Forest Plan revision process.

Proposed harvest units under Alternatives #5 would require the construction of approximately 1.5 miles of temporary roads in unroaded areas. These roads would be fully rehabilitated after one season of use. Under Alternative #4, approximately 83 percent of the harvesting in unroaded areas would be completed by helicopter yarding methods. Under Alternative #5, approximately 60 percent of the harvesting in unroaded areas would be completed with helicopter yarding methods. All harvest activities and temporary road construction would occur in suitable Management Areas, or unsuitable MAs that provide for timber salvage under the Forest Plan.

Table 2.7.5. Comparison of Activities in Inventoried Roadless Areas and Unroaded Areas.
Alternatives #2, #4, and #5 have various effects on the unroaded resource.

Comparison of Activities in Inventoried Roadless Areas and Unroaded Areas

	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Inventoried Roadless Areas (IRAs)				
Temporary Road Construction in IRAs	0 miles	0 miles	0 miles	0 miles
Permanent Road Construction in IRAs	0 miles	0 miles	0 miles	0 miles
Harvest and Salvage Units in IRAs	0 acres	0 acres	0 acres	0 acres
Unroaded Areas of Any Size				
Acres Added to Unroaded by Recontouring Existing Roads	0 miles	1860 acres	1860 acres	1860 acres
Temporary Road Construction in Unroaded Areas	0 miles	0 miles	0 miles	1.5 miles
Permanent Road Construction in Unroaded Areas	0 miles	0 miles	0 miles	0 miles
Harvest and Salvage Units in Unroaded Areas	0 acres	0 acres	1357 acres	2797 acres

■ **Water and Hydrologic Resources and Fish and Aquatic Resources**

Issue - FISH 1: Roads Impair Stream Function
Issue - FISH 2: Vegetation Management Affects Fisheries Habitat
Issue - FISH 4: Culverts Impede Fisheries Connectivity
Issue - HYDRO 3: Accelerated Soil Loss
Issue - HYDRO 4: Road Sediment and Hydrologic Effects
Issue - HYDRO 5: Increased Water Yields and Flood Peaks
Issue - FISH 1: Affects on Fish and Aquatic Habitat
Issue - WATER 1: Reburn in Riparian Areas
Issue - WATER 2: Wetlands and Riparian Areas
Issue - WATER 5: Water Quality and Degradation of WQ Limited Stream Segments
Issue - WATER 6: Restoration and Redisturbance of Disturbed Areas

Indicator: Improvement to Water Quality Limited (303d) Stream Segments
Indicator: Road Densities
Indicator: Road Densities in 300 Feet of Streams
Indicator: Miles of Road within 300 Feet of Streams
Indicator: Stream Crossing Densities
Indicator: Road/Culvert Fish Passage Barriers
Indicator: Stream Habitat Available to Fish
Indicator: Activities within 300 Feet of Streams
Indicator: Equivalent Clearcut Acres
Indicator: Sediment Delivery to Streams
Indicator: Stream Temperature

Under all alternatives, riparian areas and wetlands would be protected. No timber harvest would occur within Inland Native Fish Strategy (INFISH) Riparian Habitat Conservation Areas (RHCAs). Watershed improvement work initiated under the Burned Area Emergency Rehabilitation (BAER) Plan would continue to be implemented and monitored. Because of the already highly disturbed condition of these drainages from the wildfires and past activities, they would remain at high risk of experiencing altered hydrology under all of the alternatives.

Under Alternative #1, sediment would continue to be delivered to water bodies from burned areas. Elevated sediment yields due to the wildfires would continue for up to 10 years. Sediment yields from roads and abandoned mines would continue. Existing culverts that are improperly sized or positioned would remain in place under this alternative. Improvements to fish habitat and connectivity between stream reaches would not occur, and therefore existing development would continue to exert stress on native fish populations. This alternative would have the potential for delivering the most sediment to channels of all alternatives. Stream temperatures would be expected to recover to pre-fire conditions as riparian and overstory canopy cover re-established. Recovery rates would be dependent on the rate of streamside vegetation re-establishment and growth.

Under Alternatives #2, #4, and #5, the restoration activities that would occur within RHCAs would cause short-term effects on water quality (primarily sedimentation) but would result in long-term improvements that would outweigh the short-term effects. Short-term impacts to water quality and aquatic habitat would be reduced by mitigation measures.

Under Alternatives #2, #4, and #5, road closures and reconstruction (BMPs) would reduce runoff and sediment production from existing roads. Removal and replacement of culverts would improve hydrologic connectivity for fish and aquatic life. Riparian planting would improve recovery of burned riparian areas. Restoration of dams and mines would reduce sediment delivery and improve stream function and aquatic habitat.

Under Alternatives #4 and #5, proposed timber harvest activities would produce a higher short-term increase in sediment yield than Alternatives #1 and #2. According to the LOLOSED model results, contributions of sediment from harvesting would be small when compared to natural, fire, and road contributions. Ninemile Creek would show the largest increase in sediment from proposed harvest (particularly in Alternative #5) than any other drainage. The increased pulse of sediment, over existing, could increase the negative effects of sediment delivery on fish populations. The use of helicopter and skyline yarding systems, as well as design criteria and mitigation measures would minimize sediment yield from timber harvest activities.

Although no harvest activities in Alternatives #4 or #5 are proposed within RHCAs, the RHCA buffer width may be less than 300 feet on some channels types. Timber harvest and prescribed burning within 300 feet of stream channels may produce sediment that could be delivered to channels. Mitigation measures and use of helicopter yarding in some areas, would decrease the amount of sediment mobilized and delivered to stream channels.

Under Alternative #5, approximately 1.7 miles of temporary road would be constructed to access harvest units. Because these roads would be constructed near ridges, no RHCAs would be crossed, and they would be recontoured after use, their effects on water quality would be negligible.

Sediment delivery from restoration and harvest activities in Alternatives #2, #4, and #5 would, in most situations, coincide with or immediately follow elevated flows and sediment delivery resulting from the fires of 2000. As modeled by LOLOSED, this would result in a sharply rising sediment curve, followed by a relatively sharp decrease in sediment over a five-year period following restoration and harvest activities. Over another five to ten years, sediment delivery would decline to levels below those displayed under Alternative #1, where no activities would occur. Although the actions of Alternatives #2, #4, and #5 would display “pulses” of sediment in the short-term, the long-term benefits of reducing the “press” of sediment delivery from roads and other past development, would outweigh the short-term negative effects. Fisheries would be expected to benefit in the long-term from watershed restoration related improvements.

Under Alternatives #2, #4, and #5, recovery of stream temperatures would be similar to Alternative #1. Riparian planting would lead to improved stream shading in some areas. This would lead to an increased rate of improvement of temperatures in some watersheds. Restoration activities under Alternatives #2, #4, and #5 would require removal of streamside vegetation, and may thus lead to short-term increases in water temperatures in some stream reaches. Channel restoration, however, would improve water temperatures in the long-term as the channels became better defined and riparian vegetation became re-established.

The effects on runoff timing and quantities would be similar for all four alternatives. Because Equivalent Clearcut Acres (ECAs) reflect changes in vegetative canopy and transpiration, salvage of trees killed by fire have few effects on ECAs. There would only be a slight change in ECA where green canopy would be removed during commercial thinning. Harvest under Alternatives #4 and #5 would not appreciably increase the risk of changing runoff timing or magnitude in most watersheds. However, the effects on ECAs are greatest in Alternative #5, where a larger percentage of commercial thinning is performed. Long-term recovery in all watersheds would be anticipated as trees become established and canopy cover is restored to pre-fire and pre-management conditions.

Stream channel stability would remain at risk to the effects of past land uses and road crossings in Alternative #1 except where BAER Restoration activities removed or improved stream crossings and stabilized burned slopes. In areas where road fills and mine wastes remain in place, material would be susceptible to transport by subsequent flows. Channel width-depth ratios would remain at risk, causing channels to become wider and shallower. Under Alternatives #2, #4, and #5, restoration work would result in short-term destabilization, but would result in enhanced long-term benefits to stream channel conditions.

Under Alternative #1, sediment delivery from road, mines, and other land uses would continue to degrade water quality within the project area. Because this alternative does not show a trend in improved water quality conditions, it would not meet Forest Plan or State water quality standards.

Alternative 1 would not be consistent with Forest Plan standards as amended by INFISH. For westslope cutthroat trout, this alternative would be likely to adversely impact individuals or habitat with a consequence that may contribute toward a federal listing or reduced viability for the population or species.

Alternative #1 would result in a continued trend in degradation of bull trout habitat from the existing situation. This alternative may affect and would likely adversely affect bull trout.

Despite the short term degradation of water quality in Alternatives #2, #4, and #5, because of the overall reduction in sediment and improvement in water quality, these alternatives would meet Forest Plan and State water quality standards. Proposed restoration activities would accelerate watershed recovery in all three of these alternatives.

The restoration activities proposed under Alternative #2 would have a long-term positive effect on fisheries and fish population dynamics and persistence. This alternative may impact individual westslope cutthroat trout or habitat, but would not likely result in a trend toward federal listing or reduce viability for the population or species.

Alternative #2 may affect and would likely adversely affect bull trout. Restoration activities would cause short-term disturbance and degradation of some bull trout habitat features. These short-term effects are not anticipated to further threaten or jeopardize bull trout populations over the long-term and the net effect would be positive.

Although Alternatives #4 and #5 would contribute to short-term project effects, since it would be combined with restoration activities, it should not hinder the long-term attainment of Riparian Management Objectives given that there is little future management-based disturbance. These alternatives may impact individual westslope cutthroat trout or habitat, but would not likely result in a trend toward federal listing or reduce viability for the population or species.

Alternatives #4 and #5 may affect and would likely adversely affect bull trout. Restoration and timber harvest activities would cause short-term disturbance and degradation of some bull trout habitat features. These short-term effects are not anticipated to further threaten or jeopardize bull trout populations over the long-term and the net effect would be positive.

Table 2.7.6. Comparison of Effects on Hydrologic, Fisheries, and Aquatic Resources. *Although Alternatives #2, #4, and #5 would contribute to short-term detrimental conditions to hydrologic, fisheries, and aquatic resources, they would provide long-term improvements to these resources.*

Comparison of Effects on Hydrologic, Fisheries, and Aquatic Resources				
Water Quality Standards (303d Impaired)	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Short -Term Improvement Trend	No	No	No	No
Long -Term Improvement Trend	No	Yes	Yes	Yes
Biological Evaluations of Sensitive, Threatened, and Endangered Fish Populations	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Westslope Cutthroat Trout (Sensitive)	LIFV*	MIIH**	MIIH**	MIIH**
Bull Trout (Endangered)	LAA***	LAA***	LAA***	LAA***
Road Related Effects	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Average Road Densities in Miles/Square Mile (% reduction in density)				
Ninemile Creek Drainage	3.0 miles (0%)	1.4 miles (56%)	1.4 miles (56%)	1.4 miles (56%)
Siegel Creek Drainage	1.2 miles (0%)	1.0 miles (19%)	1.0 miles (19%)	1.0 miles (19%)
First Creek Drainage	4.3 miles (0%)	3.5 miles (18%)	3.5 miles (18%)	3.5 miles (18%)
Flat Creek Drainage	2.6 miles (0%)	2.3 miles (14%)	2.3 miles (14%)	2.3 miles (14%)
Johnson Creek Drainage	4.1 miles (0%)	3.4 miles (18%)	3.4 miles (18%)	3.4 miles (18%)
Idaho Gulch Drainage	2.6 miles (0%)	2.3 miles (14%)	2.3 miles (14%)	2.3 miles (14%)
Trout Creek Drainage	2.1 miles (0%)	1.2 miles (45%)	1.2 miles (45%)	1.2 miles (45%)
Near Channel Road Densities in Miles/Square Mile (% reduction in density)				
Ninemile Creek Drainage	0.7 (0%)	0.4 (50%)	0.4 (50%)	0.4 (50%)
Siegel Creek Drainage	0.6 (0%)	0.5 (4%)	0.5 (4%)	0.5 (4%)
First Creek Drainage	0.9 (0%)	0.8 (16%)	0.8 (16%)	0.8 (16%)
Flat Creek Drainage	0.8 (0%)	0.7 (12%)	0.7 (12%)	0.7 (12%)
Johnson Creek Drainage	0.9 (0%)	0.8 (10%)	0.8 (10%)	0.8 (10%)
Idaho Gulch Drainage	1.7 (0%)	1.5 (10%)	1.5 (10%)	1.5 (10%)
Trout Creek Drainage	0.6 (0%)	0.4 (31%)	0.4 (31%)	0.4 (31%)
Stream Crossing Densities in Numbers/Square Mile (% reduction in density)				
Ninemile Creek Drainage	2.4 (0%)	1.3 (47%)	1.3 (47%)	1.3 (47%)
Siegel Creek Drainage	1.9 (0%)	1.5 (25%)	1.5 (25%)	1.5 (25%)
First Creek Drainage	4.7 (0%)	3.7 (21%)	3.7 (21%)	3.7 (21%)
Flat Creek Drainage	2.4 (0%)	2.4 (0%)	2.4 (0%)	2.4 (0%)
Johnson Creek Drainage	4.2 (0%)	3.9 (9%)	3.9 (9%)	3.9 (9%)
Idaho Gulch Drainage	2.8 (0%)	2.5 (10%)	2.5 (10%)	2.5 (10%)
Trout Creek Drainage	2.3 (0%)	1.3 (43%)	1.3 (43%)	1.3 (43%)
Miles of Road within 300 Feet of Stream Channels	143.4 miles (total)	97.4 miles (total)	97.4 miles (total)	97.4 miles (total)
Ninemile Creek Drainage	52.8 miles	26.5 miles	26.5 miles	26.5 miles
Siegel Creek Drainage	8.1 miles	7.7 miles	7.7 miles	7.7 miles
First Creek Drainage	7.3 miles	6.1 miles	6.1 miles	6.1 miles
Flat Creek Drainage	12.9 miles	11.4 miles	11.4 miles	11.4 miles
Johnson Creek Drainage	12.8 miles	11.5 miles	11.5 miles	11.5 miles
Idaho Gulch Drainage	5.9 miles	5.3 miles	5.3 miles	5.3 miles
Trout Creek Drainage	44.8 miles	30.1 miles	30.1 miles	30.1 miles
Fish Passage Barriers	28 (total)	1 (total)	1 (total)	1 (total
Ninemile Creek Drainage	22	0	0	0
Siegel Creek Drainage	0	0	0	0
First Creek Drainage	1	0	0	0
Flat Creek Drainage	1	0	0	0
Johnson Creek Drainage	1	0	0	0
Idaho Gulch Drainage	0	0	0	0

Comparison of Effects on Hydrologic, Fisheries, and Aquatic Resources				
Trout Creek Drainage	3	1	1	1
Miles of Stream Habitat Made Available to Fish	0 miles (total)	27.5 miles (total)	27.5 miles (total)	27.5 miles (total)
Ninemile Creek Drainage	0 miles	16. 9 miles	16. 9 miles	16. 9 miles
Siegel Creek Drainage	0 miles	0 miles	0 miles	0 miles
First Creek Drainage	0 miles	5.2 miles	5.2 miles	5.2 miles
Flat Creek Drainage	0 miles	2.7 miles	2.7 miles	2.7 miles
Johnson Creek Drainage	0 miles	1.6 miles	1.6 miles	1.6 miles
Idaho Gulch Drainage	0 miles	0 miles	0 miles	0 miles
Trout Creek Drainage	0 miles	1.1 miles	1.1 miles	1.1 miles
Percent Reduction of Road Sediment Delivery to Streams after 15 Years (based on LOLOSED Computer Model)				
Ninemile Creek Drainage	0%	15%	12%	15%
Siegel Creek Drainage	0%	21%	21%	21%
First Creek Drainage	0%	14%	11%	11%
Flat Creek Drainage	0%	9%	3%	5%
Johnson Creek Drainage	0%	11%	11%	7%
Idaho Gulch Drainage	0%	2%	2%	3%
Trout Creek Drainage	0%	13%	8%	8%
Harvest Related Effects	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Acres of Harvest within 300 Feet of Stream Channels (outside of established RHCAs)	0 acres (total)	0 acres (total)	92.5 acres (total)	250.9 acres (total)
Ninemile Creek Drainage	0 acres	0 acres	15.9 acres	57.3 acres
Siegel Creek Drainage	0 acres	0 acres	0.0 acres	3.9 acres
First Creek Drainage	0 acres	0 acres	10.4 acres	29.3 acres
Flat Creek Drainage	0 acres	0 acres	36.2 acres	36.2 acres
Johnson Creek Drainage	0 acres	0 acres	19.2 acres	90.1 acres
Idaho Gulch Drainage	0 acres	0 acres	0 acres	4.8 acres
Trout Creek Drainage	0 acres	0 acres	10.8 acres	29.3 acres
Acres of Prescribed Burning within 300 Feet of Stream Channels (no ignition in RHCAs)	0 acres (total)	0 acres (total)	50.3 acres (total)	79.6 acres (total)
Ninemile Creek Drainage	0 acres	0 acres	14.1 acres	42.4 acres
Siegel Creek Drainage	0 acres	0 acres	0 acres	0 acres
First Creek Drainage	0 acres	0 acres	0.0 acres	0 acres
Flat Creek Drainage	0 acres	0 acres	36.2 acres	36.2 acres
Johnson Creek Drainage	0 acres	0 acres	0 acres	0 acres
Idaho Gulch Drainage	0 acres	0 acres	0 acres	0 acres
Trout Creek Drainage	0 acres	0 acres	0 acres	1 acres
Average Equivalent Clearcut Acres (including non-Forest Service ownerships)				
Ninemile Creek Drainage	26%	26%	27%	28%
Siegel Creek Drainage	8%	8%	8%	8%
First Creek Drainage	30%	30%	30%	30%
Flat Creek Drainage	8%	8%	8%	8%
Johnson Creek Drainage	33%	33%	33%	34%
Idaho Gulch Drainage	44%	44%	44-45%	45%
Trout Creek Drainage	17%	17%	17%	17%
Percent Reduction of Total Sediment Delivery to Streams after 15 Years (based on LOLOSED Computer Model)				
Ninemile Creek Drainage	0%	32%	28%	30%
Siegel Creek Drainage	0%	31%	29%	29%
First Creek Drainage	0%	23%	13%	13%
Flat Creek Drainage	0%	24%	11%	11%
Johnson Creek Drainage	0%	23%	19%	15%
Idaho Gulch Drainage	0%	9%	8%	7%
Trout Creek Drainage	0%	30%	21%	21%

* LIFV – Likely to impact individuals or habitat with a consequence that the action may contribute toward federal listing or result in reduced viability for the population or species.

** MIIH – May impact individuals or habitat, but will not likely result in a trend toward federal listing or reduced viability for the population species.

*** LAA – May Affect – Likely to Adversely Affect

■ Fire, Fuels and Air Quality

Issue - FIRE 1: Fuel Levels and Effect on Fire Behavior and Reburn
Issue - FIRE 2: Fuels Vary by Fire Regime and Elevation
Issue - TIMBE 3: Harvesting Leads to Fuel Problems
Issue - FIRE 4: Fuels in Intermix Communities

Indicator: Tons of Particulate Matter Per Year
Indicator: Acres of Moderate to High Intensity Burn
Indicator: Acres of Prescribed Fire and Probability of Ignition
Indicator: Acres of high fuels/risk adjacent to private land.

No burning activities are proposed in Alternatives #1 and #2. Without any burning treatments, there would be no impact on air quality or human health in the short term. However, without fuel treatments on some acres, there would be an increase in the potential for future wildfire and smoke. In the case of a major wildfire, depending on local climate conditions, smoke could persist in the valleys for several weeks, as they did in 2000.

Alternatives #4 and #5 could cause temporary degradation of air quality resulting from prescribed burns, pile burning, and road dust. Alternative #4 would produce particulate matter from approximately 934 acres of prescribed burning. Alternative #5 would produce particulate matter from approximately 1686 acres of prescribed burning. Because only 500 acres or less would be burned in any one day, both alternatives would be equal in terms of meeting regulations. At a minimum, there would be temporary degradation of air quality in the immediate vicinity of the burn.

Prescribed burns would follow approved plans and implemented to meet air quality standards and allow for good smoke dispersion. All burns would be accomplished under permit and within Montana State Airshed Group Guidelines (USDA Forest Service 2000).

Under Alternatives #1 and #2, fire would not be returned to stands or used to restore or maintain species composition and stand structure. Without fire, individual stands would continue to change as species less adapted to fire (such as Douglas-fir) increased. In the unburned VRU 2 areas, ladder fuels would increase in understories. Standing fuels would continue to present a fire hazard in the short- and long-term. Fuel conditions could cause an increase in rate of spread, resistance to control and severe fires similar to stand replacement burns that occurred in 2000. Fuels would increase and change the fire behavior and intensity, which would also affect the cost of fire suppression. A lack of fire hazard reduction could make extreme fire behavior more common, with added risk of property loss, and difficulty of suppression. Under Alternatives #1 and #2, the nearly 12,000 acres that burned at moderate-high and high severity would have an increase in fuels as trees fall. This increase in fire hazard would put regeneration that has since established at risk of loss in future wildfires. Because the increase in fuels and subsequent fire intensity and severity in VRU 2 would be beyond what occurred historically, the potential for soil damage would be high. The increase in fuels in lower elevation VRU 2 stands would also increase risk to adjacent private properties. Chances for reburn would be high and would contribute to detrimental impacts as dead trees fall in VRU 2.

Although Alternatives #4 and #5 would treat different number of acres, the effects of these alternatives are similar. Harvest and fuels treatments in these alternatives would affect stand structure and composition by reducing the amount of fire sensitive species and increasing fire resistant species. The number of trees per acre, fine fuel recruitment, and ladder fuels would be reduced. This would reduce the potential for a ground fire to increase in intensity and become a crown fire. Long-term fire hazard, fire risk, and resistance to control would be

lower following treatments. Fuel reduction in VRU 2 would restore open canopy and restore systems to a state that would allow implementation of disturbance regimes that more closely represent pre-1900 fire disturbance. Although none of the alternatives would exactly duplicate historic process in terms of scale and intensity, Alternatives #4 and #5 would have some immediate benefits in VRU 2 stands.

Thinning trees in unburned or low severity burned stands in VRU 2 would reduce future fire hazard by reducing ladder fuels and stand densities. Under Alternatives #4 and #5 thinning would reduce the number of trees contributing fine fuels to the load and continuity of fuels.

Salvage is not expected to reduce short-term fire risk or hazard in the moderate to severely burned areas because the fine fuels have already been drastically reduced. In the short term, salvage would not decrease risk of fire starting and spreading. Salvage could decrease the future intensity of fire (especially under drought conditions) and resulting mortality by reducing the number of large, dead trees that would fall and increase fuels.

Harvest and fuels treatments in VRU 2 under Alternative #4 and #5 would coincide with areas adjacent to private property and structures in the "intermix" area. Although the greatest protection of structures is afforded by treatments of fuels within 100 feet of structures, treating the fuels in the general area would reduce intensity and ember spotting, especially during extreme fire weather conditions.

The timber harvest proposed under Alternatives #4 and #5 is expected to create "activity fuels" of 10 to 15 tons per acre. This would happen on more acres in Alternative #5 than in Alternative #4. The slashed material and logging residue from green or low burn severity sites would pose a fire risk in the short term before being piled or prescribed burned. These fuels would be reduced in two to four years. Once the fuels where treated, the risk would drop. This short-term risk would be acceptable given that the changes of an unplanned ignition are small. Harvest units in moderate to high severity burns would not be scheduled for fuels treatment due to an absence of risk from fine fuels. Harvest in these units would not produce many fine fuels and would not pose a short-term fire risk. Severely burned areas not harvested would pose a hazard once fine fuels develop in 20 to 30 years.

Prescribed fire would mimic wildfires in that it would reduce fuel buildup and would reduce litter. The fires would be controlled and burn less intensively. Using prescribed fire to reduce fuel loads would decrease the potential for wildfires to burn at severe, damaging temperatures under extreme weather conditions.

Even under controlled spring and fall conditions, prescribed burns would have a chance of escape. This risk would be minimized in both alternatives with the selection of weather and fuel moisture parameters. Contingency plans would be developed as part of the burn plan and would be activated if a burn escaped control.

Fuel treatments would provide a break in continuous fuel patterns, and would reduce the potential for large, high-intensity, stand replacement fires. These mosaics would also allow more effective initial attack. The reduction of fuel loads to below 30 tons per acre would reduce the fire hazard and resistance to control in the long term in all harvest units.

Table 2.7.7. Comparison of Effects on Fire, Fuels and Air Quality. *Fuel treatments would provide a break in continuous fuel patterns, and would reduce the potential for large, high-intensity, stand replacement fires.*

Comparison of Effects on Fire, Fuels and Air Quality

Air Quality	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Estimated Smoke Emissions PM-10 From Prescribed Burning (assumes a maximum of 500 acres of fuel treatment per day)	0 tons	0 tons	83 tons	150 tons

Comparison of Effects on Fire, Fuels and Air Quality				
Estimated Smoke Emissions PMS-10 From Burning Landing Piles	0 tons	0 tons	30-122 tons	123-492 tons
Estimated Smoke Emissions PM-10 From Wildfires (occurring on same 500 acre area)	0 tons	0 tons	233 tons	420 tons
Fuel Loads				
Average Fuel Loads in Individual Stands Treated with Prescribed Fire	26-43 tons	26-43 tons	8-24 tons	8-24 tons
Average Fire Management Costs				
Projected Cost Per Acre in Individual Stands (displays comparison between potential suppression needs and prescribed burning treatments)	$500 to $5000	$500 to $5000	$150 to $300	$150 to $300
Suppression Ability	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Suppression Difficulty at a Stand Level	Higher	Higher	Lower	Lower
Risk of Escape				
Acres of Prescribed Burning with Risk of Escape	0 acres	0 acres	934 acres	1686 acres
Fire Risk Due to Commercial Harvest				
Total Activity Fuels Created by Harvesting	0 acres	0 acres	1933 acres	4845 acres

■ **Infrastructure and Improvements**

Issue - ROADS 1: Closure Affects Long-Term Land Management and Public Access
Issue - ROADS 2: Effects of Roads on Ecological Values
Issue - ROADS 3: Maintenance Practices and Best Management Practice Standards
Issue - ROADS 1: Access Needs for Land Management and Public Use

Indicator: Road Closures and Travel Restrictions
Indicator: Road Densities and Miles
Indicator: Roads with BMPs

Under Alternative #1, current public access would not change. The road system would continue to affect water quality, wildlife security, and other resource values where high road densities occur and roads were not up to BMP standards. The cost to maintain the road network would remain higher than the availability of maintenance funds. No changes would occur where current road densities exceed Forest Plan Management Area estimated averages for MAs 18 and 25.

Alternatives #2, #4, and #5 would all make changes to the road system, including reconstruction of approximately 300 miles of road to meet BMP standards, and closure of approximately 225 miles of road unnecessary for land management in the near or distant future. Some permanent road closures would affect popular driving routes. All three alternatives would place seasonal travel restrictions on approximately 15 miles of road. Alternative #4 would place an additional 20 miles of yearlong travel restrictions on popular driving routes.

Road closures and seasonal restrictions proposed under Alternative #2, #4, and #5 would affect approximately 30 percent of the Forest roads currently open to public travel. Off-road snowmobile travel would be restricted for five years within the fire perimeters under these alternatives. Additional road closures, including scarification and recontouring would occur on roads already restricted to public travel. Road reconstruction would bring all roads that were not closed up to Best Management Practice standards. Road decommissioning, restrictions, and reconstruction activities would provide improvements to water quality, and wildlife

habitat security, and bring the current road system in line with available maintenance funds.

Under Alternatives #2, #4, and #5, the road density for MAs 18 and 25 would be reduced to reflect Forest Plan direction. However, winter-open road densities would still not meet estimated averages because of the need to maintain primary access routes that fall within this Management Area.

Under Alternatives #2, #4, and #5, two popular driving routes currently open to travel would be closed or restricted seasonally. The lower portion of the Eustache Creek Road (FR #97) would be decommissioned. The upper segment would be restricted to travel seasonally. A portion of the Ninemile-Siegel Road (FR #412) between Siegel Pass and Eustache Creek would also be gated and restricted seasonally. This combination of restrictions and closures would modify established traffic patterns. Forest Road #9920, between Siegel Pass and upper Eustache, would be opened seasonally to provide an alternative driving route and maintain access between the upper portion of the Ninemile and Flat Creek drainages. This combination of travel changes would improve water quality in Eustache and Ninemile Creeks by removing or restricting travel on road segments that parallel stream channels.

Under Alternative #4, road treatments would be similar to Alternative #2 except that road reconstruction would be necessary to access timber harvest units, and additional road restrictions would be implemented to protect wildlife linkages and corridors. As with Alternative #2, off-road snowmobile travel would be restricted for five years within the fire perimeters. Road reconstruction and BMP work would occur on approximately 298 miles of road within this alternative. Timber sale activities would utilize approximately 107 miles of road.

In addition to the travel restrictions proposed in Alternative #2, Alternative #4 would restrict travel on Forest Road #388, over Freezeout Pass, on Forest Road #450, between Windfall Creek and Sunrise Creek, and on Forest Roads #5475 and #536 that cross the Alpine Divide between First Creek and Sawpit Creek. The yearlong restrictions on these roads would benefit wildlife resources by improving habitat security, reducing fragmentation, protecting wildlife linkages and corridors, and improving forage by reducing weed spread. Travel restrictions would also be placed on several local roads, including the Soldier Creek Road (FR #18102) under this alternative.

Although these restrictions would be a major step toward minimizing motorized access in potential linkages and corridors, they would be considerable changes to established traffic patterns.

Road decommissioning proposed under Alternative #5 would be similar to those under Alternative #2. Road reconstruction work would occur on approximately 286 miles of road, with timber sale activities using approximately 123 miles of road. Approximately 1.7 miles of temporary road would be constructed to provide access to proposed timber harvest units.

The difference in the proposed road decommissioning and restrictions in Alternative #5 reflects a response to public access desires, yet blends resource needs with watershed restoration and recovery treatments. Forest Roads #412, #97, and #9920 would have similar management treatments as proposed in Alternatives #2 and #4. Proposed restrictions and closures would help reduce soil erosion, especially during the wet seasons, and reduce disturbance to wildlife.

Table 2.7.8. Comparison of Road Development, Closures, and Access and Travel Management.
Alternatives #2, #4, and #5 would all make significant changes to the road system, including reconstruction of approximately 300 miles of road to meet BMP standards, and closure of approximately 225 miles of road unnecessary for land management in the near or distant future.

Alternative Comparison of Road Development, Decommissioning, and Access and Travel Management	Alternative 1	Alternative 2	Alternative 4	Alternative 5

Alternative Comparison of Road Development, Decommissioning, and Access and Travel Management

Road Reconstruction				
		279 miles (total)	298 miles (total)	286 miles (total)
Road Reconstruction and BMPs without Timber Haul	0 miles	279 miles	191 miles	163 miles
Road Reconstruction and BMPs with Timber Haul	0 miles	0 miles	107 miles	123 miles

Road Decommissioning	Alternative 1	Alternative 2	Alternative 4	Alternative 5
	0 miles (total)	228 miles (total)	225 miles (total)	225 miles (total)
Open to Scarified / Culverts Removed	0 miles	72 miles	70 miles	70 miles
Open to Recontoured	0 miles	26 miles	26 miles	26 miles
Gated to Scarified / Culverts Removed	0 miles	80 miles	80 miles	80 miles
Gated to Partially Recontoured / Culverts Removed	0 miles	2 miles	2 miles	2 miles
Gated to Recontoured	0 miles	13 miles	13 miles	13 miles
Partially Vegetated to Scarified / Culverts Removed	0 miles	21 miles	21 miles	21 miles
Partially Vegetated to Recontoured	0 miles	14 miles	14 miles	14 miles

Travel Management Restrictions	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Road Travel Management Restrictions (Gated Roads)	0 miles (total)	11 miles (total)	34 miles (total)	14 miles (total)
Open to Yearlong A Restriction	0 miles	0 miles	13 miles	0 miles
Open to Yearlong B Restriction	0 miles	0 miles	7 miles	0 miles
Open to Seasonal E Restriction	0 miles	3 miles	11 miles	6 miles
Open to Seasonal J Restriction	0 miles	8 miles	3 miles	8 miles

Road Construction	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Temporary Road Construction	0 miles	0 miles	0 miles	1.7 miles

■ Vegetation and Forest Resources

Issue - VEG 1: Fire Weakened Trees Susceptible to Insect Predation
Issue - VEG 2: Continued Insect Predation
Issue - VEG 3: Reburn Effect on Soils and Regeneration
Issue - VEG 4: Old Growth Protection and Enhancement
Issue - VEG 5: Protecting, Enhancing and Establishing "Species at Risk"
Issue - TIMBE 1: Harvesting Needed to Improve Forest Health
Issue - TIMBE 2: Harvesting Not Ecological, and Unnecessary for Fire Recovery
Issue - ECO 2: Restoration of Ecosystem Processes
Issue - TIMBE 4: Past Logging Has Caused Resource Damage
Issue - ECO 3: Insect Infestations
Issue - TIMBE 7: Planting Un-Ecological and Unnecessary

Indicator: Acres of Harvest by VRU
Indicator: Acres of Harvest in Stands at Risk to Insects
Indicator: Acres Treated in VRU 2 to Reduce Fuels
Indicator: Acres of VRU 2 Old Growth Enhancement
Indicator: Acres Planted

Alternatives #1 and #2 would provide no reduction of bark beetle infestation or risk of future infestation. There could be a considerable loss of old growth trees from bark beetle predation. Continued unaltered high-risk conditions would predispose stands containing sawtimber-size host trees to significant mortality from bark beetles. A beneficial effect of these alternatives would be the continued roles that bark beetle plays in forest succession.

Alternative #4 would provide direct reduction of bark beetle infestation or risk of future infestation on treated VRU 2 stands. This alternative would reduce the potential loss of old growth trees from bark beetle predation in treated stands. However, risk reduction would not provide absolute bark beetle prevention. Approximately 18 percent of the high-risk stands within the fire perimeters would be treated.

Alternative #5 would be similar to Alternative #4 except that it would treat more acres of high-risk stands in VRUs 2, 3, and 4. This alternative would provide direct reduction of bark beetle infestation or risk of future infestation of trees on a larger area. Approximately 31 percent of the high-risk stands within the fire perimeters would be treated.

Harvest treatments in Alternatives #4 and #5 would replicate the beneficial effects of the role that bark beetles play in forest succession. These alternatives would provide for healthy stands, and would optimize the timber growing potential on treated acres. They would improve vegetative structure to reduce the potential for epidemic bark beetle infestation in "at-risk" stands.

Alternatives #1 and #2 would provide no direct reduction of large fuels that pose a risk of potential soil damage beyond the natural range of variation on VRU 2 sites. Beneficial and adverse effects of these alternatives would be the role these atypically high levels of large woody debris would play in the forest environment. High levels of large woody debris on severely burned sites could favor regeneration on south aspects by providing shade. Adversely, this same woody debris loading could increase the degree of tree mortality in the event of a future wildfire.

Alternative #4 would provide direct reduction of large fuels on 1933 acres of VRU 2 sites. This alternative would directly reduce uncharacteristic risk conditions on treated VRU 2 sites. The potential for uncharacteristic soil damage to in the event of a reburn would be reduced.

The effects of Alternative #5 would be similar to those of Alternative #4 except that 2230 acres would be treated. Alternative #5 would provide the greatest reduction of large fuels in VRU 2.

Alternatives #1 and #2 would provide no direct enhancement or recruitment of old growth on VRU 2 sites. Considering the conditions of these stands, the old growth forests in VRU 2 would continue to decline.

Alternative #4 would provide direct enhancement or recruitment of old growth forests in VRU 2 through harvest and prescribed burning activities. Approximately 14 percent of the VRU 2 sites within the fire perimeters would be treated. All existing old growth would be protected. Commercial thinning and prescribed burning would partially replicate the effects and conditions of natural disturbance processes and therefore partially restore characteristic stand structure, composition and function.

Alternative #4 would provide direct enhancement or recruitment of old growth forests in VRU 2, which would alleviate the threat of uncharacteristic perturbations, structures, and processes on treated acres.

The effects of Alternative #5 would similar to those of Alternative #4. Alterative #5 would provide the greatest amount of direct enhancement or recruitment of old growth forest in VRU 2. Approximately 16 percent of the VRU 2 sites within the fire perimeters would be treated.

Alternatives #1 and #2 would rely solely on natural regeneration to reestablish ponderosa pine, western larch, and whitebark pine. Regeneration of area denuded by the fires would be variable with the possibility that some sites would not have these "species at risk" present. In the short-term, bark beetle predation could continue to reduce the occurrences of "species at risk".

Alternatives #4 and #5 would provide for planting of "species at risk" where natural regeneration failed. The determination of failure would take approximately two to five years of monitoring. Planting would provide the opportunity to increase the occurrence of the seral "species at risk" by direct establishment at desired numbers and locations in species mixtures typical to environment.

Under Alternative #4, commercial thinning and shelterwood cutting on approximately 1454 acres of VRU 2 sites would provide direct enhancement or recruitment of "species at risk". Because these treatments would favor these species over others, they would improve the presence, health, vigor, and reproductive capability of existing "species at risk".

Alternative #5 would have similar effects of Alternative #4, except this alternative would treat more acres. Under Alternative #5, 2632 acres of VRUs 2, 3, and 4 would be treated to enhance or recruit "species at risk". In the short term, this alternative would provide for greater

establishment of "species at risk" conifers than all other alternatives.

Table 2.7.9. Comparison of Effects on Vegetation. *Alternatives #1 and #2 would provide no reduction of bark beetle infestation or risk of future infestation. There could be a considerable loss of old growth trees from bark beetle predation.*

Alternative Comparison of Effects on Vegetation				
Harvest Treatment Prescriptions	Alternative 1	Alternative 2	Alternative 4	Alternative 5
	0 acres (total)	0 acres (total)	1933 acres total)	4845 acres (total)
Salvage	0 acres	0 acres	479 acres	2213 acres
Commercial Thinning	0 acres	0 acres	1360 acres	2246 acres
Shelterwood Preparation	0 acres	0 acres	94 acres	183 acres
Improvement Cutting	0 acres	0 acres	0 acres	203 acres
Harvest Activities By Vegetation Response Unit (VRU)	Alternative 1	Alternative 2	Alternative 4	Alternative 5
VRU 1	0 acres (total)	0 acres (total)	0 acres (total)	14 acres (total)
Salvage	0 acres	0 acres	0 acres	11 acres
Commercial Thinning	0 acres	0 acres	0 acres	3 acres
Shelterwood Preparation	0 acres	0 acres	0 acres	0 acres
Improvement Cutting	0 acres	0 acres	0 acres	0 acres
VRU 2	0 acres (total)	0 acres (total)	1933 acres (total)	2230 acres (total)
Salvage	0 acres	0 acres	479 acres	531 acres
Commercial Thinning	0 acres	0 acres	1360 acres	1548 acres
Shelterwood Preparation	0 acres	0 acres	94 acres	135 acres
Improvement Cutting	0 acres	0 acres	0 acres	16 acres
VRU 3	0 acres (total)	0 acres (total)	0 acres (total)	1207 acres (total)
Salvage	0 acres	0 acres	0 acres	742 acres
Commercial Thinning	0 acres	0 acres	0 acres	400 acres
Shelterwood Preparation	0 acres	0 acres	0 acres	10 acres
Improvement Cutting	0 acres	0 acres	0 acres	54 acres
VRU 4	0 acres (total)	0 acres (total)	0 acres (total)	1394 acres (total)
Salvage	0 acres	0 acres	0 acres	929 acres
Commercial Thinning	0 acres	0 acres	0 acres	295 acres
Shelterwood Preparation	0 acres	0 acres	0 acres	38 acres
Improvement Cutting	0 acres	0 acres	0 acres	133 acres
Reduction of Insect Predation and Risk in "at-risk" Stands	Alternative 1	Alternative 2	Alternative 4	Alternative 5
	0 acres (total)	0 acres (total)	1454 acres (total)	2632 acres (total)
Commercial Thinning	0 acres	0 acres	1360 acres	2246 acres
Shelterwood Preparation	0 acres	0 acres	94 acres	183 acres
Improvement Cutting	0 acres	0 acres	0 acres	203 acres
Treatments in VRU 2 to Reduce Fuel Loads	Alternative 1	Alternative 2	Alternative 4	Alternative 5
	0 acres (total)	0 acres (total)	2686 acres (total)	2983 acres (total)
Prescribed Burning	0 acres	0 acres	753 acres	753 acres
Salvage Harvest	0 acres	0 acres	479 acres	531 acres
Commercial Thinning, Shelterwood Preparation, and Improvement Cutting	0 acres	0 acres	1454 acres	1699 acres
Vegetative Treatments in VRU 2 for Old Growth Enhancement and Recruitment	Alternative 1	Alternative 2	Alternative 4	Alternative 5
	0 acres (total)	0 acres (total)	2207 acres (total)	2452 acres (total)
Prescribed Burning	0 acres	0 acres	753 acres	753 acres
Commercial Thinning, Shelterwood Preparation, and Improvement Cutting	0 acres	0 acres	1454 acres	1699 acres

■ **Threatened, Endangered and Sensitive Plants**

Under all alternatives, ongoing weed treatments assessed within the Big Game Winter Range and Burned Area Weed Management EIS, the Superior Ranger District Weed Management EA, and the Shapes and Feather Timber Sale would reduce existing weed populations in the project area. These activities would reduce competition between invasive species and native plant populations.

Alternatives #1 would meet the goal of the Lolo National Forest Plan to maintain viable populations of indigenous plants. It would, however, not address recommendations for Invasive Species and Rare Plants from the Assessment of the 2000 Fire Season, *Toward Restoration and Recovery*. Potential habitats as related to fire exclusion and fuel accumulations would not be improved under this alternative.

As with Alternative #1, Alternative #2 would meet the Lolo National Forest Plan goal to maintain viable populations of all indigenous plants. This alternative would address recommendations for Invasive Species and Rare Plants from the assessment of the 2000 fire season, *Toward Restoration and Recovery* because roadside weed treatments, road closures, and restoration activities would improve habitat for Threatened, Endangered, and Sensitive Plants. Potential habitats as related to fire exclusion and fuel accumulations would not be improved under this alternative.

Proposed restoration activities would generally have no direct effects on rare plant species or their habitats. Some of the proposed restoration activities could increase the risk of weed invasion. Mitigation measures, including spraying, mulching, and seeding would be used to reduce this potential.

Alternatives #4 and #5 may benefit species such as clustered ladyslipper. The indirect effects of prescribed fire and fuel treatments may benefit those species that grow in dry, fire-adapted habitats. Thinning and individual tree salvage could also result in reduction of closed canopy, and may benefit common clarkia and clustered ladyslipper, and possible taper-root orogenia and tapertip onion.

■ **Noxious and Invasive Plant Species**

Issue - TIMBE 6: Harvesting Increases Weed Spread
Issue - REC 3: Noxious Weed Spread
Issue - ECO 6: Noxious Weed Spread
The analysis for integrated weed management, including active weed control, is tiered to the Big Game Winter Range and Burned Area Weed Management EIS (USDA Forest Service 2001). Alternative D of that EIS will be implemented in the Post Burn project area. It includes restoration with prescribed fire, cultural controls, biological controls, herbicide application, education, and prevention. Additional effects analysis for that EIS is located in the Post Burn EIS Project File.

Alternative #1 would have no direct effect on noxious weed species. However, weeds could increase in areas currently infested, that are not proposed to be treated under weed management actions described in the Lolo National Forest Big Game Winter Range and Burned Area Weed Management EIS, and other decision documents. Under this alternative there would be less weed control than with other alternatives, which means that the overall cumulative effects to native vegetation and ecosystem function would be less beneficial than other alternatives.

Alternative #1 would not meet Forest Plan standards for noxious weed management. It also would not address recommendations for Invasive Species and Rare Plants from the assessment of the 2000 fire season, *Toward Restoration and Recovery.*

Under Alternatives #2, #4, and #5, herbicide treatment of noxious weeds would occur on approximately 520 miles of road. Road closures and travel management measures would also reduce the potential for establishment and spread of noxious weeds. The ground disturbing activities proposed in these alternatives would have a risk of increasing weed spread in habitats that have high susceptibility to weed invasion, or that are already disturbed. A comprehensive plan of weed control and prevention would be integrated into project design for all of the action alternatives. Mitigation measures would reduce the potential for spread where harvest activities occurred.

Alternatives #2, #4, and #5 would follow Lolo National Forest Plan management direction for

noxious weed control. They would also address the recommendations for invasive species, and indirectly, for rare plants, from the assessment of the 2000 fire season, *Toward Restoration and Recovery.*

Table 2.7.10. Comparison of Effects on Weed Spread. *Under Alternatives #2, #4, and #5, herbicide treatment of noxious weeds would occur on approximately 520 miles of road. Road closures and travel management measures would also reduce the potential for establishment and spread of noxious weeds.*

Alternative Comparison of Effects on Noxious Weed Spread				
Effects on Noxious Weed Spread	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Weed Treatments Along Roads and Disturbed Areas	0 miles (0 acres)	503 miles (1829 acres)	521 miles (1895 acres)	509 miles (1851 acres)

■ Wildlife

Issue - WLF 1 Burned Stands (Snag Associated Bird Species)
Issue - WLF 2 Green Stands (Closed Canopy Associated Bird Species)
Issue - WLF 3 Forest Fragmentation Effects on Bird Species
Issue - WLF 5 Big Game and Non-Game Habitat
Issue - WLF 6 Lynx and other Fur Bearer Habitat
Issue - WLF 7 Potential and Listed Sensitive, Threatened and Endangered Species
Issue - WLF 8 Linkages, Corridors, and Habitat Fragmentation
Issue - WLF 9 Old Growth Dependent Species
Issue - WILDLIFE 2 Lynx
Issue - WILDLIFE 6 Northern Goshawk
Issue - WILDLIFE 7 Black Backed Woodpecker
Issue - WILDLIFE 15 Pileated Woodpecker

Indicator: Elk Security
Indicator: Open Road Density within Elk Herd Units
Indicator: Open Road Density within Lynx Analysis Units
Indicator: Acres of timber harvest and acres of prescribed burning in the various wildlife habitats.

The effects of the alternatives on Threatened, Endangered, Sensitive and Management Indicator species are summarized in Table 2.7.11.

❑ *Bald Eagle*

All alternatives would have no effect on bald eagles because none of the proposed activities would be within any suitable bald eagle habitat.

❑ *Gray Wolf*

All alternatives would have no effect on wolves. Elk security is used as an indicator for effects to wolf prey populations and open road density is used to estimate the potential for human contact. Alternatives #2, #4 and #5 could result in an improvement in wolf habitat because of the increase in elk security and decrease in open road density (refer to Table 2.7.11). Alternative #4 would have a slightly greater increase in elk security and a slightly greater reduction in open road density within all the elk herd units located in the project area than the other alternatives.

❑ *Grizzly Bear*

The project area is not within a designated grizzly bear recovery area. Elk security is used to assess habitat for this species outside of recovery areas. All alternatives may affect, but would not likely to adversely affect potential grizzly bear habitat. Alternatives #2, #4 and #5 would improve potential grizzly bear habitat because of the increase in elk security and reduction in open road density (refer to Table 2.7.11). Alternative #4 would have a slightly greater increase in elk security and a slightly greater reduction in open road density within all the elk herd units located in the project area than the other alternatives. However, there is no established method to confirm that there would be no effect on habitat outside the recovery zone.

❑ ***Lynx***

Alternatives #1 and #2 would have no effect on lynx. Alternatives #4 and #5 may affect but would not likely to adversely affect lynx habitat. Although, Alternatives #2, #4 and #5 would reduce open road density, Alternative #4 would result in a slightly greater reduction of open road density in all the lynx analysis units within the project area (refer to Table 2.7.11).

Alternative #4 and #5 would harvest timber from 302 and 1658 acres, respectively, in lynx denning habitat within the project area. However, the remaining denning habitat within the lynx analysis units would still exceed the amount that is recommended in the Lynx Conservation Assessment and Strategy (LCAS) (refer to Table 2.7.11).

All alternatives would meet the LCAS recommendation for unsuitable habitat.

❑ ***Coeur d'Alene salamander, boreal toad, northern leopard frog***

All alternatives would have no impact on these species. The in-stream habitat improvement work proposed in Alternatives #2, #4 and #5 would cause a short-term disturbance in areas where previous disturbance has rendered these sites unlikely habitat for these species. Restoration activities would produce long-term benefits for the aquatic habitat.

❑ ***Harlequin Duck***

All alternatives would have no impact on this species. No vegetation treatments are proposed in the riparian area along Trout Creek where these ducks have been known to nest.

❑ ***Northern Goshawk***

All alternatives would have no impact on northern goshawk habitat. Alternatives #4 and #5 would treat approximately 35 acres (1 percent of potential habitat) and 67 acres (2 percent of potential habitat), respectively, of vegetation. These vegetation treatments would be designed to promote old growth forests with an open understory.

❑ ***Black-backed Woodpecker***

No timber harvest would occur in the stands where black-backed woodpecker nests were located during the 2001 surveys. Alternatives #4 and #5 would harvest approximately 478 acres (5 percent of potential habitat) and 1020 acres (10 percent of potential habitat) (refer to Table 2.7.11). Even stands that would be salvaged would have some value as foraging habitat for these woodpeckers All alternatives would have no impact on this species.

❑ ***Flammulated Owl***

All alternatives would have no impact on this species. Alternatives #4 and #5 would treat 10 and 100 acres (less than one percent), respectively, of vegetation within 11,150 acres of flammulated owl habitat. These treatments would primarily remove smaller trees and open up the understory. All live trees that meet Region 1 old growth criteria would remain on site. These alternatives could slightly improve foraging habitat for these owls.

❑ ***Townsend's big-eared bat***

No activities would occur directly around any open adit, therefore all alternatives would have no impact on this species.

❑ ***Fisher***

All alternatives would have no impact on fishers. Alternatives #4 and #5 would treat, 400 acres (less than one percent) and 1030 acres (2 percent), respectively, of vegetation within 44,630 acres of potential fisher habitat. Snag retention guidelines would be followed to maintain structure and woody debris and no vegetative treatments would occur within Riparian Habitat Conservation Areas.

❑ ***Wolverine***

All alternatives would have no impact on wolverine habitat. Elk security and open road density are indicators of effects on this species. Alternatives #2, #4 and #5 would increase elk security and decrease open road density, which may slightly improve wolverine habitat (refer to Table 2.7.11). Alternative #4 would have a slightly greater increase in elk security and a slightly greater reduction in open road density

within all the elk herd units located in the project area than the other alternatives.

❑ ***Peregrine Falcon***

All alternatives would have no impact on this species because no activities would occur near the known peregrine falcon nest site.

❑ ***Pileated Woodpecker***

All alternatives would have no impact on pileated woodpeckers. Alternatives #4 and #5 would treat 575 acres (1 percent) and 1040 (3 percent) acres, respectively, of vegetation (refer to Table 2.7.11). These treatments would be designed to enhance potential old growth. Any live trees that meet the Region 1 old growth criteria would be left in the stands. There would be some potential for snag loss during the timber harvest but snag mitigation measures should minimize possible losses. In addition, Alternatives #4 and #5 would underburn approximately 750 acres (2 percent) of pileated woodpecker habitat, which may create new snags.

❑ ***Big Game***

No activities are planned near summer elk habitat features such as springs, wallows and salt licks. No prescribed burning is proposed for big game winter range areas. Therefore, all alternatives would have no effect elk summer habitat or big game winter range.

Alternatives #2, #4 and #5 would increase elk security and decrease open road density, which would slightly improve elk habitat. Alternative #4 would have a slightly greater increase in elk security and a slightly greater reduction in open road density within all the elk herd units located in the project area than the other alternatives (refer to Table 2.7.11). All alternatives would have no impact on elk habitat.

❑ ***Forest Land Birds***

All alternatives would likely have no impact on these birds considering the small extent of the habitat treatments compared with the effects of the 2000 wildfires.

❑ ***Fragmentation, Linkages and Corridors***

All alternatives would have no impact on fragmentation, linkages and corridors. Elk security and open road density are indicators for effects to these features. Alternatives #2, #4 and #5 would increase elk security and decrease open road density, which may make it easier for some species to move across the landscape. Alternative #4 is designed to have the greatest increase in elk security and the largest decrease in open road density (refer to Table 2.7.11). This alternative would produce the most area with hiding cover and the lowest miles of open roads.

❑ ***Biodiversity***

Overall, the biodiversity of the project area is generally within the natural range of variation. None of the alternatives proposes forest type conversion or introduction of exotic species. None of the forest would be permanently changed to another vegetation type. A large percentage of the burned forest would not be harvested. Considering these factors, no alternatives would reduce biodiversity within the project area.

Table 2.7.11. Comparison of Effects on Wildlife. *Alternatives #2, #4 and #5 would increase elk security and decrease open road density, which would slightly improve elk habitat. Alternative 4 would have a slightly greater increase in elk security and a slightly greater reduction in open road density within all the elk herd units located in the project area than the other alternatives.*

Comparison of Effects on Wildlife				
	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Threatened and Endangered Species				
Bald Eagle	No Effect	No Effect	No Effect	No Effect
Gray Wolf	No Effect	No Effect – Slight improvement to habitat	No Effect – Slight improvement to habitat	No Effect – Slight improvement to habitat

Comparison of Effects on Wildlife

	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Grizzly Bear	May Affect, But Not Likely to Adversely Affect	May Affect, But Not Likely to Adversely Affect – Slight improvement to habitat	May Affect, But Not Likely to Adversely Affect – Slight improvement to habitat	May Affect, But Not Likely to Adversely Affect – Slight improvement to habitat
Lynx	No Effect	No Effect	May Affect, But Not Likely to Adversely Affect – Slight improvement to habitat	May Affect, But Not Likely to Adversely Affect – Slight improvement to habitat
Sensitive Species				
Coeur d'Alene Salamander	No Impact	No Impact	No Impact	No Impact
Harlequin Duck	No Impact	No Impact	No Impact	No Impact
Northern Goshawk	No Impact	No Impact	No Impact	No Impact
Black Backed Woodpecker	No Impact	No Impact	No Impact	No Impact
Flammulated Owl	No Impact	No Impact	No Impact	No Impact
Townsend's Big – Eared Bat	No Impact	No Impact	No Impact	No Impact
Fisher	No Impact	No Impact	No Impact	No Impact
Wolverine	No Impact	No Impact	No Impact	No Impact
Boreal Toad	No Impact	No Impact	No Impact	No Impact
Northern Leopard Frog	No Impact	No Impact	No Impact	No Impact
Management Indicator Species				
Pileated Woodpecker	No Impact	No Impact	No Impact	No Impact
Elk	No Impact	No Impact	No Impact	No Impact
Big Game Habitat				
Elk Security (By Herd Unit)				
Sunrise Herd Unit	44%	44%	49%	44%
Van Ness Herd Unit	47%	49%	49%	49%
Johnson Herd Unit	20%	22%	23%	21%
Upper Ninemile Herd Unit (FS Portion)	28%	32%	32%	31%
Open Road Density within the Elk Herd Units				
Sunrise Herd Unit	1.3 mi / sq mi	1.3 mi / sq mi	1.1 mi / sq mi	1.3 mi / sq mi
Van Ness Herd Unit	1.1 mi / sq mi	1.0 mi / sq mi	1.0 mi / sq mi	1.0 mi / sq mi
Johnson Herd Unit	1.2 mi / sq mi	1.2 mi / sq mi	1.1 mi / sq mi	1.2 mi / sq mi
Upper Ninemile Herd Unit (FS Portion)	0.9 mi / sq mi	0.7 mi / sq mi	0.7 mi / sq mi	0.7 mi / sq mi
Pileated Woodpecker Habitat				
Existing Habitat	30,140 acres	30,140 acres	30,140 acres	30,140 acres
Habitat Harvested (Potential Snag Loss)	0 acres	0 acres	575 acres (<1%)	1040 acres (3%)
Habitat Underburned (Potential Snag Gain)	0 acres	0 acres	750 acres (2%)	750 acres (2%)
Black-backed Woodpecker Habitat				
Existing Habitat	9870 acres	9870 acres	9870 acres	9870 acres
Habitat Harvested (acres and percent)	0 acres (0%)	0 acres (0%)	478 acres (5%)	1020 acres (10%)
Lynx Habitat				
Open Road Density (By Lynx Analysis Unit)				
Upper Ninemile – Siegel LAU	1.0 mi / sq mi	0.8mi / sq mi	0.7mi / sq mi	0.8mi / sq mi
Ninemile Divide LAU	0.4 mi / sq mi	0.3mi / sq mi	0.2mi / sq mi	0.3mi / sq mi
Trout LAU	0.8 mi / sq mi	0.8mi / sq mi	0.6mi / sq mi	0.8mi / sq mi
McCormick LAU	0.2 mi / sq mi	0.01mi / sq mi	0.01 mi / sq mi	0.01mi / sq mi

Comparison of Effects on Wildlife				
	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Lynx Denning Habitat				
Upper Ninemile – Siegel LAU	10,940 acres (33%)	10,940 acres (33%)	10,810 acres (33%)	10,330 acres (31%)
Ninemile Divide LAU	6130 acres (18%)	6130 acres (18%)	6108 acres (18%)	5520 acres (16%)
Trout LAU	17,280 acres 46%	17,280 acres 46%	17,130 acres (45%)	16, 880 acres (45%)
McCormick LAU	5600 acres (20%)	5600 acres (20%)	5600 acres (20%)	5562 acres (20%)

■ Recreation

Issue: (No Driving Issues)

The broader scale patterns and types of recreation uses would not change appreciably under any of the alternatives. Relatively low density recreation uses such as driving for pleasure, dispersed camping, firewood gathering, hunting, cross country skiing, snowmobiling, snowshoeing, berry picking, hiking, and horseback riding would continue to occur across most of the fire areas. There would be no change to the designated Recreation Opportunity Spectrum (ROS).

The Ninemile, Flat, and Landowner Fire Areas would continue to offer mostly roaded natural recreation opportunities, while the Alpine Fire area would provide mostly semi-primitive, motorized opportunities.

Firewood gathering would be expected to increase under all alternatives. As fire-killed trees remain near open roads, there would likely be increased levels of firewood collection. Firewood gathering near riparian areas may pose a problem in some areas where desirable species of larger size are readily available. "No-Cutting" signs and law enforcement would help reduce the impacts of these activities. Firewood gathering would diminish after several years, when the supply was depleted near roads.

Increased forage production may increase deer and elk numbers in the burned areas increasing hunter success. However, additional road closures under Alternatives #2, #4, and #5 would reduce motorized hunting opportunities but improve non-motorized, walk-in opportunities.

Under Alternative #1, the current system of open, closed, and seasonally restricted roads would remain in place. Snowmobile use would continue on existing, established routes. In some locations, where the fires have reduced tree densities, off-road use could increase. This would diminish as forest re-growth made off-road travel difficult.

Under Alternatives #2, #4, and #5, motorized vehicle travel on established Forest Roads would be the reduced. Some popular driving routes would be closed or restricted seasonally or yearlong to motorized vehicles. Most of the road closures would occur in the Ninemile and Trout Creek drainages. Included among these changes would be the closure of Forest Road #97 in Eustache Creek, and seasonal restriction of use on Forest Road #412, between Eustache Creek and Siegel Pass.

Under Alternatives #2, #4, and #5, off-road snowmobile use would also be restricted within the fire perimeters for five years. Approximately 34,613 acres would be restricted to off-road use of snowmobiles. Patterns of snowmobile use on established roads would still be permitted under these alternatives.

Alternative #4 would have the greatest impact on motorized vehicle access. In addition to road closures under Alternatives #2 and #5, this alternative would restrict yearlong travel on an additional 20 miles of road. Additional restrictions would occur on popular loop and thru-roads including Forest Road #450 over Windfall Creek, Forest Road #388, over Freezeout Pass, and Forest Roads #5475 and #536, between First Creek and Sawpit Creek.

Alternative #5 would compare closely to Alternative #2, with fewer road closures than Alternative #4. The overall access patterns on

established routes would be left intact. Local road access would, however, be reduced.

■ **Economics**

Issue - BESCO 7: Road System Environmental Impacts, Costs and Analysis
Issue - ECON 3: Contributions to Local Jobs, Counties and Economies
Issue - ECON 5: Product Deterioration and Value Loss
Issue - TIMBE 8: Small Sale Opportunities Needed
Issue - TIMBER 3: Logging System Feasibility
Issue - ECONOMIC 4: Funding for Resource Rehabilitation Activities

Indicators: Net PNV
Indicators: Jobs
Indicators: Estimated Timber Volume
Indicators: Logging Systems
Indicators: Small Sales
Indicators: Costs For Environmental Restoration

Alternative #1 would produce no economic outputs. There would be no return on the $1,000,000 cost of planning and analysis. The $19,200 cost for mushroom permitting and monitoring would be incurred regardless of alternative. Present net value of Alternative #1 would be -$1,000,000. Economic impacts of this alternative would be minimal when compared to other alternatives.

Alternative #2 would accomplish the same management activities of Alternatives #4, and #5 with the exception of timber harvest and a small difference in road restoration work. The total PNV for this alternative would be -$7,575,000. This alternative would generate approximately 184 jobs and $2,526,000 in employee compensation.

Alternative #4 would include the restoration activities proposed in Alternative #2 plus reforestation activities and timber harvest. If all of the offered timber volume were sold, the total PNV for this alternative would be -$10,182,000. This alternative would generate approximately 515 jobs and $7,540,000 in employee compensation. Although this alternative displays a 180 percent increase in employment over Alternative #2, the employee compensation would be 198 percent more than Alternative #2 because of the higher paying jobs associated with timber harvesting and processing. Current market conditions display a negative stumpage value, indicating that some sales under this Alternative may not have bids when offered. This is primarily due to the high percentage (64 percent) of helicopter yarding required under this alternative. Approximately $69,300 of timber revenue would be available to pay for a portion of the $1,391,200 road stabilization costs.

Alternative #5 would include the restoration activities proposed in Alternative #2 plus reforestation activities and timber harvest. Additional timber salvage would occur over that performed in Alternative #4. If all of the offered timber volume were sold, the total PNV for this alternative would be -$9,229,000. This alternative would generate approximately 927 jobs and $16,992,000 in employee compensation. This alternative displays an 80 percent increase in employment over Alternative #4. Employee compensation would be 125 percent more than Alternative #4 because of the increased number of higher paying jobs associated with added timber harvesting and processing. Current market conditions also display a negative stumpage value, indicating that some of the sales in this Alternative may not have bids when offered. This is primarily due to the percentage (43 percent) of helicopter yarding required under this alternative. Approximately $1,579,000 of timber revenue would be available to pay for a portion of the $1,693,000 road stabilization costs.

Table 2.7.12. Comparison of Economic Effects. *Each alternative would vary in total PNVs, job creation, and employee compensation. Variations are often based on proposed activities, including restoration and timber harvest.*

Comparison of Economic Effects

	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Logging Systems Average for Project	0 acres (total)	0 acres (total)	1933 acres (total)	4845 acres (total)
Tractor Yarding (% of Area)	0 acres	0 acres	197 acres (10%)	1353 acres (28%)

Comparison of Economic Effects

	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Skyline Yarding (% of Area)	0 acres	0 acres	354 acres (18%)	1415 acres (29%)
Helicopter Yarding (% of Area)	0 acres	0 acres	1382 acres (72%)	2077 acres (43%)
Logging Systems By Sale				
9 Mile Timber Sale	0 acres (total)	0 acres (total)	597 acres (total)	1127 acres (total)
Tractor Yarding (% of Area)	0 acres	0 acres	73 acres (12%)	500 acres (44%)
Skyline Yarding (% of Area)	0 acres	0 acres	50 acres (8%)	57 acres (5%)
Helicopter Yarding (% of Area)	0 acres	0 acres	473 acres (79%)	570 acres (51%)
Alpine Timber Sale	0 acres (total)	0 acres (total)	91 acres (total)	972 (total)
Tractor Yarding (% of Area)	0 acres	0 acres	4 acres (4%)	302 acres (31%)
Skyline Yarding (% of Area)	0 acres	0 acres	87 acres (968%)	502 acres (52%)
Helicopter Yarding (% of Area)	0 acres	0 acres	0 acres (0%)	168 acres (17%)
St. Louis Timber Sale	0 acres (total)	0 acres (total)	41 acres (total)	79 acres (total)
Tractor Yarding (% of Area)	0 acres	0 acres	23 acres (56%)	43 acres (54%)
Skyline Yarding (% of Area)	0 acres	0 acres	18 acres (44%)	36 acres (46%)
Helicopter Yarding (% of Area)	0 acres	0 acres	0 acres (0%)	0 acres (0%)
Siegel Timber Sale	0 acres (total)	0 acres (total)	34 acres (total)	278 acres (total)
Tractor Yarding (% of Area)	0 acres	0 acres	34 acres (100%)	221 acres (79%)
Skyline Yarding (% of Area)	0 acres	0 acres	0 acres (0%)	57 acres (21%)
Helicopter Yarding (% of Area)	0 acres	0 acres	0 acres (0%)	0 acres (0%)
Pine Creek Timber Sale	0 acres (total)	0 acres (total)	0 acres (total)	50 acres (total)
Tractor Yarding (% of Area)	0 acres	0 acres	0 acres	50 acres (100%)
Skyline Yarding (% of Area)	0 acres	0 acres	0 acres	0 acres
Helicopter Yarding (% of Area)	0 acres	0 acres	0 acres	0 acres
Sunrise Timber Sale	0 acres (total)	0 acres (total)	0 acres (total)	19 acres (total)
Tractor Yarding (% of Area)	0 acres	0 acres	0 acres	19 acres (100%)
Skyline Yarding (% of Area)	0 acres	0 acres	0 acres	0 acres
Helicopter Yarding (% of Area)	0 acres	0 acres	0 acres	0 acres
Landowner Timber Sale	0 acres (total)	0 acres (total)	341 acres (total)	654 acres (total)
Tractor Yarding (% of Area)	0 acres	0 acres	28 acres (8%)	28 acres (4%)
Skyline Yarding (% of Area)	0 acres	0 acres	82 acres (24%)	160 acres (25%)
Helicopter Yarding (% of Area)	0 acres	0 acres	231 acres (68%)	466 acres (71%)
Flat Creek Timber Sale	0 acres (total)	0 acres (total)	830 acres (total)	1666 acres (total)
Tractor Yarding (% of Area)	0 acres	0 acres	35 acres (4%)	190 acres (11%)
Skyline Yarding (% of Area)	0 acres	0 acres	117 acres (14%)	603 acres (36%)
Helicopter Yarding (% of Area)	0 acres	0 acres	678 acres (82%)	873 acres (53%)
Timber Sale Volume	0 mmbf (total)	0 mmbf (total)	12.8 mmbf (total)	36.9 mmbf (total)
9 Mile Timber Sale	0 mmbf	0 mmbf	3.7 mmbf	8.3 mmbf
Alpine Timber Sale	0 mmbf	0 mmbf	0.8 mmbf	9.2 mmbf
St. Louis Timber Sale	0 mmbf	0 mmbf	0.3 mmbf	0.5 mmbf
Siegel Timber Sale	0 mmbf	0 mmbf	1.4 mmbf	1.7 mmbf
Pine Creek Timber Sale	0 mmbf	0 mmbf	0 mmbf	0.2 mmbf
Sunrise Timber Sale	0 mmbf	0 mmbf	0 mmbf	0.2 mmbf
Landowner Timber Sale	0 mmbf	0 mmbf	1.7 mmbf	4.2 mmbf
Flat Creek Timber Sale	0 mmbf	0 mmbf	4.9 mmbf	12.6 mmbf
Sale Size	0 (total)	0 (total)	7 (total)	9 (total)
Small Sales Offered Under 2.0 mmbf	0	0	4	4
Large Sales Offered (Over 2.0 mmbf)	0	0	3	5
Employment Created	15 (total)	184 (total)	515 (total)	927 (total)
Private Sector Jobs	0	152	466	855
Federal Sector (Forest Service) Jobs	15	33	48	72
Employment Compensation	$242,000 (total)	$2,526,000 (total)	$7,540,000 (total)	$16,992,000 (total)
Private Sector Compensation	$0	$2,002,000	$6,763,000	$15,827,000
Federal Sector (Forest Service) Compensation	$242,000	$525,000	$778,000	$1,165,000

Comparison of Economic Effects

	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Jobs and Income ($1000) by Activity				
Forest Products	0	0	185	594
	$0	$0	$4,203	$13,619
Road Restoration and BMPs	0	73	72	73
	$0	$1,308	$1,281	$1,316
Reforestation	0	0	148	148
	$0	$0	$842	$842
Watershed Restoration	0	67	67	67
	$0	$529	$529	$529
Noxious Weed Treatment	0	7	7	7
	$0	$45	$45	$45
Mine Restoration	0	21	21	21
	$0	$376	$376	$376
Heritage Site Protection	0	2	2	2
	$0	$24	$24	$24
Planning and Analysis	15	15	15	15
	$242	$247	$247	$247
Sale Net Value (PNVs)				
Upper Ninemile	$0	$0	-$593.3	-$587.8
Alpine	$0	$0	$33.5	$440.7
St. Louis	$0	$0	-$4.1	-$11.3
Siegel	$0	$0	-$3.8	$71.9
Pine	$0	$0	$0	-$12.0
Sunrise	$0	$0	$0	-$0.3
Landowner	$0	$0	-$109.5	-$262.1
Flat	$0	$0	-$446.5	$13.3
Present Net Value (PNVs)	-$1000.0 (total)	-$7,575.0 (total)	-$10,182.0 (total)	-$9,229.0 (total)
Total Timber Sale Revenue ($1000)	$0	$0	-$500.1	$1,809.0
Total Sale PNVs ($1000)	$0	$0	-$1,189.6	-$2432.0
Reforestation Cost PNVs ($1000)	$0	$0	-$2,003.0	-$2,003.0
Watershed Restoration PNVs ($1000)	$0	-$1,510.0	-$1,510.0	-$1,510.0
Heritage Protection PNVs ($1000)	$0	-$50.2	-$50.2	-$50.2
Road Rehabilitation PNVs ($1000)	$0	-$4,088.9	-$3,868.2	-$3,888.1
Noxious Weed Management PNVs ($1000)	$0	-$123.7	-$123.7	$123.7
Mushroom Permitting PNVs ($1000)	-$19.2	-$19.2	-$19.2	-$19.2
Planning (NEPA) Costs PNVs ($1000)	-$1000.0	-$1000.0	-$1000.0	-$1000.0

2.8 Identification of the Agency's Preferred Alternative

The Lolo National Forest Supervisor has identified **"Alternative #5**" as the agency's preferred alternative (40 CFR 1502.14(e)).

Alternative #5 more closely fulfills the objectives of the Post Burn Project as stated within the Purpose and Need than the other proposed alternatives. It also more closely meets the statutory mission and responsibilities of the Lolo National Forest, as stated within the Goals, Objectives, and Standards of the Lolo National Forest Plan. Furthermore, it implements the majority of objectives identified within the National Fire Plan, Region 1 Assessment "*Toward Restoration and Recovery*", and the USDA, Forest Service Strategy.

Given consideration of the environmental, technical, social, and economic factors identified through both internal and external scoping, this alternative more closely balances the issues, concerns and opportunities associated with restoring and recovering watersheds and the land, and working with communities and people. By combining timber generated revenue with allocated National Fire Plan funds, Alternative #5 allows for the expedient implementation of resource restoration and recovery projects including soil stabilization, mine and stream reclamation, road decommissioning, culvert

replacements and removals, weed spraying, and road reconstruction with Best Management Practices (BMPs). With carefully selected Design Criteria, Mitigation Measures, and Monitoring Requirements, this alternative protects and improves watershed conditions, and protects or improves habitat for sensitive, threatened, and endangered fish and wildlife species.

2.9 Identification of the Environmentally Preferred Alternative

"Alternative #4" has been identified as the environmentally preferred alternative (40 CFR 1502.14(e)).

Alternative #4 would cause the fewest combined adverse effects to water quality, aquatic habitat, and fisheries resources while meeting all of the objectives of the Post Burn Project as stated within the Purpose and Need. This alternative would restore water quality, fisheries habitat, and stabilize soils impacted by the fires of 2000. This alternative would also restore vegetation structure and reduce fuels in individual VRU 2 stands where fire return intervals are most disharmonious with natural regimes. This alternative would maximize protection of potential wildlife linkages and corridors by implementing road closures and travel restrictions on well-established Forest Roads.

This alternative meets the statutory mission and responsibilities of the Lolo National Forest, as stated within the Goals, Objectives, and Standards of the Lolo National Forest Plan. Furthermore, it implements the majority of objectives identified within the National Fire Plan, Region 1 Assessment *"Toward Restoration and Recovery"*, and the USDA, Forest Service Strategy.

Given consideration of the environmental, technical, and economic factors identified through both internal and external scoping, this alternative most clearly represents the issues, concerns and opportunities associated with environmental protection and restoration.