

CHAPTER 2 – ISSUES AND ALTERNATIVES

INTRODUCTION

This chapter is the "heart" of the environmental analysis (40 CFR 1502.14). It describes the alternatives considered to achieve the purpose and need discussed in Chapter I. The National Environmental Policy Act (NEPA) requires federal agencies to "identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment" (40 CFR 1500.2(e)). Alternatives were developed in response to those issues identified during scoping and determined to be truly significant to the decision. The alternatives serve to define the effects and trade-offs of the proposed actions. This chapter discusses four action alternatives in detail and a "no action" alternative. In addition, discussion is provided on: a) issues and the scoping process; b) features common to all action alternatives, including mitigation and monitoring; c) comparison of alternatives; and d) alternatives considered but not analyzed in detail.

ISSUES AND THE SCOPING PROCESS

The Scoping Process

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

- The original EA released in March 1999 was preceded by an initial scoping period that helped define the public issues and concerns.
- Upon publication, a 30-day comment period solicited comments on the resulting analysis of alternatives.
- With signing of the Decision Notice in May 1999, a Response To Comment Appendix was included with the Notice.
- With the subsequent remand of the Decision by the 9th Circuit Court of Appeals in 2002, a request for review and comment of the Revised EA was sent to previous respondents and others who expressed interest in December 2002.
- Due to the need to update the entire analysis to reflect currency of new regulations (i.e. Canada lynx listing) and environmental conditions since the May 1999 original decision, the new comments were used to further develop the second revision to the EA.

A general description of public involvement is located in *Chapter 4-1, Chronology of Public Participation Activities*.

Issues - Significant and Nonsignificant Factors in the Decision

The purpose of scoping is not only to identify a list of issues and concerns regarding a proposal, but also to determine the significant issues to be analyzed in depth. It is the significant issues that become the focus of interdisciplinary interaction and alternative development. The NEPA provides for the identification and elimination from detailed study those issues which are not significant or which have been covered by prior environmental review, thus narrowing the discussion of those issues to a brief statement as to why they will

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not have a significant effect on the human environment or by providing reference to their coverage elsewhere (40 CFR 1501.7(3)).

On 4/8/98, the Interdisciplinary (ID) team for the Darroch-Eagle Creek Timber Sale met to identify potential issues for the project (Kujawa 1998a). As a result, 35 issues were listed and included in a 5/20/98 scoping letter to the public. In response to scoping comments, the District ID team refined the list of issues, which would then be used to guide analysis of the project. A total of 36 issues (great gray owl was added to original list) were identified that could be relevant to the proposed timber sale. Each issue was then considered by the appropriate ID team member (resource specialist) to determine how/if it was related to the proposed action.

Based on the assessment of effects and all of the further public comment as described above, the agency has determined that the issues have not appreciatively changed from the original assessment and that most issues could be adequately mitigated or addressed by design or other aspects of the proposed Darroch-Eagle Creek Timber Sale. A number of issues were found to be nonsignificant to the decision and have not been discussed in detail in this EA. While these concerns are important, they were either unaffected or mildly affected by the proposed action, or the effects could be adequately mitigated. A discussion of effects related to these issues can be found in *Appendix A, Issue Disposition Summary*. Documentation of the review of comments and issues can also be found in the project file (PF).

Following are the issues analyzed but found to not be significant factors or relevant to the decision for proposed timber harvesting in the Darroch Creek, Bear Creek, and North Fork Bear Creek drainages. These issues are discussed in *Appendix A, Issue Disposition Summary*.

8. Other Threatened, Endangered, and Proposed Wildlife Species (i.e. Canada lynx, bald eagle, gray wolf (USFWS 2002))
9. Sensitive Fish and Wildlife Species
10. Sensitive Plants
11. Other Management Indicator Species
12. Bison
13. Black Bear
14. Mountain Lion
15. Squirrels
16. Neotropical Migrant Birds
17. Raptors
18. Great Gray Owls
19. Snag Habitat and Down Woody Debris
20. Old Growth
21. Fragmentation/Biodiversity/Biological Corridors
22. Water Quality, Yield, Stream Condition
23. Aquatic Resources
24. Soils - Compaction, Productivity, Stability
25. Air Quality
26. Visual Quality
27. Recreation Use, Including Commercial Recreation (outfitting)
28. Wilderness
29. Roadless Areas
30. Cultural Resources
31. Public Safety - Traffic
32. Noxious Weeds
33. Silviculture - NFMA Requirements
34. Harvest Administration
35. Environmental Justice
36. Other Effects

The following issues were considered to be factors in the decision to be made.. These issues are discussed in detail because either they are a decision factor for the deciding official or they are, or have been, of special interest and concern to the public on similar proposals in the past.

Issue 1. Grizzly Bears. This project is located within Grizzly Bear Management Situation 1 habitat. Grizzly bears are a threatened species under the Endangered Species Act. The proposed harvest, road development, and post-harvest activities may affect grizzly bear habitat and use of the area by bears. This issue consists of six subissues: 1) loss of foraging habitat; 2) changes in hiding and security cover; 3) increased potential for bear mortalities; 4) changes in denning habitat; 5) changes in prey base; and 6) increased availability of human attractants.

Issue 2. Ungulates. Ungulates (such as elk, mule deer, and moose) are a part of the prey base for the threatened grizzly bear. This project is located within grizzly bear habitat and may affect ungulate security, hiding and thermal cover, foraging habitat, and migration/travel routes, and therefore, may indirectly affect grizzly bears. There is also a concern that existing open road density (and projected road density following harvest) may not meet the Forest Plan standard for Habitat Effectiveness Index (HEI) (Kempf 2003).

Issue 3. Economics. One purpose of this project is .to generate revenue from the sale of timber for repayment of LWCF funds borrowed to complete the purchase of the Taylor Fork tracts. A guiding principle (Planning Criterion 15) and concern is that the timber sale be economically feasible and as efficient as possible. This issue is a measure of effectiveness at meeting the project's purpose and need. Also, some comments received during scoping raised the issue of "below cost" timber sales...the concern that timber sales return less money to the treasury than it costs the Forest Service to bring standing trees to market.

Issue 4. Vegetative Diversity. The Forest-wide standard for vegetative diversity (FP standard 6.c., pp. II-19 and 20), states; "(1) Forest lands and other vegetative communities such as grassland, aspen, sagebrush and whitebark pine will be managed by prescribed fire and other methods to produce and maintain the desired vegetative conditions; (2) In order to achieve size and age diversity of vegetation, the Forest will strive to develop the following successional stages in timber compartments containing suitable timber: 10% grass-forb, 10% seedling/sapling, 10% pole, 10% mature, and 10% old growth.

Currently, the project analysis area (Compartments 305, 306) does not meet the Forest Plan standard. The present vegetative condition (shown in Table 2-1 below) is above the standard in older aged forests (62% mature and old growth) and below the standard in younger aged forests: seedlings (<1%), saplings (3.4%), and pole-size (<1%) components (Kujawa 1999c). The proposal and other two action alternatives will be unable to meet the standard. Therefore, a project-specific amendment to exempt this project from the vegetative diversity standard will be needed.

Table 2-1. Current vegetative diversity in project area.

Component	% of Area
Grass-Forb (natural)	25.2%
Grass-Forb (harvested)	<1%
Seedlings	<1%
Saplings	3.4%
Pole	<1%
Mature	23.4%
Old Growth	38.5%

Issue 5. Firewood Availability. The proposed timber harvesting and road management may affect the availability of firewood for the local Gardiner community.

Issue 6. Small Timber Operations. The proposed timber harvesting may reduce the availability of trees for local small timber or sawmill operators. A local resident expressed concern about loss of opportunity to purchase future small sales. A related scoping comment suggested that the Darroch-Eagle Creek Timber Sale is not compatible with community sentiment favoring small-scale, noncommercial or custom harvesting. The commenter goes on to state that this sentiment was expressed in the development of the Park County Comprehensive Land Use Plan.

Issue 7. Openings Exceeding 40 Acres. Some units proposed for harvest in some of the action alternatives would create openings that exceed 40 acres in size. According to the Forest Plan (Appendix A, p. A-11) and NFMA (36 CFR 219.27 (d)(2)), size of tree openings created by even-aged silviculture will normally be 40 acres or less. Cut openings larger than 40 acres may be permitted where larger units will produce a more desirable combination of net public benefits. Factors to consider in determining net public benefits include (but are not limited to): effect on wildlife and fish habitat, environmental and forest pest hazards to regeneration, effect on water quality and quantity and visual absorption capability, and relative total costs of preparation and administration.

ALTERNATIVES CONSIDERED IN DETAIL

This section is divided into four subsections: 1) Development of Alternatives; 2) Alternative Descriptions; 3) Features Common to all Action Alternatives, Including Mitigation and Monitoring; and 4) Comparison of Alternatives. The interdisciplinary team reviewed and analyzed the relevant issues and factors and used this information to identify 12 alternatives. Five alternatives (A - No Action, B, C, D, and D-Modified-preferred) are addressed in detail in the environmental assessment. Five additional alternatives were eliminated from detailed analysis and are discussed later in this chapter (Alternatives E-I).

Development of Alternatives

The initial Darroch-Eagle Creek (Jardine) Timber Sale proposal (Kujawa 1999b) was developed with the intent to comply with the "Planning Criteria for All Timber Harvest Rights Identified for Exchange" as outlined in the *Report to the Montana Congressional Delegation, Proposed Gallatin Land Consolidation*, September 1997 (USDA Forest Service 1997). These Planning Criteria include the following:

1. Comply with applicable federal and state natural resource laws, i.e. Clean Water Act, Endangered Species Act, Historic Preservation Act.
2. Be designed with sound science and silvicultural treatments.
3. Be defensible, not violate professional integrity.
4. Locate outside of Inventoried Roadless Areas.
5. Locate outside of watersheds which currently do not meet Montana Water Quality standards. For streams that have "Water Quality Limited Segments" (WQLS), manage sediment generating activities to levels that would result in no net increase in delivered sediment to the WQLS.
6. Avoid harvest within riparian areas (approximately 100 feet from the edges of perennial streams, and intermittent streams with a distinct riparian vegetative community and rock substrate stream channel).
7. Sediment increases that may occur will be constrained by Gallatin Forest Plan "Implementation Guidelines," which are designed to protect beneficial uses, particularly trout spawning habitat.
8. For watersheds that contain stream courses supporting westslope or Yellowstone cutthroat trout, the standard is to have "no effect" or a "beneficial effect" on fish habitat and water quality.
9. Meet Gallatin Forest Plan standards and guidelines for basic resource protection, i.e. for soil, air and water. Strive to meet all other Forest Plan standards and guidelines, but recognize that in current checkerboard land areas, certain standards and guidelines (e.g., HEI, road density, visuals) cannot be met at this time. The Forest will develop a set principles to guide future management of consolidated land areas (Taylor Fork, Gallatin Roaded and Bangtails).
10. Comply with federal, state and local recovery and management plans for threatened and endangered (T/E) species. A Biological Assessment for T/E species will be written. USFWS will be contacted as needed by the findings of the Biological Assessment.
11. Within the Grizzly Bear Recovery Zone, timber harvest must be compatible with recovery. Comply with the Gallatin Forest Plan Amended Biological Opinion (1/31/95), which means manage lands within the Recovery Zone to not increase "open" or "total" motorized access route density above current levels,

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and not decrease the amount of "core areas" below current levels, unless allowed through consultation with USFWS.

12. Where "sensitive species" of terrestrial wildlife occur, activities will not occur if the finding is likely to result in loss of viability or trend toward federal listing.

13. Carefully consider effects on wildlife in the timing and location of harvest activities.

14. Manage snags and dead/down material according to FP Amendment 15.

15. Be economically feasible. Extensive road construction and reconstruction will be avoided where possible. Helicopter logging will only be considered where other harvest options are not available. Be sawtimber sales, with only incidental inclusion of other products.

16. New roads will be closed and vegetated after harvest and post-sale activities. Road standards will be the minimum needed to access timber while protecting basic resources.

17. Undergo interdisciplinary analysis and documentation, public involvement, and coordination with other state and federal agencies. A process that parallels typical NEPA evaluation including interdisciplinary team (IDT) analysis, documented specialists input and coordination with state and federal agencies will be conducted.

Upon additional analysis by the team, as well as public comment received during scoping, the original Darroch-Eagle Creek Proposed Action was found to be inconsistent with one or more of the Planning Criteria and/or the significant issues raised. Several other alternatives were considered. Three of these, along with the original Proposed Action and the No Action Alternative, were studied in detail. In addition, mitigation measures were developed to help address issues. These mitigation measures are integral components of the four action alternatives.

Alternative Descriptions

Alternative A- (No Action)

The NEPA requires the consideration of a "no action" alternative (40 CFR 1502.14d) where none of the proposed actions identified in Chapter 2 would occur. This alternative provides a baseline of comparison to aid in determining the significance of issues and effects of the proposed action. Under this alternative, no timber harvest, reforestation, road construction, or reconstruction would occur. No project-specific Forest Plan amendments would be needed, although some environmental conditions would remain outside of identified standards due to existing conditions. This alternative responds to concerns that oppose any additional vegetation manipulation or road construction in the project area, however, No Action also represents looking for other options to help reimburse the borrowed LWCF funds (including implementation of other timber sales on the Gallatin or other Eastside forests, the sale of Forest Service land and/or facilities, use of other National Forest Funds (NFF) generated). Other activities described in *Chapter 3-2, Reasonably Foreseeable Future Activities* would still likely occur.

Alternative B – (Proposed Action)

This alternative is the Proposed Action described in *Chapter 1-3*. It was the initial proposal developed to meet the project purpose and need. Alternative B includes the following five components:

1. **Timber Harvest and Reforestation:** Timber harvest and reforestation is proposed on a maximum of about 449 acres of forest land classified as suitable for timber management by the Gallatin Forest Plan (1987). Harvest prescriptions for identified units include silvicultural treatments that remove approximately 60-80% of the mature and overmature lodgepole pine, Douglas-fir, Engelmann spruce, or subalpine fir (depending on the forest type). Methods used to remove the timber include tractor skidding on 285 acres and cable yarding on 164 acres. As per the Timber Sale Contract Provision

(CT6.316# Limited Operating Period) no contract related activities would be permitted in the Darroch Creek subdivision of the sale from December 1 to May 1 of each year. In the Eagle Creek subdivision, contract related activities would be prohibited from October 16 to June 30 of each year (units #14 and #15). Harvest related activities would continue for up to three years. The harvest operations would be authorized and controlled via a standard Forest Service timber sale contract administered by the Forest Service. This proposal would produce approximately 3.4 million board feet (MMBF) of timber from live and insect-killed or damaged timber within the Bear Creek drainage. Because this alternative would create openings greater than 40 acres, this alternative would require Regional Forester approval to implement.

Slash treatment and site preparation for reforestation of the harvested stands would be conducted after the harvest operation, as needed. Methods would include lopping slash and mechanical trampling and piling on the gentler slopes (tractor ground) and lopping and yarding entire trees to landings on the steeper slopes (cable ground). Natural regeneration is planned for 339 acres and artificial regeneration (planting of nursery tree stock - a diversity of native species) would occur on 110 acres. If monitoring indicates natural regeneration is not meeting stocking standards and legal requirements, then planting would be conducted to augment natural methods.

Table 2-2 below is a schematic of the estimated timeframe for the Darroch-Eagle Creek Timber Sale for all of the action alternatives

Table 2-3 shows acres, silvicultural treatments, and harvest systems proposed for each unit for Alternative B. **Map E-1** (Appendix E) displays the location of proposed harvest units, road construction, reconstruction, and pre-sale road closures.

Table 2-2. Activity schedule (estimated) for the Darroch-Eagle Creek Timber Sale (all alternatives).

Activity	2004	2005	2006	2007	2008
Road construction and reconstruction					
Harvest and hauling					
Slash treatment and site prep ¹					
Firewood removal (personal use minor)					
Close new roads (minor)					

¹ Slash treatment and site preparation will occur concurrently with or immediately after harvesting. For example, yarding tops will occur during harvest operations, when a yarder is on site.

- Road Construction and Reconstruction:** Harvest operations would require construction of approximately 2.0 miles of "specified" road and reconstruction of 4.4 miles of existing system roads. After the sale is completed and the landings have been open to firewood gathering for about two seasons (see *Mitigation, Chapter 2-25*), the newly constructed roads would be closed according to guidelines described in the section *Features Common To All Action Alternatives, Including Mitigation and Monitoring, Chapter 2-23*. Additional information on road construction/reconstruction activities is available in the project file.

Note: To mitigate the effects of any new road construction on grizzly bear security habitat, stabilization and closure of approximately 1.4 miles of existing open system roads (#3245 & #3243B) and improvement of the closure barrier on 0.4 miles of a currently closed road (#6976C) in the project area. Was implemented in 1999. The closures involved: a) revegetating the road surface where needed to reduce soil erosion and to maintain slope stability and b) installing new or maintaining existing barriers sufficient to preclude use of the road by motorized vehicles. These roads were selected based on their relatively low contribution to motorized access for personal-use firewood cutting and dispersed recreation and based on benefits to wildlife and watershed values. Map E-1 in Appendix E shows the pre-sale road closures.

3. **Amendment to the Forest Plan Standard for Elk Effective Cover (FP, page II-18).** If the decision for this project were not to include sufficient additional closures of existing roads, a Project-specific Forest Plan Amendment would be required to exempt the proposed road construction and road closure actions associated with this harvest project from having to achieve the Forest Plan standard of an elk effective cover (or HEI) rating of 70% (see *Road Closure Options described in Chapter 1-6 and Chapter 2-19*). As discussed in Chapter 1, calculations for the current condition resulted in an HEI value of 58% for the Eagle Creek HAU¹; 62% for the Upper Bear Creek HAU; and 49% for the Palmer Mountain HAU, all below the Forest Plan standard (Kempff, 2003). To access timber stands to be harvested, this alternative includes up to 2.0 miles of new road construction. These roads would then be closed after harvest, post-sale treatments, and public firewood gathering activities are complete. However, closing all new roads constructed for this project would still leave open road density and HEI values at existing levels, below the Forest Plan standard. HEI values would also be reduced slightly in the Upper Bear Creek HAU during the life of the project due to new road construction. The commensurate pre-sale road closures conducted in 1999 were intended to compensate for this temporary increase in road density.

Table 2-3. Alternative B (proposed action) - harvest unit summary.

Unit No.	Acres	Treatment Method ¹	Volume (MBF)	Logging System	Reforestation	Fuels/Site Prep
1	43	Cut 70%, Leave 30%	330	Cable	Plant 28 ac Natural 15 ac	Entire tree yard (ETY) 50%, lop 50%
2	18	Cut 70%, Leave 30%	144	Tractor 10 ac Cable 8 ac	Plant 10 ac Natural 8 ac	Tractor: lop/trample Cable: lop
3	58	Cut 80%, Leave 20%	580	Tractor 15 ac Cable 43 ac	Natural	Tractor: trample/pile Cable: ETY 50%, lop 50%
4	52	Cut 80%, Leave 20%	488	Tractor 20 ac Cable 32 ac	Natural	Tractor: trample/pile Cable: lop
5	19	Cut 80%, Leave 20%	114	Tractor	Natural	Lop
6	11	Cut 80%, Leave 20%	64	Tractor	Natural	Lop
7	12	Cut 80%, Leave 20%	120	Tractor 7 ac Cable 5 ac	Natural	Tractor: lop/scatter Cable: ETY 50%, lop 50%
8	25	Cut 80%, Leave 20%	175	Tractor	Natural	Lop/trample
9	27	Cut 80%, Leave 20%	270	Tractor	Natural	Lop/trample
10	24	Cut 70%, Leave 30%	168	Cable	Natural	Lop
11	14	Cut 70%, Leave 30%	126	Tractor 5 ac Cable 9 ac	Plant 9 ac Natural 5 ac	ETY 50%, lop 50%
12	24	Cut 60%, Leave 40% 8 ac Cut 80%, Leave 20% 16 ac	120	Tractor	Plant 8 ac Natural 16 ac	Lop 8 ac Lop/trample 16 ac
13	25	Cut 60%, Leave 40%	75	Tractor	Plant	Lop
14	52	Cut 80%, Leave 20%	312	Tractor	Plant 30 ac Natural 22 ac	Lop/trample
15	36	Cut 80%, Leave 20%	288	Tractor	Natural	Lop
16	9	Cut 70%, Leave 30%	36	Tractor	Natural	Lop
Total	449		3,410			

¹ See sketches A-E showing projected appearance of units after harvest on either tractor or cable ground.

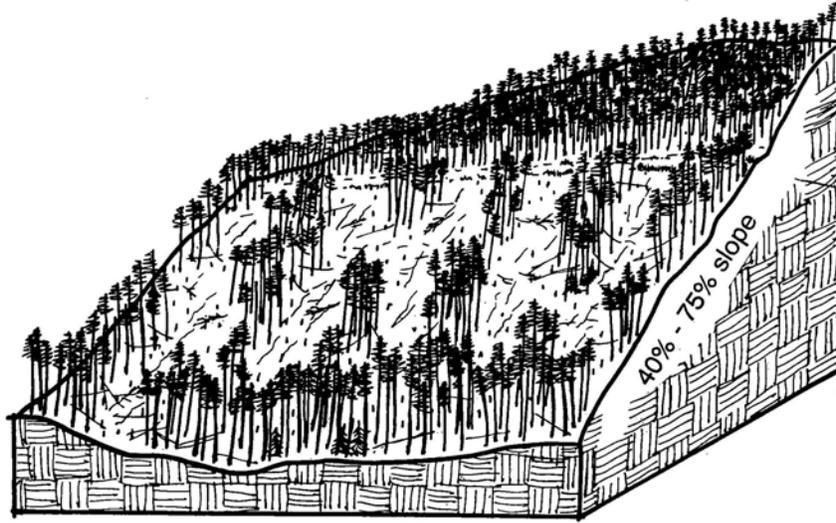
¹ HEI is actually higher than reflected in the Eagle Creek HAU during the general fall hunting season due to seasonal gate closures on portions the Eagle Creek Road # 3243 (5 miles) and the Pole Gulch Road #3243a (.5 miles) that are currently in effect.

4. ***Vegetative Diversity Amendment:*** Approve a site-specific Forest Plan amendment to exempt the project from the Forest Plan standard for vegetative diversity (Forest-wide standard 6.c.2, FP, pp. II-19 and 20). The standard states, "(1) Forest lands and other vegetative communities such as grassland, aspen, sagebrush and whitebark pine will be managed by prescribed fire and other methods to produce and maintain the desired vegetative conditions. (2) In order to achieve size and agediversity of vegetation, the Forest will strive to develop the following successional stages in timber compartments containing suitable timber: 10% grass/forb, 10% seedling/sapling, 10% pole-size forest, 10% mature forest, and 10% old growth forest."

Presently, Compartments 305 and 306 are not meeting the standard. The existing condition for vegetative structural composition is below the standard in the seedling (<1%), sapling (3.4%) and pole-size (<1%) forest components. The greatest percentage of the area consists of older-aged forests (61.9% mature and old growth). After implementation of Alternative B, the structural stages would be: 25.24% grass/forb-natural, 0.89% grass/forb-harvested, 0.14% seedlings, 3.41% saplings, 0.32% pole, 23.32% mature and 37.83% old growth. The harvesting proposed in Alternatives B would increase the amount of grass/forb component in the short term, and seedling, sapling, and pole component in the long term; however, the proposed harvesting will not change enough of the structure for these three components to achieve the FP standard of 10% for each.

5. ***Grizzly Bear - Distance to Hiding Cover:*** The Forest Service proposes a site-specific amendment to exempt the project from the Forest Plan standard for meeting distance-to-hiding-cover requirements in Appendix G of the Forest Plan (Appendix G standard 4.A(3), FP, p. G-11). The standard states, "Regeneration harvest units should be irregular in shape and have no point more than 600 feet from cover." The proposal (Alternative B) would not meet this distance requirement. Specifically, Units 1, 3, 8, 9, and 13 would have small portions further than 600 feet to hiding cover.

SKETCH A



Conceptual sketch of a typical treatment method for cut 80%, leave 20%, cable harvest.

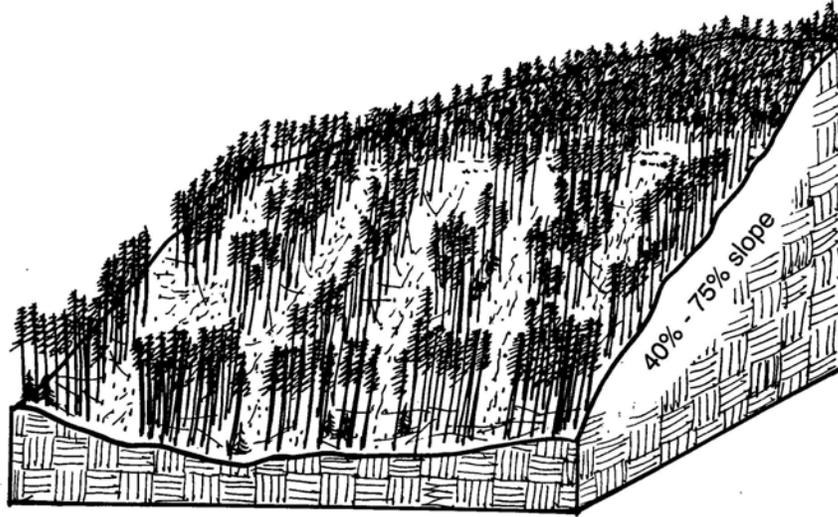
SKETCH B



Conceptual sketch of a typical treatment method for cut 80%, leave 20%, tractor harvest.

Note: Drawing format adapted from Forest Ecosystem Stewardship, R. Logan, Montana State University Extension Service, 1996.

SKETCH C



Conceptual sketch of a typical treatment method for cut 60%, leave 40%, cable harvest.

SKETCH D



Conceptual sketch of a typical treatment method for cut 60%, leave 40%, tractor harvest.

SKETCH E



Conceptual sketch of a typical thinning treatment for cut 50%, leave 50%, tractor harvest.

Alternative C

This alternative was developed to better meet the project purpose and need and Planning Criterion 15 (economic feasibility) than Alternative B. It increases net revenue generated by eliminating: a) harvest units that would have yielded relatively low volumes of timber and b) the associated 1.1 mile of road construction to access those units. Alternative C includes the following five components:

1. **Timber Harvest and Reforestation:** Timber harvest and reforestation is proposed on approximately 373 acres of forest land classified as suitable for timber management by the Gallatin Forest Plan (1987). Harvest prescriptions for identified units include silvicultural treatments that remove approximately 60-80% of the mature and overmature lodgepole pine, Douglas-fir, Engelmann spruce, or subalpine fir (depending on the forest type). Methods used to remove the timber include tractor skidding on 318 acres and cable yarding on 65 acres. As per the Timber Sale Contract Provision (CT6.316# Limited Operating Period) no contract related activities would be permitted in the Darroch Creek subdivision of the sale from December 1 to May 1 of each year. In the Eagle Creek subdivision, contract related activities would be prohibited from October 16 to June 30 of each year (units #14 and #15). Harvest related activities would continue for up to three years. The harvest operations would be authorized and controlled via a standard Forest Service timber sale contract administered by the Forest Service. This proposal would produce approximately 2.9 MMBF of timber from live and insect-killed or damaged timber within the Bear Creek drainage. Because this alternative would create openings greater than 40 acres, this alternative would require Regional Forester approval to implement.

Slash treatment and site preparation for reforestation of the harvested stands would be conducted after the harvest operation, as needed. Methods would include lopping slash and mechanical trampling and piling on the gentler slopes (tractor ground) and lopping and yarding entire trees to landings on the steeper slopes (cable ground). Natural regeneration is planned for 314 acres and planting would occur on 69 acres. If monitoring indicates natural regeneration is not meeting stocking standards and legal requirements, then planting would be conducted to augment natural methods.

The estimated timeframe for this alternative is similar to Alternative B (*See Table 2-2) Chapter 2-7*. Table 2-4 shows acres, silvicultural treatments, and harvest systems proposed for each unit in Alternative C. *Map E-2* displays the location of proposed harvest units, road construction, reconstruction, and pre-sale road closures.

2. **Road Construction and Reconstruction:** Harvest operations would require construction of approximately 0.9 miles of "specified" road and reconstruction of 4.4 miles of existing system roads. After the sale is completed and the landings have been open to firewood gathering for about two seasons (*see Mitigation, Chapter 2-25*), the newly constructed roads would be closed according to guidelines described in the section *Features Common To All Action Alternatives, Including Mitigation and Monitoring, Chapter 2-23*. Additional information on road construction/reconstruction activities is available in the project file.

Note: To mitigate the effects of any new road construction on grizzly bear security habitat, stabilization and closure of approximately 1.4 miles of existing open system roads (#3245, #3243B) and improvement of the closure barrier on 0.4 miles of a currently closed road (#6976C) in the project area was implemented in 1999. The closures involved: a) revegetating the road surface where needed to reduce soil erosion and to maintain slope stability and b) installing new or maintaining existing barriers sufficient to preclude use of the road by motorized vehicles. These roads were selected based on their relatively low contribution to motorized access for personal-use firewood cutting and dispersed recreation and based on benefits to wildlife and watershed values. *Map E-1* shows the pre-sale road closures.

3. **Amendment to the Forest Plan Standard for Elk Effective Cover (FP, page II-18).** If the decision for this project were not to include sufficient additional closures of existing roads, a project-specific Forest Plan amendment would be required to exempt the proposed road construction and road closure actions associated with this harvest project from having to achieve the Forest Plan standard of an elk effective cover (or HEI) rating of 70% (see *Road Closure Options described in Chapter 1-6 and Chapter 2-19*). As discussed in Chapter 1, calculations for the current condition resulted in an HEI value of 58% for the Eagle Creek HAU¹; 62% for the Upper Bear Creek HAU; and 49% for the Palmer Mountain HAU, all below the Forest Plan standard (Kempff, 2003). To access timber stands to be harvested, this alternative includes up to 0.9 miles of new road construction. These roads would then be closed after harvest, post-sale treatments, and public firewood gathering activities are complete. However, closing all new roads constructed for this project would still leave open road density and HEI values at existing levels, below the Forest Plan standard. HEI values would also be reduced slightly in the Upper Bear Creek HAU during the life of the project due to new road construction. The commensurate pre-sale road closures conducted in 1999 were intended to compensate for this temporary increase in road density.

Table 2-4. Alternative C - harvest unit summary.

Unit No.	Acres	Treatment Method ¹	Volume (MBF)	Logging System	Reforestation	Fuels/Site Prep
1	43	Cut 70%, Leave 30%	330	Tractor	Natural	Entire tree yard (ETY) 50%, lop 50%
2	18	Cut 70%, Leave 30%	144	Tractor 10 ac Cable 8 ac	Plant 10 ac Natural 8 ac	Tractor: lop/trample; Cable: lop
3	40	Cut 80%, Leave 20%	400	Tractor 15 ac Cable 25 ac	Natural	Tractor: trample/pile Cable: ETY 50%, lop 50%
4	52	Cut 80%, Leave 20%	488	Tractor 20 ac Cable 32 ac	Natural	Tractor: trample/pile Cable: lop
5	19	Cut 80%, Leave 20%	114	Tractor	Natural	Lop
6	11	Cut 80%, Leave 20%	64	Tractor	Natural	Lop
8	30	Cut 80%, Leave 20%	210	Tractor	Natural	Lop/trample
9	32	Cut 80%, Leave 20%	320	Tractor	Natural	Lop/trample
12	24	Cut 60%, Leave 40% 8 ac Cut 80%, Leave 20% 16 ac	120	Tractor	Plant 8 ac Natural 16 ac	Lop 8 ac Lop/trample 16 ac
13	25	Cut 60%, Leave 40%	75	Tractor	Plant	Lop
14	44	Cut 80%, Leave 20%	352	Tractor	Plant 26 ac Natural 18 ac	Lop/trample
15	36	Cut 80%, Leave 20%	288	Tractor	Natural	Lop
16	9	Cut 70%, Leave 30%	36	Tractor	Natural	Lop
Total	383		2,941			

¹ See sketches A-E showing projected appearance of units after harvest on either tractor or cable ground.

4. **Vegetative Diversity Amendment:** Approve a site-specific Forest Plan amendment to exempt this alternative from the Forest Plan standard for vegetative diversity. Presently, Compartments 305 and 306 are not meeting the standard. The existing condition for vegetative structural composition is below the standard in the seedling (<1%), sapling (3.4%) and pole-size (<1%) forest components. The greatest percentage of the area consists of older-aged forests (61.9% mature and old growth). After implementation of Alternative C, the structural stages would be: 25.24% grass/forb-natural, 0.78% grass/forb-harvested, 0.14% seedlings, 3.43% saplings, 0.32% pole, 23.33% mature and 37.93% old growth. Similar to Alternative B, Alternative C would increase the amount of grass/forb harvested component in the short term, and seedling, sapling, and pole component in the long term. However,

¹ HEI is actually higher than reflected in the Eagle Creek HAU during the general fall hunting season due to seasonal gate closures on portions the Eagle Creek Road # 3243 (5 miles) and the Pole Gulch Road #3243a (.5 miles) that are currently in effect.

the proposed harvesting will not change enough of the structure for these three components to achieve the FP standard of 10% for each.

5. **Grizzly Bear - Distance to Hiding Cover:** The Forest Service proposes a site-specific amendment to exempt the project from the Forest Plan standard for meeting distance-to-hiding-cover requirements in Appendix G of the Forest Plan (Appendix G standard 4.A(3), FP, p. G-11). The standard states, "Regeneration harvest units should be irregular in shape and have no point more than 600 feet from cover." Alternative C would not meet this distance requirement. Specifically, Units 1, 3, 9, and 13 would have small portions further than 600 feet to hiding cover.

Alternative D

This alternative was developed to economically fulfill the purpose and need while avoiding creating openings greater than 40 acres in size. The analysis shows (by comparing effects of alternatives) there is no apparent biological reason that would support creating openings over 40 acres in size. The reasons that suggest exceeding this size limit are driven by economic efficiency and maximizing timber receipts (the project's primary purpose and need). Both of these factors would favor cutting larger units. However, the agency believes those reasons alone would not meet with Regional Forester approval, as required. Also, the conditions required for an exception to obtaining his approval are not present (FP, pp. II-22 and A-11). Alternative D includes the following four components:

1. **Timber Harvest and Reforestation:** Timber harvest and reforestation is proposed on approximately 266 acres of suitable forest land. Harvest prescriptions for identified units include silvicultural treatments that remove approximately 60-80% of the mature and overmature lodgepole pine, Douglas-fir, Engelmann spruce, or subalpine fir (depending on the forest type). Methods used to remove the timber include tractor skidding on 178 acres and cable yarding on 88 acres. As per the Timber Sale Contract Provision (CT6.316# Limited Operating Period) no contract related activities would be permitted in the Darroch Creek subdivision of the sale from December 1 to May 1 of each year. In the Eagle Creek subdivision, contract related activities would be prohibited from October 16 to June 30 of each year (units #14 and #15). Harvest related activities would continue for up to three years. The harvest operations would be authorized and controlled via a standard Forest Service timber sale contract administered by the Forest Service. This proposal would produce approximately 2.1 MMBF of timber from live and insect-killed or damaged timber within the Bear Creek drainage. This alternative would not create openings greater than 40 acres; therefore, it does not require Regional Forester approval to implement.

Slash treatment and site preparation for reforestation of the harvested stands would be conducted after the harvest operation, as needed. Methods include lopping slash and mechanical trampling and piling on the tractor ground and lopping and yarding entire trees to landings on the cable ground. Natural regeneration is planned for 189 acres and planting would occur on 77 acres. If monitoring indicates natural regeneration is not meeting stocking standards and legal requirements, then planting would be conducted to augment natural methods.

The estimated timeframe and sequence of activities for this alternative is similar to Alternatives B and C (See Table 2-2) Chapter 2-7. Table 2-5 shows acres, silvicultural treatments, and harvest systems proposed for each unit in Alternative D. Map E-3 displays the location of proposed harvest units, road construction, reconstruction, and pre-sale road closure.

2. **Road Construction and Reconstruction:** Harvest operations would require construction of approximately 0.6 miles of "specified" road and reconstruction of 4.4 miles of existing system roads. After the sale is completed and the landings have been open to firewood gathering for about two seasons (see *Mitigation, Chapter 2-25*), the newly constructed roads would be closed according to guidelines described in the section *Features Common To All Action Alternatives, Including Mitigation and Monitoring Chapter 2-23*. Additional information on road construction/reconstruction activities is available in the project file

. Note: To mitigate the effects of any new road construction on grizzly bear security habitat, stabilization and closure of approximately 1.4 miles of-existing open system roads (#3245,#3243B) and improvement of the closure barrier on 0.4 miles of a currently closed road (#6976C) in the project area was implemented in 1999. The closures involved: a) revegetating the road surface where needed to reduce soil erosion and to maintain slope stability and b) installing new or maintaining existing barriers sufficient to preclude use of the road by motorized vehicles. These roads were selected based on their relatively low contribution to motorized access for personal-use firewood cutting and dispersed recreation and based on benefits to wildlife and watershed values. Map E-1 shows the pre-sale road closures.

Table 2-5. Alternative D - harvest unit summary.

Unit No.	Acres	Treatment Method ¹	Volume (MBF)	Logging System	Reforestation	Fuels/Site Prep
1	35	Cut 70%, Leave 30%	269	Cable	Plant 25 ac Natural 10 ac	Entire tree yard (ETY) 50%, lop 50%
3	40	Cut 80%, Leave 20% 30 ac Cut 60% Leave 40% 10 ac	400	Tractor 8 ac Cable 33 ac	Plant 27 ac Natural 13 ac	Tractor: lop/trample Cable: lop
4	40	Cut 80%, Leave 20%	375	Tractor 20 ac Cable 20 ac	Natural	Tractor: lop/trample Cable: lop
8	25	Cut 80%, Leave 20%	175	Tractor	Natural	Lop/trample
9	28	Cut 80%, Leave 20%	280	Tractor	Natural	Lop/trample
12	3	Cut 80%, Leave 20%	30	Tractor	Natural	Lop
13	33	Cut 60%, Leave 40% 25 ac Cut 80%, Leave 20% 8 ac	99	Tractor	Plant 25 ac Natural 8 ac	Lop
14a	24	Cut 80%, Leave 20%	192	Tractor	Natural	Lop/trample
14b	2	Cut 80%, Leave 20%	20	Tractor	Natural	Lop/trample
15	36	Cut 80%, Leave 20%	288	Tractor	Natural	Lop
Total	266		2,128			

¹ See sketches A-E showing projected appearance of units after harvest on either tractor or cable ground.

3. **Amendment to the Forest Plan Standard for Elk Effective Cover (FP, page II-18).** If the decision for this project were not to include sufficient additional closures of existing roads, a project-specific Forest Plan amendment would be required to exempt the proposed road construction and road closure actions associated with this harvest project from having to achieve the Forest Plan standard of an elk effective cover (or HEI) rating of 70% (see *Road Closure Options described in Chapter 1-6 and Chapter 2-19*). As discussed in Chapter I, calculations for the current condition resulted in an HEI value of 58% for the Eagle Creek HAU¹; 62% for the Upper Bear Creek HAU; and 49% for the Palmer Mountain HAU, all below the Forest Plan standard (Kempff, 2003). To access timber stands to be harvested, this alternative includes up to 0.6 miles of new road construction. These roads would then be closed after harvest, post-sale treatments, and public firewood gathering activities are complete. However, closing all new roads constructed for this project would still leave open road density and HEI values at existing levels, below the Forest Plan standard. HEI values would also be reduced slightly in the Upper Bear Creek HAU during the life of the project due to new road construction. The commensurate pre-sale road closures conducted in 1999 were intended to compensate for this temporary increase in road density.
4. **Vegetative Diversity Amendment:** Approve a site-specific Forest Plan amendment to exempt Alternative D from the Forest Plan standard for vegetative diversity. As previously discussed, Compartments 305 and 306 are currently not meeting the standard for seedling, sapling, and pole-size forest components. After implementation of Alternative D, the structural stages would be: 25.24% grass/forb-natural, 0.56% grass/forb-harvested, 0.14% seedlings, 3.43% saplings, 0.32% pole, 23.40% mature and 38.07% old growth. Similar to Alternatives B and C, this alternative would increase the

¹ HEI is actually higher than reflected in the Eagle Creek HAU during the general fall hunting season due to seasonal gate closures on portions the Eagle Creek Road # 3243 (5 miles) and the Pole Gulch Road #3243a (.5 miles) that are currently in effect.

amount of grass/forb harvested component in the short term, and seedling, sapling, and pole component in the long term. However, the proposed harvesting would not change enough of the structure for these three components to achieve the FP standard of 10% for each.

Alt D-Modified-(Preferred Alternative)

Alternative D-Modified, as well as Alternative D, was developed to economically fulfill the purpose and need while avoiding creating openings greater than 40 acres in size. The analysis shows (by comparing effects of alternatives) there is no apparent biological reason that would support creating openings over 40 acres in size. The reasons that might suggest exceeding this size limit would include economic efficiency and maximizing timber receipts (the project's primary purpose and need). Both of these factors would favor cutting larger units. However, the agency believes those reasons alone would not meet with Regional Forester approval, as required. Also, the conditions required for an exception to obtaining his approval are not present (FP, pp. II-22 and A-11). Although normally EA units are developed with estimates of acres taken from various tools such as, aerial photos, topographic maps, site visits, and stand information from the Timber Stand Management Record-keeping System (TSMRS), there was extensive field reconnaissance involved in developing this alternative, taking into effect actual on the ground conditions and utilizing GPS techniques to attain more accurate unit acreages. Alternative D-Modified, (the preferred alternative), includes the following four components.

1. **Timber Harvest and Reforestation:** Timber harvest and reforestation is proposed on approximately 195 acres of suitable forest land. Harvest prescriptions for identified units include silvicultural treatments that remove approximately 60-80% of the mature and overmature lodgepole pine, Douglas-fir, Engelmann spruce, or subalpine fir (depending on the forest type). Methods used to remove the timber include tractor skidding on 164 acres and cable yarding on 31 acres. As per the Timber Sale Contract Provision (CT6.316# Limited Operating Period) no contract related activities would be permitted in the Darroch Creek subdivision of the sale from December 1 to May 1 of each year. In the Eagle Creek subdivision, contract related activities would be prohibited from October 16 to June 30 of each year (units #14 and #15). Harvest related activities would continue for up to three years. For units #9 and #14 all timber harvest is to be concluded prior to August 30th of any given year as a mitigation measure for grizzly bear foraging due to the proximity of the whitebark pine zone to these units. The harvest operations would be authorized and controlled via a standard Forest Service timber sale contract administered by the Forest Service. This proposal would produce approximately 1.5 MBF of timber from live and insect-killed or damaged timber within the Bear Creek drainage. This alternative would not create openings greater than 40 acres; therefore, it does not require Regional Forester approval to implement.

Slash treatment and site preparation for reforestation of the harvested stands would be conducted after the harvest operation, as needed. Methods include lopping slash and mechanical trampling and piling on the tractor ground and lopping and yarding entire trees to landings on the cable ground. Natural regeneration is planned for 169 acres and planting would occur on 26 acres. If monitoring indicates natural regeneration is not meeting stocking standards and legal requirements, then planting would be conducted to augment natural methods.

The estimated timeframe and sequence of activities for this alternative is similar to Alternatives B and C (See Table 2-2) Chapter 2-7. Table 2-6 shows acres, silvicultural treatments, and harvest systems proposed for each unit in Alternative D-Modified. Map E-4 displays the location of proposed harvest units, road construction, reconstruction, and pre-sale road closure.

2. **Road Construction and Reconstruction:** Harvest operations would require construction of approximately 0.9 miles of temporary road and reconstruction of 3.6 miles of existing system roads. No new "specified" road construction would be required for this alternative. Purchaser will be required to close the road and burn dozer piles along the temporary road constructed to access unit #14 upon completion of harvest activities. After the sale is completed and the landings have been opened to firewood gathering for about two seasons (see *Mitigation Chapter 2-25*), the remaining newly

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constructed temporary roads would be closed according to guidelines described in the section *Features Common To All Action Alternatives, Including Mitigation and Monitoring, Chapter 2-23*. The Gardiner Ranger District will be responsible for re-bunching piles and closing these temporary roads. Brush Disposal (BD) collections will be made from the sale to allow FS to burn landing piles after firewood use. Either road maintenance dollars as part of the forest firewood program or watershed improvement dollars would be used. for the road closures. Additional information on road construction/reconstruction activities is available in the project file.

.Note: To mitigate the effects of any new temporary road construction on grizzly bear security habitat, stabilization and closure occurred of approximately 1.4 miles of-existing open system roads (#3245, #3243B) and improvement of the closure barrier on 0.4 miles of a currently closed road (#6976C) in the project area was implemented in 1999.. The closures involved: a) revegetating the road surface where needed to reduce soil erosion and to maintain slope stability and b) installing new or maintaining existing barriers sufficient to preclude use of the road by motorized vehicles. These roads were selected based on their relatively low contribution to motorized access for personal-use firewood cutting and dispersed recreation and based on benefits to wildlife and watershed values. *See Map E-1*

Table 2-6. Alternative D Modified - harvest unit summary.

Unit No.	Acres	Treatment Method ¹	Volume (MBF)	Logging System	Reforestation	Fuels/Site Prep
1	16	Cut 70%, Leave 30%	123	Tractor	Natural 16 ac	Entire tree yard (ETY) 50%, lop 50%
1A	5	Cut 70%, Leave 30%	39	Cable	Natural 10 ac	Entire tree yard (ETY) 50%, lop 50%
1B	4	Cut 70%, Leave 30%	31	Tractor	Natural 10 ac	Entire tree yard (ETY) 50%, lop 50%
1C	6	Cut 70%, Leave 30%	46	Cable	Plant 6 ac	Entire tree yard (ETY) 50%, lop 50%
3	20	Cut 80%, Leave 20%	200	Cable	Natural 20 ac	Lop and scatter tops Dozer Pile >20 t/a
3A	5	Cut 80%, Leave 20%	50	Tractor	Natural 5 ac	Lop/trample tops Dozer Pile >20 t/a
4A	2	Cut 80%, Leave 20%	20	Tractor	Natural 2 ac	Lop/trample tops Entire tree yard >20 t/a
4B	16	Cut 80%, Leave 20%	160	Tractor	Natural 16 ac	Lop/trample tops Entire tree yard >20t/a
4C	1	Cut 80%, Leave 20%	10	Tractor	Natural 1 ac	Lop/trample tops Entire tree yard >20 t/a
8	18	Cut 80%, Leave 20%	126	Tractor	Natural 18 ac	Lop/trample tops Dozer pile >20 t/a
9	15	Cut 80%, Leave 20%	150	Tractor	Natural 15 ac	Lop/trample tops Dozer pile >20 t/a
12	3	Cut 80%, Leave 20%	30	Tractor	Natural 3 ac	Lop/trample tops Dozer Pile >20 t/a
13	26	Cut 60%, Leave 40% 20 ac Cut 80%, Leave 20% 6 ac	78	Tractor	Plant 20 ac Natural 6 ac	Lop/trample tops Dozer Pile >20 t/a
14	21	Cut 80%, Leave 20%	168	Tractor	Natural 21 ac	Lop/trample tops Dozer pile >20 t/a
15	37	Cut 80%, Leave 20%	296	Tractor	Natural 37 ac	Lop/trample tops Dozer Pile >20 t/a
Total	195		1527			

3. **Amendment to the Forest Plan Standard for Elk Effective Cover (FP, page II-18).** If the decision for this project were not to include sufficient additional closures of existing roads, a project-specific Forest Plan amendment would be required to exempt the proposed road construction and road closure actions associated with this harvest project from having to achieve the Forest Plan standard of an elk effective cover (or HEI) rating of 70% (*see Road Closure Options described in Chapter 1-6 and Chapter 2-19*). As discussed in Chapter I, calculations for the current condition resulted in an HEI value of 58% for the Eagle Creek HAU¹; 62% for the Upper Bear Creek HAU; and 49% for the Palmer Mountain HAU, all below the Forest Plan standard (Kempff, 2003). To access timber stands to be harvested, this alternative includes up to 0.9 miles of new temporary road construction. These roads would then be closed after harvest, post-sale treatments, and public firewood gathering activities are complete. However, closing all new roads constructed for this project would still leave open road density and HEI values at existing levels, below the Forest Plan standard. HEI values would also be reduced slightly in the Upper Bear Creek HAU during the life of the project due to new road construction. The commensurate pre-sale road closures conducted in 1999 were intended to compensate for this temporary increase in road density.
4. **Vegetative Diversity Amendment:** Approve a site-specific Forest Plan amendment to exempt Alternative D-Modified from the Forest Plan standard for vegetative diversity. As previously discussed, Compartments 305 and 306 are currently not meeting the standard for seedling, sapling, and pole-size forest components. The implementation of Alternative D-Modified would result in structural stage percentages of 25.24% grass/forb-natural, 0.56% grass/forb-harvested, 0.14% seedlings, 3.43% saplings, 0.32% pole, 23.40% mature and 38.07% old growth. Similar to Alternatives B and C, this alternative would increase the amount of grass/forb harvested component in the short term, and seedling, sapling, and pole component in the long term. However, the proposed harvesting would not change enough of the structure for these three components to achieve the FP standard of 10% for each.

Alternative Road Closure Mitigation

As discussed earlier, existing open road density within the three habitat analysis units (HAU's) surrounding the proposed project area do not meet the Forest Plan standard for elk effective cover (i.e. a habitat effectiveness index rating of 70%) (FP, page II-18). As an alternative to allowing this situation to continue after proposed timber sale and firewood gathering under any alternative described previously, there are options to close additional existing roads. (*See Map in Chapter 1-12 HAU's and Appendix E Maps E-1 through E-4 Possible Additional Closure for HEI*).

Option 1

This option would close seasonally, to wheeled motorized travel, 3 miles of existing open road in the Upper Bear Creek HAU, 6.9 miles of road in the Eagle Creek HAU¹, and 3.0 miles of road in the Palmer Mountain HAU from October 15th to December 2nd. The dates of restriction coincide with the general hunting season as specified in the Forest Plan standard. This would be sufficient to meet an HEI of 70% in the Upper Bear Creek and Eagle Creek HAUs, but HEI would remain below standard in the Palmer Mountain HAU due the amount of existing open county and private road not within Forest Service jurisdiction to close. Note that there are no harvest activities proposed within the Palmer Mountain HAU.

¹ HEI is actually higher than reflected in the Eagle Creek HAU during the general fall hunting season due to seasonal gate closures on portions the Eagle Creek Road # 3243 (5 miles) and the Pole Gulch Road #3243a (.5 miles) that are currently in effect.

The road closure options are displayed on the harvest alternative maps in Appendix E. Roads considered for hunting season closure would include:

1. **Eagle Creek HAU:** - close 6.9 miles of road, which would entail an additional 1.4 miles of closure (5.5 miles currently have gated seasonal closure)¹:
These roads (6.9 miles) are under Forest jurisdiction.
Eagle Creek Road #3243 (and spurs) – Gate this road to wheeled motorized travel at the existing gravel stockpile near Casey Lake in the northwest corner of section 7, T9S, R9E.
2. **Upper Bear Creek HAU:** - close an additional 3.0 miles of road:
These roads (3.0 miles) are under Forest jurisdiction.
Bear fork Road #6961 – Gate this road to wheeled motorized travel at the junction with road #6961A, about ½ mile from the Bear Creek road (#493).
3. **Palmer Mountain HAU:** - close an additional 3.6 miles of road²:
These roads (3.6 miles) are under Forest jurisdiction.
Bald Mountain Road #6945 – Gate this road to wheeled motorized travel at the Crevice Mountain Road.
Gate the Forest roads at the east end of the Crevice Mountain Road beyond the private land.

.Implementation of the above closures would begin in fall of 2004.

Option 2

This option would close the same roads as in Option 1, but physical barriers instead of gates would be used to establish permanent year-round closures. Year-round closure would be consistent with the more restrictive way the Forest Plan Elk Effective Cover standard has been applied historically (Appendix G).

Implementation of these closures would begin in fall of 2004. If Option 2 were to be chosen, due to the need for access to the sale units, the portions of the Eagle Creek Road #3243 would become a seasonal closure during the general hunting season through the life of the sale activities and then changed to a permanent year-round closure after completion of harvest, post-sale, and firewood gathering activities.

Projected Benefits of Road Closure Mitigation to Elk and Other Wildlife Habitat

Roads may have negative effects for wildlife, although responses and impacts vary considerably among species, populations, and individuals. Secretive animals such as lynx, wolverine, and grizzly bears are more likely to be displaced from roads or to avoid them, while various ungulates may display more tolerance. Additional variables that determine the reaction of wildlife to roads include road size and location, traffic amounts and vehicle types, cover quality and availability, season of use, time of day, abundance and distribution of food, and amount of previous exposure to humans.

Obviously, roads allow increased access by humans into areas where animals are attempting to obtain resources for survival. Consequences for wildlife include an increase risk of mortality due to confrontation with humans. This is especially true for large predators such as grizzly bears and other animals that act aggressively in surprise encounters. Roads increase the exposure of animals to humans or human foods

¹ HEI is actually higher than reflected in the Eagle Creek HAU during the general fall hunting season due to seasonal gate closures on portions the Eagle Creek Road # 3243 (5 miles) and the Pole Gulch Road #3243a (.5 miles) that are currently in effect.

² The Palmer Mountain Road #3232 and Sin Nombre Road #3234 (3.6 miles) provide private land access and can't reasonably be closed or restricted during summer or fall seasons. In order to meet HEI in the Palmer HAU the balance of the road closures (7.1 miles) would have to be private or county roads.

leading to habituation and an increased potential for human related conflicts. Animals may also be directly affected by being struck by vehicles.

Displacement of animals from food and shelter may compromise their nutritional status and/or ability to avoid predators. Animals may burn non-surplus calories during a flight response or by being unable to access needed resources consistently. The effects of being nutritionally stressed can accumulate over time and be expressed as lower reproductive rates or reduced winter survival.

Conversely, roads can play an important role in agency management strategies by providing hunters greater access, thus making the game species more vulnerable and potentially removing excess animals through harvest. These reductions can have positive effects on habitat quality when food supplies are limited and competition is high, such as on winter range.

Option 1- Seasonal Closure. Because this would be a fall closure, it would eliminate most hunter and fire wood gathering vehicles on the involved roads; two sources of traffic that constitute a significant amount of the annual motorized use. This would be especially beneficial to the grizzly bear during the critical fall months of preparation for hibernation. Although hunters would continue to access the area on foot, limiting motorized use would likely reduce the number of hunters. This could decrease the potential for lethal meetings between humans and bears through surprise encounters and mistaken species shootings such as a hunter mistaking a grizzly bear for a black bear.

Targeted game species would potentially be less vulnerable without motorized access along the roads proposed for closure. Moreover, hunter access to more remote locations would be reduced because the distance from the closest motorized access point to these areas would be greater. Consequently, hunter harvest of elk, deer, and moose could decline in Bear Creek. It is unknown if this potential reduction in hunter takes would represent a change in rates of mortality. Therefore, while a reduction in hunter harvest is obviously beneficial for individual animals, the nature of the effects is less certain at the population level.

In concept, it is reasonable to assume that other important species, such as mid-sized forest carnivores, would benefit from these seasonal road closures, but it is difficult to determine the magnitude of the effects.

Option 2- Permanent Closure. Many of the characteristics and effects to wildlife associated with the seasonal closure would also apply to a permanent closure. The amount of additional advantage for each species between a seasonal and a permanent closure is unknown. For species that are the least tolerant of human presence, the permanent closure alternative has the greatest advantages. This includes, among others, grizzly bears, lynx, mountain lions, and wolverines. Benefits to ungulates would exist but be less pronounced because these animals are not hunted during the summer months.

Projected Consequences of Road Closure Mitigation to Public/Administrative Access and Recreation Opportunity

Eagle Creek HAU

Option 1 - Seasonal Closure. Since there is an existing seasonal closure of 5.5 miles of the Eagle Creek and Pole Gulch roads, a seasonal closure would add only 1.4 miles of additional closure beginning October 15. Effects to cross-country skiers and hunters would be similar to the permanent closure effects. There would be few or no effects to hikers or persons driving for pleasure except after October 15.

Option 2 - Permanent Closure. Permanently closing Eagle Creek Road #3245 at the gravel stockpile near Casey Lake would affect hunters, persons driving for pleasure, cross country skiers, hikers and firewood gatherers. A seasonal closure at the Eagle Creek – Bear Creek divide currently restricts motorized vehicle travel between October 15 and June 30. No motorized vehicles are permitted on 5.5 miles of national forest roads during this 8 ½ month period.

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If a year-round closure was implemented, the elderly and disabled and families with young children would be most affected as they (and others) would no longer be able to drive the 6.9 miles of road that would be permanently closed.

A permanent road closure would mean hunters would have fewer miles to road hunt but since there is currently a seasonal closure on most of the road system (beginning October 15), moving the closure point down 1.4 miles would add only a small distance to hunters on foot or horseback. Hunting quality may be improved by additional closures since fewer hunters may choose to hike or ride the additional distance.

Since there are very few accessible trees adjacent to the Eagle Creek Road below Casey Lake, the opportunity to cut firewood would essentially be eliminated from the drainage. This would concentrate firewood gathering in the Bear Creek drainage since there are so few roads accessing national forest system lands forested areas near Gardiner.

No forest service system trails are accessed from the 6.9 miles of road above Casey Lake but the area is moderately popular with locals for dispersed hiking. Closing the upper 6.9 miles of road would make the currently accessible adjacent lands less accessible.

The last 2 years cross country skiers have driven to the upper Eagle Creek gate to access good early season ski terrain prior to the start of the Gardiner late hunt. Moving the permanent closure down 1.4 miles would mean skiers would often encounter marginal snow conditions in the lower section below the Eagle Creek–Bear Creek divide.

There is adequate room at the gravel stockpile (proposed closure site) to park several vehicles and vehicles with trailers could turn around.

Upper Bear Creek HAU

Option 1 - Seasonal Closure. A seasonal closure would have many of the same effects as the permanent closure except there would be few or no effects to recreationists between snow melt and October 15.

Option 2 - Permanent Closure. Permanently closing Bear Fork Road #6961 would affect hunters, persons driving for pleasure, hikers and firewood gatherers.

If a year-round closure was implemented, the elderly and disabled and families with young children would be most affected as they (and others) would no longer be able to drive the 4.5 miles of road that would be permanently closed.

A permanent road closure would mean hunters would have fewer miles to road hunt. Hunting access to upper Pine Creek would be more difficult. Hunting quality may be improved by the closure since fewer hunters may choose to hike or ride the additional distance.

Firewood gatherers, already limited by numbers of miles of roads in the Gardiner Basin, would have fewer accessible gathering areas.

No forest service trails would be affected by the closure. Summer dispersed recreation opportunities are limited along the Bear Fork Road so a road closure would have little or no affect to hikers, bikers or stock users. Cross-country skiers and snowmobilers would not be affected by a closure.

A small turnaround and parking area would need to be constructed at the closure point.

Palmer Mountain HAU

Option 1 - Seasonal Closure. A seasonal closure would have many of the same effects as the permanent closure except there would be few or no effects to recreationists between snow melt and October 15.

Option 2 - Permanent Closure. Permanently closing Bald Mountain Road #6945 would affect hunters, persons driving for pleasure, hikers and firewood gatherers.

If a year-round closure was implemented, the elderly and disabled and families with young children would be most affected as they (and others) would no longer be able to drive the 3.6 miles of road that would be permanently closed.

A permanent road closure would mean hunters would have fewer miles to road hunt. Hunting access to upper Pine Creek would be more difficult. Hunting quality may be improved by the closure since fewer hunters may choose to hike or ride the additional distance.

Firewood gatherers, already limited by numbers of miles of roads in the Gardiner Basin, would have fewer accessible gathering areas.

No forest service trails would be affected by the closure. Summer dispersed recreation opportunities are limited along the Bear Fork Road so a road closure would have little or no affect to hikers, bikers or stock users. Cross-country skiers and snowmobilers would not be affected by a closure.

A small turnaround and parking area would need to be constructed at the closure point.

Features Common to All Action Alternatives, Including Mitigation and Monitoring

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

Harvest Operations

Unless waived in writing by the Forest Service, operational restrictions will include the following: (1) July 1 through October 15 will be considered the normal operating season for contractual purposes, (2) no hauling of logs from the sale area will be allowed from Friday at 5 PM until midnight Sunday, or 5 PM preceding a state or federal holiday to midnight of that same day, (3) all timber sale contract activities that would use the Eagle Creek road system are precluded October 16 to June 30, and (4) all timber sale contract activities that would use the Bear Creek road system are precluded December 1 to May 1. In addition, all felling, skidding, and hauling activities are to be concluded in units #9 and #14 prior to August 30 of any given year to mitigate for possible grizzly bear foraging due to the proximity of the whitebark pine zone to these units.

Road Maintenance/Management/Rehabilitation

1. Road maintenance: The purchaser will be required to pay his/her commensurate share of road maintenance and surface replacement throughout the life of the timber sale. Normal considerations will be applied to log truck hauling to protect existing roads, structure and surfaces.
2. Seed mix for revegetation: The Forest Service will designate the seed mixture to be used in road rehabilitation activities. It will consist of native plant species; avoiding any seed that is not native to the region (C6.601# - Erosion Control Seeding). This seed mixture will be applied to those areas where activity disturbance has exposed high levels of bare soil (such as along the fill and cut slopes of existing

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roads). Seeding is the responsibility of the contractor and will be accomplished during the first seeding season (generally September 1 through October 30) immediately following activity in an area. Seeding native plant species will reduce the possibility of nonnative species introduction. The purpose of seeding is to reduce erosion potential of a disturbed area.

3. New road construction (specified, or "spec" roads): Where new roads are planned, the locations will be guided by the long-term harvest and transportation plan, as required by the Gallatin National Forest Plan, pp. II-22 & II-27. The design of the new roads will be to support short-term use, while maintaining a long-term location. Short-term design principles will include design for log hauling only, with no allowance for mixed commercial and recreation traffic. This translates into fewer turnouts, fewer drainage structures such as ditches and relief culverts, and preservation of slash during construction for restoration after the sale. Construction will be accomplished by the Specified Road Package of the timber sale contract. The road will be managed during the life of the sale to preclude public uses, likely with the use of a gate. Complies with Planning Criterion 16.

4. Management of new roads: Following the sale, the new roads will be open to the public for firewood gathering for up to two seasons. They will then be closed and put into "cold storage". Post-sale treatment will include ripping and seeding, installation of cross drains, and spreading of slash onto the road surface where prescribed. Prism recontouring will not be conducted. Post-sale treatments will be accomplished by means outside the timber sale contract because the contract will likely have terminated by the time the firewood gathering is completed.

5. Temporary roads: The costs and treatments for roads constructed for temporary access into harvest units will be guided by the pertinent C-clauses in the Timber Sale Contract. In general, these roads are short in length (less than 1/4 mile) and used where the topography and drainage requirements are minimal and the potential impacts are low risk. They serve no long-term need as a road, so would be put back as close as possible to pre-sale conditions. (including closure, ripping, and seeding) These roads would be managed during the life of the sale to preclude public uses. The purchaser will be required to close the road and burn dozer piles along the temporary road constructed to access unit #14 upon completion of harvest activities...After the sale is completed and the landings have been open to firewood gathering for about two seasons (see *Mitigation Chapter 2-25*), the remaining newly constructed temporary roads would be closed according to guidelines described in this chapter under *Mitigation and Monitoring, Chapter 2-23*. The Gardiner Ranger District will be responsible for closing these temporary roads. Either road maintenance dollars as part of the forest firewood program or watershed improvement dollars would be used for the road closures

6. Existing roads currently closed to use: These are existing roads that are presently closed to all uses because of either physical barriers or ingrown vegetation. They are needed for log hauling on the sale and will either receive pre-haul maintenance or reconstruction, depending on their condition. The work needed will be necessary to safely accommodate logging traffic. Roads in this category will be managed during the life of the sale to preclude public uses, likely with the use of a gate. Post-sale treatments will return the roads, as close as possible, to pre-sale conditions. The same principles described above under the *New road construction* section will be used for these roads. The final disposition of these roads will restrict all uses.

7. Existing roads currently open to use: These include roads that are presently open to either public, administrative, or private uses. The roads will receive either pre-haul maintenance or reconstruction, depending on their condition and needs. Any safety deficiencies for use as mixed commercial and recreational traffic will be corrected. Improvements will include those needed to correct safety problems, replace failing structures, restore failed surfacing, to correct cut/fill failures, grades, or alignments, or to reduce sediment production.

8. Pre-sale road closures: Refer to *Mitigation Measures -Grizzly Bears below*.

Mitigation Measures

The following mitigation measures and project design elements are an integral part of all four action alternatives and have been identified as necessary to ensure the timber sale and associated activities comply with the Forest Plan and to reduce environmental impacts. These measures will be incorporated into the project design, timber sale contract, and other contracts and project plans.

Cultural Resources

Timber sale contract provision C6.24# - Protection of Cultural Resources will be incorporated into the sale contract to help ensure cultural resources are protected.

Firewood Availability

Following the timber sale, most of the newly constructed/reconstructed roads (except the temporary access road into unit #14) would be open to the public for firewood gathering for up to two seasons. Additionally, the logging slash at landings would not be burned by brush disposal crews until the public has had two seasons to utilize this material for firewood. This would help alleviate the loss of firewood gathering opportunities caused by removal of timber along existing open roads.

Grizzly Bears

Two of the four management goals for MA 13 are aimed at managing vegetation and activities within grizzly bear habitat for recovery of the grizzly bear as outlined in Appendix G of the Forest Plan. The following mitigation measures are intended to help achieve these goals:

1. Road Reconstruction: Improvements made to existing roads to accommodate a mix of logging and public traffic will be conservative, i.e., improvements will address safety concerns only and will not be conducted to achieve improved public access. The design of road safety improvements will meet the minimum requirements and no more.
2. General: All individuals involved in implementing this project will adhere to the Special Order requiring attractants be made unavailable to bears under the Timber Sale Contract Provision (CT6.25#). If a conflict with a grizzly bear occurs during any phase of project implementation, Gardiner District personnel will be notified, and activities will cease until the situation can be assessed.
3. Contract Provision: Provision C6.251# (Protection of Habitat of Endangered Species) will be incorporated into the timber sale contract. It will cover the following requirements:
 - Activities authorized by the contract must be conducted in a manner, which will prevent or minimize the opportunity for conflicts with the grizzly bear.
 - The authorized officer may order an immediate temporary suspension of all human activities permitted by this contract in order to prevent confrontation or conflict between humans and grizzly bears. The holder shall immediately comply with such order. The United States shall not be liable for any consequences from such a suspension, revocation, or termination. Such suspension, revocation, or termination may be appealed to the next higher level as provided in 36 CFR 251, Subpart C.
 - The purchaser and subcontractors will adhere to the food storage order under CT6.25#. All food items and grizzly bear attractants will be made unavailable to grizzly bears.

Noxious Weeds

To reduce the potential for introducing noxious weeds, all off road vehicles used for logging and road construction (i.e., skidders, dozers) will be power scrubbed or steamed cleaned on the undercarriage, chassis and passenger compartment before traveling to the sale area (C6.26# - Noxious Weed Control).

Recreation

Winter Recreation: To reduce or avoid possible conflicts between cross-country skiing and snowmobiling activities, timber sale contractual activities are precluded from December 1 until May 1.

Hunting: To reduce or avoid possible conflicts between sale activities and the general big game hunt, timber sale contractual activities are precluded in the Eagle Creek area from October 16 to June 30. This is consistent with the road closure schedule.

All roads used for logging will be posted with warning signs and intervisible turnouts will be constructed and maintained to minimize traffic conflicts.

Reforestation

Each action alternative proposes measures for reforestation (tree planting) where natural regeneration cannot be achieved. Planting of conifers will be accomplished soon after harvest activities are completed to guarantee planting success and encourage quicker reforestation within the harvested areas. Species to be planted include lodgepole pine, Douglas-fir, and Engelmann spruce. Information pertaining to regeneration methods can be found in the project file located at the Gardiner District office.

Public Safety - Traffic

Road reconstruction standards and objectives emphasize safety (See *Features Common to All Action Alternatives, Existing Roads Currently Open to Use, Chapter 2-23*). The sale contract will contain safety provisions C6.33 - Safety and C6.332# - Safety (Timber Hauling). These provisions require development and implementation of a traffic control plan and other safety requirements.

Snag Habitat and Down Woody Debris

1. Snag Habitat: Harvest units not scheduled for broadcast burning would be designed to leave an average of 30 snags (greater than 18 ft. in height and greater than 10 inch DBH) per 10 acres (3 snags/acre equivalent), and an average of 30 live snag replacement trees (greater than 18 ft. in height and greater than 10 inch DBH) per 10 acres (3 replacement snags/acre equivalent) where they are available. If there are not sufficient trees meeting this size criteria, the largest available trees would be left as snags. For Douglas-fir and subalpine fir on rocky or shallow soils, 60 trees per 10 acres would be designated as replacement trees if available (Forest Plan, Amendment 15). Leave islands and clumps would be incorporated into the marking plan and timber contract to address safety concerns, while still being able to achieve snag standards. For harvest units scheduled for broadcast burning, snags and replacement trees would be retained to the extent feasible.

1. Down Woody Debris: The Forest Plan standard for dead and down woody debris (Amendment 15) is to leave a minimum of 15 tons per acre of 3 inch diameter or larger debris scattered after machine site preparation and/or hazard reduction within harvest units. Down woody debris to leave after project completion includes logs at various stages of decomposition. A minimum of two logs per acre (at least 10 inches in diameter and 20 feet long) in log class 1 and 2 (little decay has begun with these class logs) are to be left along with most if not all class 3, 4 and 5 logs (these logs are much higher levels of decay). For harvest units scheduled for broadcast burning, snags and replacement trees would be retained to the extent

feasible. Where machine piling is specified, windrowing of dead and down woody debris would be prohibited. Also, portions of the forest floor would be left undisturbed during the logging operation to minimize disturbance of downed logs.

Soil Protection

Follow the guidelines of Gallatin Forest Best Management Practices (BMP's)

- Require a systematic skid trail pattern during logging.
- Maintain an average of at least 75 feet between skid trails, and allow no ground-based equipment off these trails at any time, with the exception of designated landings and roads.
- Scarify all skid trails with a 3-4 tooth scarifier to a depth of 6 inches and with tooth spacing about 12 inches. This will reduce compaction on designated skid trails.
- The above do not apply if operating on soils with at least 8 inches of snow cover, or over soils frozen to at least 4 inches in depth. Winter logging has a negligible effect on soil or vegetation cover.
- Allow no mechanical site preparation equipment off established skid roads unless the soil is frozen or snow-covered as discussed above.
- Site preparation for fuels will consist of broadcast burn; hand lop and scatter; trample over dry soil (see below), with at least 12 inches of slash between the machine and soil surface; or other similar measures that minimize soil disturbance. Operators will be encouraged to trample only where there is sufficient slash to protect the soil surface. Burning will be considered strongly before the latter two options are specified.
- No mechanical site preparation will be specified other than for the fuels and cone preparation purposes as specified above. This will help assure productivity guidelines are met, as scarification for natural regeneration site preparation results in excessive detrimental soil disturbance.
- Perform mechanical site preparation activities only when soil is dry to the touch and not moldable in the hand, in the top 6 inches of the soil profile.

Water Quality

To minimize erosion and ensure compliance with State water quality standards, all road construction and timber harvest associated with the Darroch-Eagle Creek Timber Sale will be completed using Best Management Practices (BMPs). It is recommended that a formal BMP and SMZ review be conducted after all logging related activities are completed. The State of Montana requires that BMP's be used on all activities to comply with State water quality standards. Those sections are hereby incorporated by reference into this EA. The applicable BMPs are listed below. These are described in greater detail in *Appendix D, Best Management Practices*. The relevant timber sale contract provisions will be incorporated into the contract.

PRACTICE 11.01 - Determination of Cumulative Watershed Effects

PRACTICE 11.05 - Wetlands Analysis and Evaluation;

PRACTICE 11.09 - Management by Closure to Use

PRACTICE 13.03 - Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows;

PRACTICE 13.04 - Revegetation of Surface Disturbed Areas

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- PRACTICE 13.05 - Soil Protection During and Following Slash Windrowing (slash filter windrowing)
- PRACTICE 13.06 - Soil Moisture Limitations for Tractor Operation
- PRACTICE 14.02 - Timber Harvest Unit Design
- PRACTICE 14.03 - Use of Sale Area Maps for Designating Soil & Water Protection Needs
- PRACTICE 14.04 - Limiting the Operating Period of Timber Sale Activities
- PRACTICE 14.06 - Riparian Area Designation and Protection
- PRACTICE 14.08 - Tractor Skidding Design
- PRACTICE 14.09 - Suspended Log Yarding in Timber Harvesting
- PRACTICE 14.10 - Log Landing Location and Design
- PRACTICE 14.13 - Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities
- PRACTICE 14.14 - Revegetation of Areas Disturbed by Harvest Activities
- PRACTICE 14.16 - Meadow Protection During Timber Harvesting
- PRACTICE 14.18 - Erosion Control Structure Maintenance
- PRACTICE 14.19 - Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
- PRACTICE 14.20 - Slash Treatment in Sensitive Areas
- PRACTICE 14.22 - Modification of the Timber Sale Contract
- PRACTICE 14.23 - Reforestation Requirement
- PRACTICE 15.01 - General Guidelines for Transportation Planning
- PRACTICE 15.02 - General Guidelines for the Location and Design of Roads
- PRACTICE 15.03 - Road Erosion Control Plan
- PRACTICE 15.04 - Timing of Construction Activities
- PRACTICE 15.05 - Slope Stabilization and Prevention of Mass Failures
- PRACTICE 15.06 - Mitigation of Surface Erosion and Stabilization of Slopes.
- PRACTICE 15.07 - Control of Permanent Road Drainage
- PRACTICE 15.08 - Pioneer Road Construction
- PRACTICE 15.09 - Timely Erosion Control Measures on Incomplete Roads & Stream Crossings
- PRACTICE 15.10 - Control of Road Construction Excavation and Sidecast Material
- PRACTICE 15.11 - Servicing and Refueling of Equipment
- PRACTICE 15.13 - Controlling In-Channel Excavation
- PRACTICE 15.15 - Stream Crossings on Temporary Roads
- PRACTICE 15.21 - Maintenance of Roads
- PRACTICE 15.23 - Traffic Control During Wet Periods
- PRACTICE 15.25 - Obliteration of Temporary Roads

The 1991 Streamside Management Zone (SMZ) law and the 1993 SMZ rules of Montana also apply, although no streamside harvesting would occur in the Darroch-Eagle Creek Timber Sale.

Visual Quality

1. Units 14-16: The trees that are left within the units should be designed mostly in clumps rather than individual trees unless those individual trees have full crowns. The edges should be feathered as much as possible to borrow from vegetation patterns on adjacent slopes. These patterns include open hillsides with dispersed individual trees with full canopies as well as clumps of trees; elsewhere there are large open meadows, as well as other areas that have a series of somewhat smaller openings. Generally, all of these

natural openings have somewhat uneven edges. This feathering of edges of proposed units should be done at a scale that would be discernible even at a distance of more than 3 miles.

2. Units 1A,1C,3: To the extent that silvicultural and stand management objectives can be met, within the cable portions of these units, the drag corridors should be designed to alternate openings on both sides with trees on both sides, and from corridor to corridor, these blocks should be staggered so that the eye is drawn less towards the corridors. Where possible, some trees should be left below the road so as to not make the road become a linear visible feature. Also, above the road, tractors should be used to open up the canopy so that the cable unit below the road does not look like an isolated feature, thus drawing more attention to it.

Within the tractor portion of these units, all edges should be feathered so they would not be discernible as a distance of at least 3 miles.

Monitoring

Monitoring occurs at several levels...the programmatic or Forest Plan level (USDA Forest Service 1991) and the project-specific level. Following are several monitoring activities relevant to this project.

Project Implementation

General implementation of the project (sale and road design, contract preparation, contract administration, and implementation of mitigation measures) will be completed by qualified Forest Service personnel and reviewed by the District Ranger and staff. Contract administration will be conducted on a regular basis and as needed to obtain acceptable contractor performance.

Firewood Availability

District personnel will manage the road system to ensure that most of the newly constructed roads (except the road accessing unit #14) are left open for two summer seasons after the sale is closed. They will also ensure that the logging slash at landings is not burned by brush disposal crews until the public has had the opportunity to remove a portion of this material for firewood.

Grizzly Bears

Monitoring grizzly bear mortality and/or conflicts will continue to be used to measure the effectiveness of management as it relates to the protection of grizzly bears. If grizzly bear/human conflicts arise on the Darroch-Eagle Creek Timber Sale, they will be documented with appropriate actions taken as outlined in Appendix G of the Forest Plan.

Contract compliance checks will be conducted randomly throughout the timber sale operating season to check food storage compliance.

Noxious Weeds

The roads and harvest units will be monitored for five or more years after the harvest, for early detection of new sites. If new infestations sites are identified, the plants will be spot treated with approved herbicides or pulled, and the site will be monitored for other seedlings. Since seeds remain viable for many years in the soil, the number of years for monitoring the site will be adjusted according to the species present. For example, seeds from Spotted Knapweed can remain viable in the soil for 25 years, so the site could need to be monitored for the next 25 years.

Recreation

The timber sale administrator will ensure the contract provisions requiring warning signs, etc. will be followed.

Reforestation

Regeneration success in harvested areas will be reviewed at years 2, 4 and 5 for natural regeneration, and years 1, 3 and 5 for planted sites. Should this monitoring conclude that additional cultural treatments are required, these treatments will be scheduled.

Visual Quality

Monitoring should occur during the layout/design phase to incorporate full-crowned leave islands and individual trees. Monitoring should also occur during the contract phase to ensure that the edge feathering does occur and that the appropriate trees and groupings have been left.

Water Quality

Refer to *Appendix D, Best Management Practices* for a detailed discussion of water quality monitoring.

Comparison of Alternatives

Tables 2-7 and 2-8 briefly compare the five alternatives as they relate to the project components, objectives (purpose and need), and the issues. Also, each alternative is rated as to whether it complies with Forest Plan standards and the Planning Criteria. A more in-depth discussion of environmental consequences of each alternative is found in *Chapter 3, Affected Environment and Environmental Consequences*.

Table 2-7. Comparison of project elements and design, by alternative.

Item	Alternative A (No Action)	Alternative B (Proposal)	Alternative C	Alternative D	Alternative D-modified (Preferred)
Timber Harvest:					
Area Treated (acres)	0	449	383	266	195
Cut 60%/Leave 40%	0	33	33	35	20
Cut 70%/Leave 30%	0	108	70	35	31
Cut 80%/Leave 20%	0	308	280	196	144
Tractor Logging (acres)	0	285	318	178	164
Cable Logging (acres)	0	164	65	88	31
No. of Cutting Units	0	16	13	10	15
Volume, Gross (MMBF)	0	3.4	2.9	2.1	2.9
Reforestation:					
Natural (ac):	0	339	314	189	169
Planted (ac):	0	110	69	77	26
Road Work:					
Pre-Sale Road Closure (mi)	0	(1.4) ¹	(1.4)	(1.4)	(1.4)
Pre-Sale Road Closure Maintenance (mi)	0	(0.4)	(0.4)	(0.4)	(0.4)
Road Reconstruction (mi)	0	4.4	4.4	4.4	3.6
New Road Construction (mi)	0	2.0 specified	0.9 specified	0.6 specified	0.9 temp.
New Roads Closed (mi)	0	(2.0)	(0.9)	(0.6)	(0.9)
Open Roads - Effective Net Change During Project (mi)	0	3.6	2.5	2.1	2.7
Open Roads - Effective Net Change Long-Term (mi)	0	0	0	0	0

¹ Figures in () denote negative values for purposes of determining net change in open roads.

Table 2-8 Comparison of effects to significant issues, by alternative.

Issue	Alternative A (No Action)	Alternative B (Proposal)	Alternative C	Alternative D	Alternative D modified (preferred)
Grizzly Bear					
Foraging Habitat:					
Amount of foraging habitat modified (acres harvested):	0	449	383	266	195
Old growth harvested (ac):	0	352	312	231	173
Percent of forested acres that are old growth (post-project):	58.4%	57.4% (-1.0)	57.5% (-0.9)	57.8% (-0.6)	57.9%(-0.5)
FP, MA 13 old growth standard met? (>30% of forested acres must be old growth)	Yes	Yes	Yes	Yes	Yes
Forest Plan amendment needed?	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
Hiding and Thermal Cover:					
Hiding Cover (% of forested compartment):	62.9%	62.0%	62.1%	62.3%	62.4%
Thermal Cover (% of forested compartment):	19.7%	19.3%	19.3%	19.5%	19.7%
Hiding and Thermal Cover (cont):					
FP, Appendix G standards met?	Yes	Yes	Yes	Yes	Yes
% cover: minimum of 20% hiding, 10% thermal, and 10% hiding or thermal.					
Distance to hiding cover (600') met?	Yes	No	No	Yes	Yes
Forest Plan amendment needed?	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>No</i>
Duration/Reentry:					
USFWS Biological Opinion standards met? (Duration standard: Sale activities <3 consecutive years) (Reentry: one entry/decade)	Yes	Yes	Yes	Yes	Yes
Security Habitat: (during project, with pre-sale road closure mitigation applied)					
Secure (Core) Habitat , (% of bear subunit and change +/- from existing):					
Season 1 Secure Habitat:	75%	75% (0)	75% (0)	75% (0)	75% (0)
Season 2 Secure Habitat:	69%	70% (+1)	70% (+1)	70% (+1)	70% (+1)

Issue	Alternative A No Action	Alternative B (Proposal)	Alternative C	Alternative D	Alternative D modified (preferred)
Open Road Density (% of bear subunit and change +/- from existing): Season 1: 0.0 mi/mi ² 0.0-1.0 mi/mi ² 1.1-2.0 mi/mi ² >2.0 mi/mi ² Season 2: 0.0 mi/mi ² 0.0-1.0 mi/mi ² 1.1-2.0 mi/mi ² >2.0 mi/mi ²	68% 12% 8% 12% 67% 13% 8% 12%	68 (0) 12% (0) 8% (0) 11% (-1) 67% (0) 13% (0) 8% (0) 12% (0)	68% (0) 13% (+1) 8% (0) 11% (-1) 67% (0) 13% (0) 8% (0) 12% (0)	68% (0) 13% (+1) 8% (0) 12% (0) 67% (0) 13% (0) 8% (0) 12% (0)	68% (0) 13% (+1) 8% (0) 12% (0) 67% (0) 13% (0) 8% (0) 12% (0)
Total Road Density (% of subunit and change +/- from existing): 0.0 mi/mi ² 0.0-1.0 mi/mi ² 1.1-2.0 mi/mi ² >2.0 mi/mi ² FP Amendment 19 standards met? (no reduction in % secure habitat and no increase in road density) Forest Plan amendment needed? Are Planning Criteria 1, 10, and 11 met?	67% 13% 8% 12% Yes <i>No</i> Yes	67% (0) 13% (0) 8% (0) 12% (0) Yes <i>No</i> No	67% (0) 13% (0) 8% (0) 12% (0) Yes <i>No</i> No	67% (0) 13% (0) 8% (0) 12% (0) Yes <i>No</i> Yes	67% (0) 13% (0) 8% (0) 12% (0) Yes <i>No</i> Yes
Ungulates Security Habitat (HEI): Eagle Creek area: ¹ Upper Bear Creek area: Palmer Mtn. area Forest Plan standard met? (HEI minimum is 70%) FP amendment needed?	58% 62% 49% No <i>No</i>	58% 59% 49% No Yes *	58% 60% 49% No Yes *	58% 60% 49% No Yes *	58% 60% 49% No Yes *
Hiding and Thermal Cover: Hiding cover (ac) (% change): Thermal cover (ac) (% change):	21,796 6,820	21,481 (-1.4%) 6,686 (-2.0%)	21,525 (-1.2%) 6,708 (-1.6%)	21,597 (-0.9%) 6,753 (-1.0%)	21,621 (-0.87%) 6,800 (-0.3%)?

***Note: If the Road Closure Option is chosen, the need for a Forest Plan Amendment for HEI would be eliminated for that alternative.**

^{1 3} HEI is actually higher than reflected in the Eagle Creek HAU during the general fall hunting season due to seasonal gate closures on portions of the Eagle Creek Road # 3243 (5 miles) and the Pole Gulch Road #3243a (.5 miles) that are currently in effect

Issue	Alternative A (No Action)	Alternative B (Proposal)	Alternative C	Alternative D	Alternative D modified (preferred)
Forage:					
Elk Forage (ac) (% change):	19,346	19,795 (+2.3%)	19,729 (+2.0%)	19,612 (+1.4%)	19,541 (+1%)
Moose Winter Forage (ac) (% change):					
Early Winter:	17,021	16,584 (-2.6%)	16,638 (-2.2%)	16,755 (-1.6%)	16,826 (-1.1%)
Mid-Winter:	16,562	16,149 (-2.5%)	16,184 (-2.3%)	16,304 (-1.6%)	16,367 (-1.2%)
Late Winter:	10,975	10,657 (-2.9%)	10,684 (-2.6%)	10,709 (-2.4%)	10,780 (-1.8%)
Cover/Forage Ratio (Elk):	60:40	59:41	59:41	58.42	58.42
Is Planning Criterion 13 met?	Yes	Yes	Yes	Yes	Yes
Economics					
Total benefits discounted (\$)	0	\$512,652.41	\$448,841.08	\$327,366.94	\$238,824.50
Total costs discounted (\$)	0	\$387,350.23	\$327,680.76	\$260,477.54	\$172,136.87
Benefit/Cost Ratio	0	1.323	1.370	1.257	1.387
Present Net Value (\$)	0	\$125,302.18	\$121,160.32	\$66,889.41	\$66,687.63
Is Planning Criterion 15 met?	Yes	Yes	Yes	Yes	Yes
Vegetative Diversity					
Figures are acres and % of total compartment acres (52,608) after implementation of the alternative):					
Grass/Forb (natural)	13,278 (25.2%)	13,278 (25.24%)	13,278 (25.24%)	13,278 (25.24%)	13,278 (25.24%)
Grass/Forb (harvested)	39 (<1%)	488 (0.92%)	422 (0.80%)	305 (0.58%)	214 (0.44%)
Seedling	73 (<1%)	73 (0.14%)	73 (0.14%)	73 (0.14%)	73 (0.14%)
Sapling	1,804 (3.4%)	1,804 (3.4%)	1,804 (3.43%)	1,804 (3.43%)	1,804 (3.43%)
Pole	168 (0.32%)	168 (0.32%)	168 (0.32%)	168 (0.32%)	168 (0.32%)
Mature	12,333 (23.4%)	12,266 (23.32%)	12,272 (23.33%)	12,308 (23.40%)	12,331 (23.42%)
Old Growth	20,255 (38.5%)	19,903 (37.83%)	19,943 (37.93%)	20,024 (38.07%)	20,082 (38.17%)
FP standards met? (FP standard is 10% grass/forb, 10% seedling, 10% sapling, 10% pole, 10% mature, 10% old growth.)	No	No	No	No	No
FP amendment needed?	No	Yes	Yes	Yes	Yes

***Note: Alternative A (No Action) requires no amendment for HEI or Vegetative Diversity, however it does not meet Forest Plan Standards for either due to existing conditions.**

Table 2-8. Comparison of effects to significant issues, by alternative (cont).

Issue	Alternative A (No Action)	Alternative B (Proposal)	Alternative C	Alternative D	Alternative D modified (preferred)
Firewood Availability	No effect	Removes 3.4 MMBF but most of this timber is green and not accessible to firewood cutters. New roads are left open for 2 years.	Same as Alt. B but removes 2.9 MMBF.	Same as Alt. B but removes 2.1 MMBF.	Same as Alt. B but removes 1.5 MMBF.
Small Timber Operations	No effect	Removes 3.4 MMBF but most is green timber...not in demand locally. Not all is accessible to local timber operators due to equipment limitations.	Same as Alt. B but removes 2.9 MMBF.	Same as Alt. B but removes 2.1 MMBF.	Same as Alt. B but removes 1.5 MMBF.
40-Acre Opening Limit Do any created openings exceed the 40-acre limit?	No	Yes	Yes	No	No

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Throughout the analysis process, a wide variety of alternatives were presented and explored to address certain issues. However, for one reason or another, many of these alternatives did not merit detailed analysis or further consideration in the process. These alternatives and the reason(s) for eliminating them are described below.

Alternative E: Manage vegetation to avoid a vegetation diversity Forest Plan amendment.

This alternative focused on Issue 4: Forest Vegetation Diversity. As stated in the *Issues* section of this chapter, Compartments 305 and 306 are presently not meeting the Forest Plan standard for vegetative diversity. The Plan strives for a minimum of at least 10% in each of the following stages: grass/forb, seedlings, saplings, pole, mature, and old growth. Presently, the area has a structural stage composition of 25.2% grass/forb-natural, <1% grass/forb-harvested, <1% seedlings, 3.4% saplings, <1% pole, 23.4% mature, and 38.5% old growth (Kujawa 1999c). To achieve the Forest Plan standard for diversity during this entry would be impossibility. Impossible because: (1) to achieve a 10% seedling percentage on

forested lands would require even-aged harvests and reforestation on 9% of the area (over 3,100 acres); and (2) the seedling, sapling, and pole stages will require 10 to 20 years to grow into the next structural stage. Because of the problems and possible negative effects associated with regenerating over 3,100 acres of forest within a short time period (3 to 5 years) and the impossibility of forested stands growing into the next structural stage by the end of the timber sale, an alternative developed to address the Forest Plan standard for this issue was considered unreasonable/infeasible and was not analyzed in detail.

Alternative F: No harvest of old growth.

The focus of this alternative is to briefly discuss what the ramifications would be if no old growth is harvested. This alternative was considered to address a comment received during the scoping period. As discussed in *Chapter 1 –3, Proposed Action/Purpose and Need*, the primary reason for this proposal is to generate revenue which will contribute value, as a federal exchange asset in the Gallatin Land Consolidation project, for acquisition of four sections of BSL land within the Taylor Fork drainage and to also help with public acquisition of around 55,000 acres of BSL land located within several mountain ranges on the Gallatin National Forest.

Achievement of Purpose and Need: All the units proposed for harvest under Alternatives B, C, D, and D-Modified log either mature or old growth forest because these trees are sawtimber-size trees, which have the greatest market value. (See Planning Criterion 15 regarding the statement that the BSL sales be "sawtimber" sales, with only incidental inclusion of other products). If no harvest of old growth timber took place under this alternative, the project would be limited to harvesting only mature timber stands. A test case was analyzed using Alternative B, which is the action alternative that would generate the maximum non-old growth timber volume. Because of other resource constraints, no other mature timber stands are available to substitute volume for the old growth stands deleted. This scenario would yield about 0.6 MMBF from 97 acres. About 0.3 miles of new road would be needed. Alternative F would generate \$34,866.00 in timber receipts.

The action alternative closest to Alternative F in terms of minimizing the harvest of old growth and also substantially meeting the project's purpose and need is Alternative D-Modified, which would generate \$175,668 in timber receipts. Alternative F falls short of meeting the project's purpose and need by generating only a minimal amount of timber receipts. This low level of achieving the project's purpose and need is closer to Alternative A (No Action) and is not considered a practical alternative worth pursuing (Cassani 2003).

Effects on old growth and old growth dependent species: The majority of the forested portion of the analysis area is old growth (58%) and is the most common structure type when all compartment acres are analyzed (38.5%). So, the reduction of old growth forest caused by Alternatives B, C, D, and D-Modified is relatively minor (a maximum of 1%). The wildlife effects analysis for Alternatives B, C, D, and D-Modified shows that harvesting old growth would cause no effect or only a minor effect to old-growth-dependent wildlife.

In conclusion, developing and studying an alternative that does not harvest old growth would not provide additional key information for a reasoned choice among alternatives. Refer to *Appendix A, Issue Disposition Summary; Appendix B, Biological Evaluation; Appendix C, Biological Assessment*; and the project file for a detailed discussion of effects to old growth dependent species.

Alternative G: Maximize biodiversity and wildlife habitat.

This alternative was generated by a comment received during the scoping period. It was eliminated from detailed study because the purpose of Alternative G (to use the proposed timber sale to maximize biodiversity and wildlife habitat) is outside the scope of this project, as defined in Chapter 1.

Alternative H: Harvest other timber stands within project area.

In order to meet the project purpose and need, other timber stands within the project area were evaluated and considered for harvest. Numerous timber stands in the Bear Creek drainage were considered for inclusion in the proposal but were eliminated from further planning early on because they were recognized as valuable moose winter range and travel corridors and moose numbers are down from historical levels due to various factors (Shea 1997). (See *Planning Criterion 13, Chapter 2-6.*)

Two cable harvest units above the North Fork of Bear Creek were considered but dropped from further planning because they were determined to be partially within an inventoried roadless area (See *Planning Criterion 4, Chapter 2-5.*)

Alternative I: No new road construction.

This alternative addresses what the effects would be if no new roads were constructed to harvest timber. Alternative J was generated by a comment received during the scoping period that suggested no new roads be considered for this proposal. Alternative D-Modified is the alternative studied in detail that requires the least amount of new road construction (0.9 miles of temporary road) with no new specified road construction.. Using that alternative as a starting point, Alternative I would not harvest portions of Units 1,4, 8, or 14. This would result in a significantly lower harvest volume. This alternative would likely still be an economically viable alternative, similar to the four alternatives studied in detail. The difference in economics generated by this alternative compared to the range of economic conditions provided by the action alternatives would not likely be a key decision factor.

The pre-sale closure of 1.8 miles of existing roads in 1999 was intended to address the significant (mainly grizzly bear) issues associated with new road construction. These closures were accomplished in order to result in no net increase in road mileage, which is comparable in effects to grizzly bears as to what Alternative J would provide. Alternatives B, C, D, and D-Modified also would meet State water quality standards regarding sediment yield. Alternative J was eliminated from detailed study because an analysis of it essentially duplicates those done for the four action alternatives studied in detail.

Scoping comments also suggested that helicopter logging be considered as a means of harvesting timber without building new roads. Helicopter logging is a very expensive logging method. Because the project area is already heavily roaded, the objective of harvesting without building new roads was better met by Alternative I discussed above. Alternative I was a more economically feasible alternative to consider, compared to helicopter logging and better meets *Planning Criterion 15, Chapter 2-6.*