

APPENDIX D
TREATMENT UNITS

VAIL VALLEY FOREST HEALTH PROJECT TREATMENT UNIT PRESCRIPTIONS

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
All lodgepole pine units (101-129)		None	None	<ul style="list-style-type: none"> ➤ Thin lodgepole pine from below, leaving 50 to 70 percent of the basal area. ➤ Excessively limby trees, or trees with branches down to breast height, will be favored for retention unless dead, dying, or a hazard tree. ➤ Trees with 30 to 50 percent crown ratio will be favored for retention. ➤ If present, Douglas fir, Engelmann spruce, and subalpine fir will be retained. ➤ Aspen patches will be improved by thinning lodgepole pine. ➤ Areas with severe MPB damage will be treated by sanitation/salvage thinning from above of up to 70 percent of the basal area. ➤ Areas of large, dense lodgepole pine at high risk to MPB infestation will be patch cut. ➤ Lodgepole pine less than 7 inches DBH will be retained where not acting as ladder fuels. 	Same as Alternative B	Same as Alternative B

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
101	33	None	None	<ul style="list-style-type: none"> ➤ Widen 1.1 miles of the Stone Creek trail (FDT 2349) to serve as a temporary road for hauling. ➤ In areas where the average DBH is 10 to 11 inches, cut five small patches (2 to 4 acres each) and tie into aspen where possible. ➤ Use ground-based logging system. 	Same as Alternative B except the Stone Creek trail (FDT 2349) would not be widened. Instead, a tractor trail would be constructed to haul logs to the upper portion of the unit where a cable system would bring them to a landing. A 500-foot temporary road would connect Unit 101 with Unit 105 for final removal.	Same as Alternative B
102	40	None	None	<ul style="list-style-type: none"> ➤ Widen 1.1 miles of the Stone Creek trail (FDT 2349) to serve as a temporary road for hauling (same as Unit 101). ➤ Remove dead trees with 12- to 16-inch DBH first. ➤ In areas where the average DBH is 10 to 11 inches, cut four small patches (2 to 7 acres each) and tie into aspen where possible. ➤ Use ground-based logging system. 	Same as Alternative B except the Stone Creek trail (FDT 2349) would not be widened. Instead, a tractor trail would be constructed to haul logs to the upper portion of the unit where a cable system would bring them to a landing. A 0.7-mile temporary road would connect Unit 102 with Unit 104 for final removal.	Same as Alternative B
103	25	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. 	Same as Alternative B	Same as Alternative B

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
104	42	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. ➤ In areas where the average DBH is 10 to 11 inches, cut small patches (2 to 8 acres each) and tie into aspen where possible. 	Same as Alternative B except up to 0.7 miles of temporary road would connect Unit 102 with Unit 104.	Same as Alternative B
105	45	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. ➤ In areas where the average DBH is 10 to 11 inches, cut small patches (2 to 8 acres each) and tie into aspen where possible. 	Same as Alternative B except up to 500 feet of temporary road would connect Unit 101 with Unit 105.	Same as Alternative B
106	26	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. ➤ In areas where the average DBH is 10 to 11 inches, cut small patches (2 to 8 acres each) and tie into aspen where possible. 	Same as Alternative B	Same as Alternative B
115	48	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. 	Same as Alternative B	Same as Alternative B
116	16	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. 	Same as Alternative B	Same as Alternative B

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
117	22	None	None	<ul style="list-style-type: none"> ➤ Lodgepole pine will be thinned less on upper slopes than in the lower portion of the unit in response to variable MPB damage. ➤ Use a combination of ground-based and cable logging systems. 	Same as Alternative B	Same as Alternative B
118	127	None	None	<ul style="list-style-type: none"> ➤ Lodgepole pine will be thinned less on upper slopes than in the lower portion of the unit in response to variable MPB damage. ➤ Use ground-based logging system. 	Same as Alternative B	Same as Alternative B
119	21	None	None	<ul style="list-style-type: none"> ➤ Use a combination of ground-based and cable logging systems. 	Same as Alternative B	Same as Alternative B
120	46	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. 	Same as Alternative B	Same as Alternative B
121	29	None	None	<ul style="list-style-type: none"> ➤ No cutting will occur within 160 feet of Grouse Creek trail (FDT 2127). ➤ Use a combination of ground-based and cable logging systems. 	Same as Alternative B	Same as Alternative B
122	11	None	None	<ul style="list-style-type: none"> ➤ No cutting will occur within 160 feet of Grouse trail (FDT 2127). ➤ Use a combination of ground-based and cable logging systems. 	Same as Alternative B	Same as Alternative B

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
123	38	None	None	<ul style="list-style-type: none"> ➤ In areas where the average DBH is 10 to 11 inches, cut two small patches (3 to 5 acres each). ➤ Use ground-based logging system. 	Same as Alternative B	Same as Alternative B
124	15	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. 	Same as Alternative B	Same as Alternative B
125	18	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. ➤ Patch cut unit and tie into aspen where possible. ➤ Retain all aspen. 	Same as Alternative B	Same as Alternative B
126	10	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. ➤ Patch cut unit and tie into aspen where possible. ➤ Retain all aspen. 	Same as Alternative B	Same as Alternative B
127	18	None	None	<ul style="list-style-type: none"> ➤ Use ground-based logging system. ➤ Patch cut unit and tie into aspen where possible. ➤ Retain all aspen. 	Same as Alternative B	Same as Alternative B
128	29	None	None	<ul style="list-style-type: none"> ➤ In areas where the average DBH is 10 to 11 inches, cut small patches (2 to 8 acres each) and tie into aspen where possible. ➤ Steeper portions will be hand cut and piled. ➤ Use ground-based logging system. 	Same as Alternative B	Same as Alternative B

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
129	37	None	None	<ul style="list-style-type: none"> ➤ In areas where DBH is 10 to 11 inches, cut small patches (2 to 8 acres each) and tie into aspen where possible. ➤ Use ground-based logging system. 	Same as Alternative B	Same as Alternative B
201	71	Game Creek	None	<ul style="list-style-type: none"> ➤ Maintain and enhance aspen with 5- to 10-acre patch-cuts to stimulate root suckering. ➤ Perimeter expansion would remove live lodgepole pines shading the ground. 	Same as Alternative B	Not included
202	53	Game Creek	None	<ul style="list-style-type: none"> ➤ Maintain and enhance aspen by cutting up to 40 percent of live lodgepole pine. ➤ Within 2 tree lengths (120 to 160 feet) of the Forest boundary, maintain < 10 tons per acre of surface fuels that are < 8-inch diameter. ➤ Prune boles 12 feet above ground surface. ➤ Expand aspen perimeters. 	Same as Alternative B	Same as Alternative B

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
203	30	Game Creek	None	<ul style="list-style-type: none"> ➤ Cut up to 40 percent of the live lodgepole pine that are overtopping healthy aspen or aspen suckers. ➤ Cut dying aspen and surrounding lodgepole pine to stimulate suckering. ➤ Prune boles 12 feet above ground surface. 	Same as Alternative B	Not included
204	10	Game Creek	None	<ul style="list-style-type: none"> ➤ Cut up to 40 percent of the live lodgepole pine that are overtopping healthy aspen or aspen suckers. ➤ Cut dying aspen and surrounding lodgepole pine to stimulate suckering. Prune boles 12 feet above ground surface. 	Same as Alternative B	Not included
205	6	Game Creek	None	<ul style="list-style-type: none"> ➤ Cut up to 40 percent of the lodgepole pine that are overtopping healthy aspen or dense enough to impede perimeter expansion of aspen. ➤ Prune boles 12 feet above ground surface. 	Same as Alternative B	Not included

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
206	10	Game Creek	None	<ul style="list-style-type: none"> ➤ Cut up to 40 percent of the lodgepole pine that are overtopping healthy aspen or dense enough to impede perimeter expansion of aspen. ➤ Prune boles 12 feet above ground surface. 	Same as Alternative B	Not included
207	19	Game Creek	None	<ul style="list-style-type: none"> ➤ Cut up to 40 percent of the lodgepole pine that are overtopping healthy aspen or dense enough to impede perimeter expansion of aspen. ➤ Prune boles 12 feet above ground surface. 	Same as Alternative B	Not included
208	5	Game Creek	None	<ul style="list-style-type: none"> ➤ Cut up to 40 percent of the lodgepole pine that are overtopping healthy aspen or dense enough to impede perimeter expansion of aspen. ➤ Prune boles 12 feet above ground surface. 	Same as Alternative B	Not included
209	6	Game Creek	None	<ul style="list-style-type: none"> ➤ Cut up to 40 percent of the lodgepole pine that are overtopping healthy aspen or dense enough to impede perimeter expansion of aspen. ➤ Prune boles 12 feet above ground surface. 	Same as Alternative B	Not included

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
Generalized patch units 210-214	168 (patches only)	None	None	➤ Where aspen exists as patches with the lodgepole pine forest, enhance aspen with patch cuts to stimulate suckering.	Same as Alternative B	Same as Alternative B
301	75	Buffer Mountain	None	➤ Broadcast burn. ➤ Change from fuel model #2 to fuel model #1.	Mechanical fuel reduction and pile burning.	Same as Alternative B
302	40	Buffer Mountain	None	➤ Broadcast burn. ➤ Change from fuel model #2 to fuel models #1 and #5.	Mechanical fuel reduction and pile burning.	Same as Alternative B
303	94	Buffer Mountain	None	➤ Broadcast burn. ➤ Change from fuel model #2 to fuel model #1.	Mechanical fuel reduction and pile burning	Same as Alternative B
305	116	Buffer Mountain	None	➤ Broadcast burn. ➤ Change from fuel model #2 to fuel model #1.	Mechanical fuel reduction and pile burning.	Same as Alternative B
306	119	Buffer Mountain	None	➤ Broadcast burn. ➤ Change from fuel model #2 to fuel model #1.	Mechanical fuel reduction and pile burning.	Same as Alternative B
309	64	Buffer Mountain	None	➤ Broadcast burn. ➤ Change from fuel model #6 to fuel models #1 and #5.	Mechanical fuel reduction and pile burning.	Same as Alternative B
310	72	Buffer Mountain	None	➤ Broadcast burn. ➤ Change from fuel model #2 to fuel models #1 and #5.	Mechanical fuel reduction and pile burning.	Same as Alternative B
313	325	Game Creek	None	➤ Broadcast burn. ➤ Change from fuel model #2 to fuel model #8.	Mechanical fuel reduction and pile burning	Same as Alternative B
411	123	None	Eagles Nest Wilderness	➤ Broadcast burn. ➤ Change from fuel model #2 to fuel model #8.	Not included	Same as Alternative B

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
412	398	None	Eagles Nest Wilderness	<ul style="list-style-type: none"> ➤ Broadcast burn. ➤ Change from fuel model #2 to fuel model #8. 	Not included	Not included
514	60	None	None	<ul style="list-style-type: none"> ➤ Cut dead trees and pile burn; then broadcast burn outside wilderness boundary. ➤ Change from fuel model #2 to fuel model #8. 	Cut dead trees and pile burn.	Same as Alternative B
515	171	Corral Creek	None	<ul style="list-style-type: none"> ➤ Cut dead trees and pile burn; then broadcast burn outside wilderness boundary. ➤ Change from fuel model #2 to fuel model #8. 	Cut dead trees and pile burn.	Not included
617	39	None	None	<ul style="list-style-type: none"> ➤ Patch cut aspen and cut all conifers. ➤ Cut trees within 500 feet of private land and pile burn. ➤ Change from fuel model #2 to fuel model #8. 	Same as Alternative B	Same as Alternative B
618	70	Spraddle Creek B	None	<ul style="list-style-type: none"> ➤ Patch cut aspen and cut all conifers. ➤ Cut trees within 500 feet of private land and pile burn. ➤ Change from fuel model #2 to fuel model #8. 	Same as Alternative B	Same as Alternative B except that the unit would be reduced to 12 acres (618D) because no cutting would occur more than 200 feet inside the inventoried roadless area.
619	42	Spraddle Creek B	None	<ul style="list-style-type: none"> ➤ Patch cut aspen and cut all conifers. ➤ Cut trees within 500 feet of private land and pile burn. ➤ Change from fuel model #2 to fuel model #8. 	Same as Alternative B	Same as Alternative B except that the unit would be reduced to 8 acres (618D) because no cutting would occur more than 200 feet inside the inventoried roadless area.

Treatment Unit	Acres	Inventoried Roadless	Designated Wilderness	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
620	76	Buffer Mountain	None	<ul style="list-style-type: none"> ➤ Patch cut aspen and cut all conifers. ➤ Cut trees within 500 feet of private land and pile burn. ➤ Change from fuel model #2 to fuel model #8. 	Same as Alternative B	Not included

Note: DBH – diameter at breast height, 4.5 feet above the ground

Vail Valley Forest Health Project Design Criteria

Design criteria are specific project design features that are incorporated within the proposed action and alternatives. They provide specific guidance on project implementation, and become part of the decision made and the project implementation plan. Design criteria for each of the action alternatives are presented below by alternative, treatment unit type, and resource topic.

Design Criteria for Alternative B

All Treatment Units

Geology and Soils

1. Conduct surface disturbing activities in a manner that minimizes sediment discharge into streams, lakes, and wetlands.
2. Reclaim disturbed areas promptly when treatment activities end, as needed, to prevent resource damage and invasion of noxious weeds.
3. Disturbed areas will be reclaimed in a timely manner and will be monitored to achieve 70 percent cover (as compared with nearby undisturbed areas). Seed mixtures and mulches will be certified weed-free. To prevent soil erosion, non-persistent, non-native perennials or sterile perennials may be used while native perennials become established. The Forest Service must approve any seed mixtures used by cooperators or contractors prior to implementation.
4. Seeding of meadows that have been scarified will not be necessary due to the presence of sufficient plant propagules.
5. Treatments will retain the average per-acre levels of coarse woody debris summarized in **Table D-1** below.

Table D-1 Retention of Coarse Woody Debris

Forest Type	Minimum Retention for Small Diameter Component (tons per acre)	Minimum Retention for Large Diameter Component (tons per acre)	Minimum Coarse Woody Debris Retention for All Components (tons per acre)
Lodgepole pine	4.25	0.75	5
Aspen	2.5	0.5	3

Source: Forest Plan, page 2-5

6. The width of skid trails will be limited to 12 feet and spacing between trails will be no closer than 120 feet on average (Forest Plan page 2-6).

Noxious Weeds

1. All weed infestations will be inventoried and pretreated within and adjacent to vegetation treatment units and along travel routes.

2. For a minimum of 3 years, the Forest Service will monitor and treat new infestations in treatment units and along travel routes.
3. Noxious weed management will include preventative measures such as cleaning off-road equipment and seeding of disturbed ground. The provisions for protection of disturbed areas from establishment of noxious weeds, and equipment cleaning will be included in contracts for timber sales, stewardship services, or other services. Native plants will be used for revegetation where feasible. Genetically local (at the ecological subsection level) seeds will be used if available.
4. Timber purchaser's off road equipment will be cleaned before moving on Forest and from a weed infested unit to a weed free unit to decrease the potential for spread of noxious weeds.

Wetland and Riparian Areas

1. Prior to implementation of vegetation treatments, the Forest Service will use global positioning system (GPS) technology to locate and flag all perennial seeps, springs, and wetlands within and 200 feet down-gradient of the treatments units.
2. No ground-based equipment will enter the water influence zone (WIZ) except at designated stream crossings on roads.
3. A buffer of untreated land will be maintained that is 100 feet wide (or equal to the mean height of mature, dominant, late-seral vegetation, whichever is more) on either side of intermittent and perennial drainage channels.
4. Activities will avoid creating or expanding connected disturbance that will provide a conduit for routing sediment to streams.
5. In riparian areas, vegetation cover will be managed to provide suitable wildlife habitat along a minimum of 80 percent of the length of riparian zones within the project area (Forest Plan page 2-17).

Wildlife and Fisheries

1. For management activities that have the potential to impact occupied Colorado River cutthroat trout (CRCT) habitat, tributaries of occupied CRCT habitat, or identified reintroduction areas, maintain or enhance existing CRCT habitat. At minimum and where necessary, reduce sediment from management activities, maintain pool depths, maintain riparian vegetation, and retain large woody debris in streams.
2. Project activities will be limited or prohibited during periods of use by big game and special status species, as required. All silvicultural treatment activities, including temporary road building and log hauling, within MA 5.43 (Units 101 to 106) will be prohibited from May 15 to June 20 to reduce disturbances to elk calving, unless approved in writing by the Forest Service authorized officer.
3. If negative effects to management indicator species (MIS) or to migratory birds, nests, or eggs are observed during project activities, the Forest Service will be notified and specific mitigation measures directed at that species will be implemented under direction of the Forest Service.
4. All treatment areas will be evaluated for the presence of nesting migratory birds. If nesting is identified, the timing of project activities in that area will avoid the nesting period, which varies by species but is generally from March to June.

Heritage Resources

1. Heritage staff will designate protection zones around significant heritage resources within treatment units. All sites eligible for the National Register of Historic Places will require protection and avoidance using a physical boundary of 100 feet or more.

Special Uses

1. Existing special use authorizations and improvements and private land boundaries will be shown on the improvement map in contracts for project implementation. These interests will be protected.

Designated Wilderness and Inventoried Roadless Areas

1. Boundary surveys of the Eagles Nest Wilderness will occur where mechanical treatment or road construction is proposed adjacent to the designated area. No road construction or mechanical treatment is planned in designated wilderness.
2. Surveys of inventoried roadless area boundaries will occur when road construction is proposed adjacent to the designated area. No road construction is planned in inventoried roadless areas.

Lodgepole Pine Treatment Units

Geology and Soils

1. Construction of landings, temporary roads, and tractor or skid trails will be avoided within or within 200 feet up-gradient of existing rotational slumps and landslides and areas identified as high stability hazard areas or prominent landslide features, shown on **Figure 3-1**.
2. Topsoil will be stripped and stockpiled to improve the potential for successful reclamation.

Forest Health and Biodiversity

1. Where aspen patches exist within lodgepole pine units, aspen will be enhanced for forested fuelbreaks and wildlife habitat diversity by removing pine within the aspen patches and 1 to 2 tree lengths around the patch.
2. To maintain stand diversity, large, live, individual trees of all species will be retained unless severe MPB infestation threatens to spread to the remaining stand. However, where large, live, individual trees occur as groups, the density will be reduced to 80 basal area.
3. To meet Forest Plan soil productivity standards, logging slash (lop and scatter) will be left as necessary (see Table D-1).
4. Vegetation management activities will protect, avoid, or retain areas of understory Douglas-fir, Engelmann spruce, and aspen along ridgelines and forest margins with meadows. Where possible, upland willow resprouting will be enhanced.
5. Snags and downed logs will be retained in accordance with the average minimums specified in **Table D-2**.
6. In areas where MPB infestation/mortality is extensive, and a sanitation/salvage treatment is applied, cone-bearing tops of lodgepole pine will be left in the unit to serve as seed sources.

Table D-2 Retention of Snags and Downed Logs

Forest Type	Snags			Large Snags			Downed Logs	
	DBH ^{1,2} (inches)	Retention/ Recruitment Density (number per acre)	Snag Height ¹ (feet)	DBH ^{1,2} (inches)	Retention Density (number per acre)	Snag Height ¹ (feet)	DBH ^{1,2} (inches)	Retention Density (linear feet per acre)
Lodge-pole pine	8	3	25	20	1	50	8	100
Aspen	8	3	25	20	1	50	8	50

Source: Forest Plan, page 2-8

Note: These amounts are to be calculated as per-acre averages for each 1,000 acres over a silvicultural landscape assessment area.

¹ Minimum

² DBH refers to the diameter at breast height, 4.5 feet above the ground surface.

Wetland and Riparian Areas

1. Contractors may directionally fell trees within the WIZ to meet MPB objectives. No cutting of trees will occur on slopes over 60 percent.
2. Slash will be distributed on treated areas 24 to 48 inches deep with a greater amount of slash placed on steep slopes within the treated areas to slow runoff.
3. Construction of landings, temporary roads, or tractor and skid trails will be avoided within 100 feet (or a distance equal to the mean height of mature dominant late-seral vegetation, whichever is more) of perennial seeps, springs, wetlands, and intermittent and perennial drainage channels. If needed, crossings will be constructed and restored to prevent headcutting, gulying, erosion, or sediment transport.
4. A buffer of untreated land will be maintained that is 100 feet wide (or equal to the mean height of mature dominant late-seral vegetation, whichever is more) on either side of intermittent and perennial drainage channels. If needed, crossings will be constructed and restored to prevent headcutting, gulying, erosion, or sediment transport to intermittent or perennial channels.
5. Activities will avoid creating or expanding connected disturbance, including vegetation treatments, temporary roads, and tractor or skid trails, that will provide a conduit for routing sediment to streams.

Fire and Fuels

1. To avoid the creation of ladder fuels (downed woody debris and regeneration), whole tree skidding will be used to remove seed source and slash from the site. Scattered piles of slash will be left for wildlife.

Wildlife and Fisheries

1. Trees serving as squirrel caches will be retained.
2. Subalpine fir and spruce will be retained for snowshoe hare browse when branches are less than 12 inches from the ground.

3. Hard and soft snags will be removed only if they have a DBH greater than 9 inches and have been dead less than 15 years. Small groups or individual dead lodgepole pine will be retained in aspen patches to provided snag and future downed log habitat.
4. All silvicultural treatment activities, including temporary road building, within MA 5.43 (Units 101 to 106) will be prohibited from May 15 to June 20 to reduce disturbances to elk calving, unless approved in writing by the Forest Service authorized officer.
5. Vegetation treatments and new roads will not reduce the elk habitat effectiveness index below 0.45 by Data Analysis Unit (DAU), or further reduce effective habitat in DAUs that are already at or below 0.40 on NF lands (Forest Plan page 2-17).

Heritage Resources

1. Heritage staff will designate protection zones around significant heritage resources within treatment units. The designation will occur prior to marking of timber and will be permanent enough to last through project implementation. All sites eligible for the National Register of Historic Places will require protection and avoidance using a physical boundary of 100 feet or more.
2. No new disturbance will be allowed outside the existing road corridor near archaeological sites.
3. An archaeologist will monitor all mitigation activities and construction activities.
4. Mitigation measures for site 5EA1555 will include padding the site with a geotextile cloth overlain with soil.
5. Mitigation measures for site 5EA2114 will include padding the site with a geotextile cloth overlain with soil and monitoring during management activities to assess potential damage from logging traffic.
6. After completion of management activities, the affected roads will be restored to their current condition in a manner that does not disturb the archaeological sites.
7. The road construction, maintenance, and reclamation will conform to any required mitigation measures in the archaeological clearances and Forest requirements.

Recreation

1. Stone Creek Trail (FDT 2349) will be restored to a single-track trail and revegetated as necessary.
2. Implementation of management activities will include measures to minimize impacts to recreationists.
3. Signs will be posted to keep recreationists out of treatment areas when project activities are occurring.

Scenic Integrity

1. If the post-treatment basal area would not meet criteria acknowledged to reduce MPB risk, adaptive management of the unit will be based on consideration of the effects of both MPB

infestation and additional thinning on scenic integrity. However, if MPB have infested more trees than planned for removal, a sanitation/salvage prescription will be implemented to assure removal of standing dead, infested, and hazard trees.

2. Where possible, aspen will be retained to provide a visual screen for treatment units.
3. Resource protection measures proposed for erosion control, vegetation, and wildlife will also be used to mitigate impacts to visual quality.
4. Exposed soils resulting from vegetation management activities and road and landing construction can create strong color, form, and line contrasts. These contrasts can be reduced by re-establishing vegetation on the exposed soil. Re-establishment of vegetation in the vegetation management stands, and revegetation of temporary roads will restore the landscape to a natural appearance.
5. The visual contrast of timber treatment stands on the landscape, particularly in middle to background distance zones as viewed from sensitive viewpoints, will be reduced by creating irregular or indistinct edges.
6. The debris from vegetation management activities will be removed to the extent practicable because it creates undesirable textural contrasts with the landscape. Debris left in foreground distance zones of viewing areas, such as recreational sites and trails, will be removed as soon as is practical. Forest Plan guidance regarding coarse woody debris will be met.

Public Safety

1. During logging, the purchaser or contractor will post temporary “Caution Logging Trucks Ahead” signs where logging roads intersect the bike path and trails. These locations will be shown on the improvement map that will be included in the timber or service contract.
2. To protect snowshoe hare habitat, roadside brushing will be limited to where needed to improve sight distance to provide for public safety on low-speed and low-volume roads.

Roads

1. Travelways open to motorized travel will not exceed an average travelway density of 2 miles per square mile in MA 5.4.
2. Travelways open to motorized travel will not exceed an average travelway density of one-half mile per square mile during seasons when the area in MA 5.43 is designated for elk calving, migration, winter, or summer habitat.
3. Project-related activities in MA 5.43 will be avoided in elk calving areas from May 15 to June 20.
4. Disturbance associated with reconstruction of existing NFSRs will be confined to the previously disturbed area.
5. Existing roads shall be maintained at their current maintenance level standards. Additional detail and description of maintenance levels can be found in FSH 7709.58 - Transportation System Maintenance Handbook.
6. Existing irrigation ditch at milepost 2.0 on NFSR 733.1 shall be protected.

7. All temporary road construction and road reconstruction shall follow requirements set forth in FSH 2509.25, Watershed Conservation Practices Handbook.
8. Temporary roads will be adequately closed to prevent recreational use year round. There would be no opportunity for improved recreation from the rehabilitation of temporary roads over the long-term.
9. The number, width, and total length of temporary roads and other disturbed sites will be limited to the minimum feasible disturbance consistent with the purpose of specific operations, local topography, and climate.
10. Temporary roads will be located away from forested stringers where feasible.
11. Temporary roads will be minimized on ridgetops, saddles, and other areas identified as important for lynx habitat connectivity.
12. The construction of temporary roads will be restricted within 150 feet from the edge of the current or historic floodplain, whichever is greater, to maintain hydrologic function and limit road-related stream sediment.
13. All roads crossing perennial or intermittent stream channels will have culverts installed. Culverts and bridges will be sized to pass debris and allow unimpeded movement of aquatic life. Stream crossings will be hardened to withstand floods as described in **Table D-3** below.

Table D-3 Stream Crossing Design

Design Life (years):	1	2	5	10	20	50
Design Flood (years):	10	10	25	50	100	200

14. Stream crossings will be installed to sustain bank-full dimensions of width, depth, and slope. Hardened fords and bridges will be used on streams with floodplains, and bottomless arches will be used instead of pipe culverts wherever feasible.
15. If excessive detrimental soil compaction is identified on skid trails and landings during monitoring by the Forest Service soils scientist, the affected areas will be ripped to a depth of 12 to 18 inches after use.
16. Culverts will be installed when there is minimal water flowing in the stream channels, often early fall, to minimize erosion.
17. Where feasible, haul roads will be reconstructed with rolling grades instead of ditches and culverts.
18. Cross drains will be emptied into vegetated filter strips to trap sediment and minimize connection to streams, lakes, and wetlands. Vegetated filter strips will be at least 100 feet wide in order to be effective. Where road drainage is located closer than 100 feet from streams, other mitigation will be used such as surfacing with 1 to 3 inches of gravel, constructing sediment traps, or windrowing slash. If sediment traps are used, they will be keyed into the ground and cleaned out when they are 80 percent full.
19. Temporary roads and tractor trails will be recontoured where they intercept surface water.

20. Temporary roads located in meadows will be scarified to a depth of 6 inches.
21. Where possible, temporary road cuts and fills will be avoided. Where possible, temporary roads will be located on low-angle slopes where the erosion potential and the area of exposed cut and fill slopes can be minimized.
22. All temporary roads will be closed or obliterated using a variety of methods such as recontouring, scattering slash, ripping and seeding, placing logs in roadway, or other approved methods.
23. Temporary roads will be designed to avoid creating large water collection points, such as road ditches or excessively large waterbars, particularly up-gradient of existing rotational slumps and landslides, shown on **Figure 3-1**. A greater frequency of smaller waterbars will be used than the number recommended in FSH 2509.25 – Watershed Conservation Practices Handbook.
24. All activities will follow standards and design criteria in Chapter 10 of FSH 2509.25, Water Conservation Practices Handbook.
25. Roads and tractor trails will be decommissioned after use in the following manner:
 - All culverts will be removed.
 - All fill in stream channels will be excavated and recontoured to the original geometry.
 - Roads with ditches will be outsloped to reestablish natural hillslope drainage.
 - Decommissioned road segments located within 100 feet of streams will be mulched and seeded.
 - Water bars will be placed where appropriate.

Specific Lodgepole Pine Treatment Units

Treatment Units 101 and 102

1. At the bottom of Unit 102, the steep inner gorge portion along Stone Creek will be removed.
2. For trail user safety, the Stone Creek Trail (FDT 2349) will be closed for one logging season.
3. Within 15 feet on either side of the trail, stumps will be cut flush for recreation safety.
4. Trail tread will be restored to the original trail width and condition after harvest.
5. Visual aesthetics will be mitigated by leaving 80 to 100 percent of the basal area within a specified distance of the trail to be determined during project implementation. However, beetle-infested, dead, or hazard trees will be removed.

Treatment Units 103 to 106

1. To prevent an increase in snow compaction and risks to public safety, summer and winter travel will be kept off temporary roads using densely-stocked Common Vegetation Unit (CVU) 12 as a barrier and blocking the temporary roads at either end.
2. A previously identified lithic scatter will be evaluated for protection prior to treatment activities.

Treatment Unit 105

1. On the west boundary of the unit, a constructed tractor trail will be used on slopes greater than 25 percent and less than 35 percent.

2. Skid trails will be located on the contour in the northern one-third of the treatment unit.
3. Where aspen swales are crossed by temporary roads located between Units 101, 102, and 105, the Forest Service will deep rip the area to a depth of 12 to 18 inches using ripper shacks during closure activity.

Treatment Unit 106

1. On the west boundary of the unit, tractor trails will be used on slopes greater than 25 percent and less than 35 percent.

Treatment Unit 115

1. Tractor trails will be used in the lower east-northeast corner of the treatment unit, up-gradient of slope break with a series of wetlands below.
2. Skid trails will be located on existing benches and on the contour.
3. Tops will be left for soil productivity.
4. The Meadow Mountain B inventoried roadless area boundary will be identified where it is in close proximity to the unit.

Treatment Unit 116

1. Skid trails will be located on the contour and protect improvement ditches.

Treatment Units 117, 118, 119, and 120

1. In the southern lobes of these units, skid trails should not be developed.
2. The Meadow Mountain B inventoried roadless area boundary will be identified where it is in close proximity to the unit.

Treatment Units 121 and 122

1. Temporary roads will be located on existing benches and on the contour.
2. Cutting will be excluded within 160 feet of the Grouse Creek trail (FDT 2127).
3. Cutting will be excluded of spruce-fir thickets in the riparian areas.
4. The Holy Cross Wilderness boundary will be identified where it is in close proximity to the unit.

Treatment Unit 123

1. Existing skid trails within the Green Bear Salvage unit will be used.

2. Treatments and construction of temporary roads, skid trails and landings in and around the abandoned mineshaft will be avoided. The Forest Service will consider permanently sealing the opening of the mineshaft.
3. The Holy Cross Wilderness boundary will be identified where it is in close proximity to the unit.

Treatment Unit 124

1. Existing skid trails will be used within the Green Bear Salvage unit.

Treatment Units 125 and 126

1. The temporary road will be located approximately 150 feet southwest and down slope of the existing sinkhole located northeast of the center of Section 34.

Treatment Unit 127

1. Harvest operations, temporary road construction, mechanized harvesting, and skidding will be avoided under wet and moist conditions. If unavoidable, skid trails will be deep ripped after they dry out to a depth of 12 to 18 inches using ripper shacks.
2. The Holy Cross Wilderness boundary will be identified where it is in close proximity to the unit.

Treatment Unit 128

1. Trees will be hand cut on slopes facing the town of Minturn that exceed a gradient of 40 percent.
2. Roads at the base of Units 128 and 129 will be made impassable to all terrain vehicles (ATVs).

All Aspen Treatment Units

Geology and Soils

1. To protect slope stability, no tree felling will occur within slump areas shown on **Figure 3-1** or described in Forest staff field notes and green cards used to document field-level project designs. Any cutting of trees along slump perimeters will be limited to a 60- to 90-foot buffer with less than 30 percent removal. The 30 percent criteria will be calculated based on current standing tree numbers that include both live and beetle-killed trees.

Forest Health and Biodiversity

1. Aspen stands will be maintained, expanded and connected to act as forested fuelbreaks by the following treatments:
 - Cutting dead aspen with suckering that are surrounded and overtopped by live, healthy lodgepole pine.
 - Cutting fading aspen trees with small, thin crowns, surrounded and overtopped by live, healthy lodgepole pine.
 - Cutting healthy aspen surrounded and overtopped by live, healthy lodgepole pine.
 - Cutting dead, fading, or healthy aspen surrounded by a mix of beetle-killed and live, healthy lodgepole pine.
 - Cutting dead, fading, or healthy aspen surrounded and overtopped by beetle-killed lodgepole pine.

2. Canopy openings created from cutting lodgepole pine to expand and/or stimulate aspen suckering will vary from 1 to 2½ tree lengths (1/10 to 1 acre) in size.
3. Up to 40 percent of the live lodgepole will be cut to provide increased sunlight to the forest floor and improve growing conditions for suckering aspen.
4. To promote species diversity, all mature and immature Engelmann spruce and Rocky Mountain Douglas-fir will be retained.
5. To promote aspen resprouting where slash might accumulate too deep, slash will be piled and/or pulled out of the felled area to provide free-to-grow conditions. Piles will be kept small and scattered to meet scenery objectives.
6. Standing dead lodgepole will be cut only to create big game barriers. Limbs will be left on the cut trees to act as a barrier. Dead standing lodgepole pine do not need to be felled for aspen sucker stimulation since the dead, needle-free crowns are not shading the forest floor.
7. To provide protection from big game browse on aspen shoots, dead trees first will be cut first, then live trees, if needed, around the perimeter of the aspen suckering areas to form a 4- to 5-foot tall barrier. Trees felled in the interior will deter big game movement through the aspen stand.
8. Monitoring of the success of the proposed prescription will include field evaluations conducted 1 year post-treatment, and then at 5-year intervals. Monitoring items will include:
 - Evaluation of aspen sprouting and suckering at the expanded perimeter and within aspen clones. Regeneration will be mapped and monitored with permanent photo points.
 - Assessment of the effectiveness of using felled trees as a barrier to aspen browse by big game.
 - Assessment of conifer regeneration in the aspen-lodgepole pine interface to determine whether additional silvicultural treatments targeting lodgepole pine will be necessary to maintain a single-story condition.
 - Evaluation of fuel accumulation, arrangement, and location with respect to standing dead or dying trees.
9. No heavy machinery will be used in the Vail Intermountain area in order to maintain the roadless area characteristics of the Game Creek inventoried roadless area.
10. The trunks of cut lodgepole pine will be placed in contact with the ground and roughly perpendicular to the slope.

Fire and Fuels

1. As beetle-killed trees fall, dead and down lodgepole pine will be monitored for fuel build-up. The vertical arrangement will be reduced, if necessary.
2. Following limbing of lodgepole pine, trunks will be placed in contact with the ground and roughly perpendicular to the slope.
3. Where lodgepole pine are cut and are not needed to create a barrier to big game browsing, the decomposition of surface fuels will be accelerated by cutting tree boles into pieces less than 10 feet long and placing them directly on the ground. Slash will be lopped and scattered to be less than 24 inches high.

Specific Aspen Treatment Units

Treatment Unit 203

1. Vegetation treatments within the hummocky drainage located in the northeast corner of the treatment unit (southeast of the water tower) will be avoided.

All Fuel Treatment Units

1. If feasible, broadcast burns in areas of slope hazards or sensitive soils will be completed in the spring, provided up-gradient areas are snow covered, to allow a full growing season for recovery of ground vegetation before the burned area is covered by snowpack.
2. Site-specific smoke modeling will be conducted for each prescribed burn to predict and manage possible impacts from smoke. In general, south to west wind is preferred during prescribed burning.
3. A Prescribed Burn Plan will be developed before any broadcast or pile burning will take place. These plans address burn prescriptions, smoke management, safety, public information, and required resources need to safely accomplish the burn.
4. If sediment load to intermittent and perennial drainage channels is anticipated to be excessive, check dams will be constructed using straw bales in tributary drainages above the 100-foot buffer zones at natural sediment deposition locations.
5. A mosaic of burned and unburned areas will be created. Intense prescribed fire will not be conducted in the Water Influence Zone (WIZ). If possible, burning will be conducted to maintain some duff or residual organic matter on the soil in burn areas to prevent soil erosion.
6. Natural fire breaks, such as rock outcrops or water bodies, and other existing fire breaks, such as roads or areas of recent timber harvest, will be used wherever possible, to reduce the need for constructed firelines and minimize the length of constructed firelines. Where needed, firelines will be built by hand with the minimum feasible soil disturbance. Constructed firelines will have rolling grades and minimum convergence in a downhill direction.
7. Construction of firelines in wetlands or the WIZ will be avoided unless needed to protect life, property, or wetlands. Handlines with minimum feasible soil disturbance and using natural barriers will be used in these areas.
8. Fireline waterbars will be constructed to divert and dissipate flowing water, as described in **Table D-4** below.

Table D-4 Fireline Waterbar Design

Fireline Slope (percent)	Maximum Distance Apart (feet)
1 – 6	300
7 – 9	200
10 – 14	150
15 – 20	90
21 – 40	50
41 – 60	25

9. Firelines will be restored after burning is completed.
10. Temporary and permanent changes to the sagebrush cover type will be avoided during treatment activities.
11. The most noticeable piles, including those near trails and in other visible areas, will be burned first when feasible, to limit the duration of visual impacts.
12. In high recreation use areas and other visible areas, noticeable piles will be burned in a random pattern where feasible so that the blackened areas will not be concentrated, thus spreading out the visual impact.
13. Each hand pile will contain approximately 300 to 400 cubic feet. Each machine pile will contain 1,000 to 2,000 cubic feet. Piles larger than these take a long time to burn out and would pose smoke management problems. An estimated 8 to 10 hand piles or 2 to 3 machine piles per acre will be used.

Specific Fuel Treatment Units

Treatment Unit 303

1. The northeast lobe of the original unit will be excluded from vegetation treatment.
2. A mosaic of burned and unburned areas will be treated so that 50 to 60 percent of the treatment unit is unburned.
3. A 200-foot buffer of untreated land will be maintained up-gradient of the rotational slump complex shown on **Figure 3-1**, east of the unnamed drainage that divides this unit.

Treatment Unit 305

1. The southeast one-third of the original unit will be excluded from vegetation treatment.

Treatment Unit 306

1. A non-system trail in this unit will be signed to assure the safety of recreationists during treatment.

Treatment Unit 313

1. Because this unit is west of Vail Ski area, a south wind is preferred during treatment. Signage will be used to assure the safety of trail users. The Game Creek Trail will serve as the southern boundary of the burn unit.

Treatment Units 411, 412, 514, and 515

1. The burn will be timed to avoid periods of high recreation use.
2. Prior to implementation of vegetation treatments, an onsite slope stability exam will be conducted in areas identified as potentially unstable. Potentially unstable land is described as having a “high” or “very high” instability ranking or classification as “unstable” or “marginally stable.” Once identified, these areas will be avoided.

3. No mechanical treatment is planned in Units 411 and 412.
4. The Eagles Nest Wilderness boundary will be identified adjacent to Unit 514.

Treatment Units 514, and 515

1. Areas of heavy fuels will be pretreated with pile burning; no more than 30,000 cubic feet of slash should be burned in 1 day.
2. The wilderness boundary will be delineated prior to implementation.

Treatment Units 617, 618, 619, and 620

1. Prior to implementation of vegetation treatments, an onsite slope stability exam will be conducted in areas identified as potentially unstable. Potentially unstable land is described as having a “high” or “very high” instability ranking or classification as “unstable” or “marginally stable.” Once identified, these areas will be avoided.
2. Prior to implementation of vegetation treatments, the location, size, and distribution of all aspen patch cuts will be identified.
3. Deteriorating aspen will be regenerated and enhanced as natural fuelbreaks. Aspen patch cuts will be no more than 2 to 10 acres in size. These aspen treatments involve the cutting of conifer within aspen stands. At least 75 percent of the conifer occurring within the perimeter of these stands will be cut.
4. Vegetation treatments in landslide colluvium will be avoided, especially in perennial and ephemeral drainages, and in glacial deposits of Pinedale and Bull Lake age. These deposits are roughly located in the eastern lobe of Unit 617, the lower border of Unit 618 below an elevation of 8,750 feet above mean sea level and the western one-fifth of Unit 619.
5. The trunks of cut lodgepole pine will be placed in contact with the ground and roughly perpendicular to the slope.
6. Within 500 feet of private land, all residual material (slash, logs, vegetation debris) resulting from treatment will be piled and burned. No more than 30,000 cubic feet of slash should be burned in 1 day.

Design Criteria for Alternative C

All Lodgepole Pine and Aspen Treatment Units

1. Lodgepole pine and aspen treatments under Alternative C are the same as under Alternative B, and will be carried out with the same design criteria.

All Fuel Treatment Units

1. Alternative C will remove Units 411 and 412 from the proposed project, and design criteria specific to those units will not be applicable.
2. Broadcast burning will not be used under Alternative C. Design criteria pertaining to the design of the broadcast burn and associated firelines will not be applicable.

3. Pile burning will replace broadcast burning, and design criteria pertaining to wind direction and public safety will still apply.

Design Criteria for Alternative D

All Lodgepole Pine Treatment Units

1. Lodgepole pine treatments under Alternative D are the same as under Alternative B, and will be carried out with the same design criteria.

All Aspen Treatment Units

1. Unit 202 will be the only aspen unit in the Vail Intermountain area treated under Alternative D. Design criteria pertaining to Unit 203 will not be applicable.

All Fuel Treatment Units

1. Alternative D will remove Units 412, 515, and 620 from the proposed project, and design criteria specific to those units will not be applicable.