II. Alternatives, Including the Proposed Action

This chapter describes and compares the alternatives considered for the Jim's Creek Savanna Restoration Project. It includes a description and map of each alternative and presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., the number of acres treated or the number of entries to remove excess trees) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (i.e., the amount of income produced or degree of effects to recreation, etc.).

A. Alternative A – Proposed Action

This alternative would return about half of the Jim's Creek project area to its pre-European settlement/pre-fire suppression condition. It would open up a portion of the forest, as shown on the adjacent map, to provide for reestablishment of the native bunchgrass and provide the potential for natural or managed ponderosa pine and Oregon white oak regeneration. About 240 acres would be treated initially with a single entry excess tree removal. The alternative also includes other eventual restoration activities, as described in the narrative below. The intent of the understory density reduction is that any given acre will only be disturbed by harvest once. The excess trees in a given area would all be removed at the same time to provide for the quickest recovery of bunchgrass and oak regeneration and to avoid future ground disturbing activities that could damage recovering vegetation, including young oaks, and provide additional risk of introducing noxious weeds.

Approximately 90 percent of the younger age class Douglas-fir, grand-fir, and incense cedar would be removed to leave an average of about 20 trees per acre. The largest of the younger age classed trees would be retained. Oregon white oak and ponderosa pine, regardless of size, (other than young pine encroaching upon meadows) would be retained. Since the largest trees are not evenly distributed across the landscape, the distribution of retained trees would be variable and there may be some areas up to an acre in size which would have no retained large trees in the areas treated by tree removal. It is estimated that up to two percent of the area treated would be in openings from one quarter to one acre in size and less than one percent would remain more or less at its current density. The intent is to retain all of the live, older savanna legacy trees. About 10 of the largest 100 year age class trees would be retained pre acre to provide for replacement of savanna trees which have died or for those that will die in the next several decades.

The fuels generated by the harvest would be reduced by hand piling and burning. Snags would also be created throughout the areas proposed for harvest if natural mortality does not create sufficient number within five years.

Clumped green tree retention, as per page C-41 of the NW Forest Plan (USDA/USDI, 1994) would occur on the north edge of the project area as shown on the Alternative map. This area contains more large, older trees, provides for a late-successional habitat connection, and would be protected from the prescribed fire since it is on the north side of a ridge. Based upon the net acres of harvest (not including riparian buffers and meadows) Alternative A would require retention of at least 22 acres of green tree retention clumps. The green tree retention areas delineated on the following map encompasses 48 acres.

The removal of the understory trees described above would be accomplished using a timber sale. Trees would be removed by cable machinery capable of suspending at least one end of the logs above the ground surface where it is feasible to do so from the existing road. In areas where that kind of cable removal is not feasible while retaining the legacy trees, helicopters would be used to achieve full suspension of logs. The tree removal would generate about 6.2 million board feet of merchantable timber products

No new roads would be built. Existing roads 2129.371, 375, and 367 would be maintained before and after use, then closed once all activities covered in this analysis are completed. Maintenance of Road 2129 would occur to facilitate log removal. The culvert through which Young's Creek crosses Road 2129 would be replaced since this culvert is undersized and is starting to deteriorate.

The four plantations in the Jim's Creek stand (two clearcuts and two shelterwoods) have already experienced some restoration of original conditions. All plantations have developed a relatively dense and healthy stand of bunchgrass (California fescue). Oaks have repopulated, the area, and retained overstory trees have survived and are more vigorous. Further treatments in the plantations would reduce fuels generated by the recent pre-commercial thinning. Prescribed underburning would be done to favor native grasses, keep brushy species reduced, and to keep fuels accumulations low. Young conifer thinning would occur if the prescribed underburning does not sufficiently reduce their density. Bunchgrass would be cultivated for seed collection. Snag creation would also occur in portions of the two shelterwood stands, which currently contain more than the desired average number of trees per acre.

This alternative would also include the regular application of prescribed fire to maintain the savanna. This prescribed fire would burn the reestablished bunchgrass cover and would be applied to reduce the density of shrubs and young conifers that will thrive in the open forest conditions. Prescribed fire would be applied across all harvest areas,

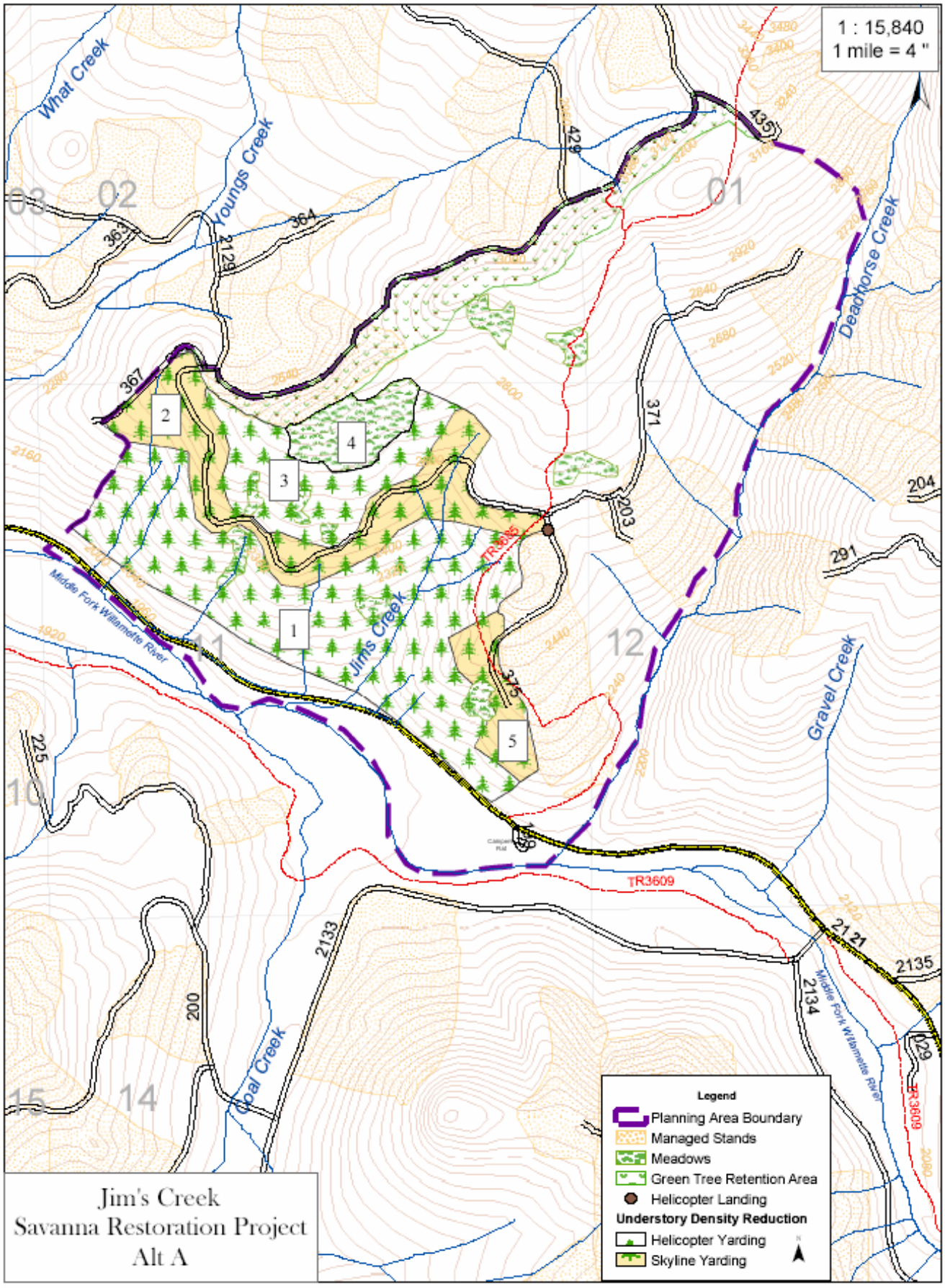

Figure 3 - Alternative A

including those portions of riparian areas to be treated. Application of this maintenance underburning would not begin until the bunchgrass is adequately established and young oaks are large enough to survive. It is not known at this time how long that may take, but it is currently thought such a prescribed fire regime would not begin until 10 years or more after bunch grass and oak planting occurs.

The proposed excess tree removal would occur within all class III and IV riparian areas (as those areas were also part of the original savanna) with the exception of an average 50 feet either side of stream channels. A full two tree height untreated buffer would be maintained to protect all fish bearing stream channels.

Implementation of this alternative would require a site-specific, non-significant Forest Plan amendment, as described above for the Proposed Action in Section I. There are several Forest Wide and Management Area standards and guidelines with which this proposal may not fully comply. Specifically, Forest Wide trail management guidelines may have to be modified for this specific area, as well as timber harvest guidelines for scenic Management Areas 11c and 11d.

Activities that would occur in addition to the harvest and fuels reduction (either before, after or concurrently) would include:

- grass seeding of California fescue
- Oregon white oak planting.
- underburning in five to ten years, once grass has become established, depending upon the development of the Oregon white oak seedlings, and upon what we learn from recent underburning tests (USDA, 2004 and Bailey 2005)
- noxious weed abatement,
- native plants important to cultural use would be planted (such as camas, bunch grass, yampa, etc.), primarily by direct seeding
- existing meadows would be restored through removal of encroaching small conifers and reintroduction of fire,
- existing plantation restoration including reduction of fuels generated by the recent pre-commercial thinning, young conifer thinning, oak regeneration, snag creation, the application of light prescribed fire to maintain these areas as an open forest, and possibly culturing the bunchgrass for seed collection.
- Closure of roads 2129.375, 371, 367 and 435 once management activities are completed,

- Snag creation if it is determined that natural leave tree mortality has not occurred or has not generated adequate numbers or qualities of snags.

Table 1 - Alternative A: Proposed Action

Unit	Ac.	Harvest method	Yarding method	Soil Type.	Forest Plan Mgmt. Area	Plant Assoc.	Crown Cover % post treat.
1	123	Partial Cut 20 TPA*	helicopter	316,310U	11c,11d,14	PSME/HODI/GRASS CDS2 12	20%
2	52	Partial Cut 20 TPA	skyline	310U,316,233	14a, 9d	PSME/HODI/GRASS CDS2 12	20%
3	36	Partial Cut 20 TPA	helicopter	310U, 316	9d, 14a	PSME/HODI/GRASS CDS2 12	20%
4	16	thinning	helicopter	2	9d	Blue wildrye – brome GM41 21	10%
5	14	Partial Cut 20 TPA	skyline	316	11d,11c,14a	PSME/HODI/GRASS CDS2 12	20%
Total	241						

*TPA = trees per acre retained

B. Alternative B - No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No activities would be implemented to accomplish the project purpose and need.

Consideration of the No Action alternative is required by the National Environmental Policy Act and provides a baseline for estimating the effects of other alternatives (Forest Service Handbook 1909.15 – Environmental Policy and Procedures, Chapter 10, 14.1)

This alternative would not provide for any restoration of historic savanna conditions.

Removal of most of the younger age class of trees would not occur and there would be no need to reduce activity created fuels.

Planting of native ground vegetation;

Plantation restoration, including reduction of fuels generated by the recent pre-commercial thinning, young conifer thinning, oak regeneration, snag creation, the

application of light prescribed fire to maintain these areas as an open forest, and possibly culturing the bunchgrass for seed collection would not occur .

Noxious weed abatement along the road system and within meadows would not occur;

Road closures responding to the District Roads Analysis (USDA, 2004b) would not occur;

Prescribed underburning would not occur, since there would be no savanna to maintain

Meadow restoration including removal of invading conifers, removal of invasive species, burning, and seeding of native meadow, and planting of native ground vegetation would not occur;

C. Alternative C

This alternative would begin restoration on a somewhat smaller area than addressed in Alternative A, and would implement a different strategy of treatments. Excess understory trees in the 100 year age class would be removed in two stages to address the concern that removal of all excess trees at once might create a problem (see the restoration discussion under the vegetation section of Chapter 3). This alternative responds to public concerns which have been expressed that rapid restoration of a more open forest conditions could harm the retained trees, possibly by making them more susceptible to windthrow. The objective of this alternative would be ultimately to leave about 20 of the largest trees, but the initial treatment this analysis will analyze would retain about 40 trees per acre. It also includes all the associated restoration activities mentioned in Alternative A.

Should this alternative be selected for implementation, the remainder of the excess trees would be removed in a separate action some time in the future if it is determined that the initial density reduction is successful and continued reduction of the 100 year old age class density is needed to provide for adequate establishment of Oregon white oak and native bunchgrass.

The fuels generated by the harvest would be reduced by hand piling and burning. Snags would also be created throughout the areas proposed for harvest if natural mortality does not create sufficient number within five years.

The removal of excess trees described above would be accomplished using a timber sale. Trees would be removed by cable machinery capable of suspending at least one end of the logs above the ground surface where it is feasible to do so from the existing road. In areas where that kind of cable removal is not feasible, helicopters would be used to achieve full suspension of logs. Altogether, excess tree removal would occur on about

171 acres. The initial tree removal entry would generate about 3.6 million board feet of merchantable timber products.

The proposed overstory canopy reduction would occur within all class III and IV riparian areas (as those areas were also part of the original savanna) with the exception of an average 50 feet either side of stream channels. A full two tree height untreated buffer would be maintained to protect all fish bearing stream channels.

No new roads would be built; the existing Road 2129.371 would be maintained before and after use, then closed once all cultural activities are completed. Maintenance of Road 2129 would occur to facilitate log removal.

Green tree retention, culvert replacement, activities within the plantations, snag creation, application of prescribed fire to maintain the savanna, and all other associated restoration activities would occur as described fully under Alternative A. Based upon the net acres of harvest (not including riparian buffers and meadows) Alternative C would require retention of at least 15 acres of green tree retention clumps. The green tree retention area delineated on the following map encompasses 48 acres.

Implementation of this alternative would require a site-specific, non-significant Forest Plan amendment as described above for the Proposed Action in Section I. There are several Forest Wide and Management Area standards and guidelines with which this proposal may not fully comply. Specifically, Forest Wide trail management guidelines may have to be modified for this specific area, as well as timber harvest guidelines for scenic Management Areas 11c and 11d.

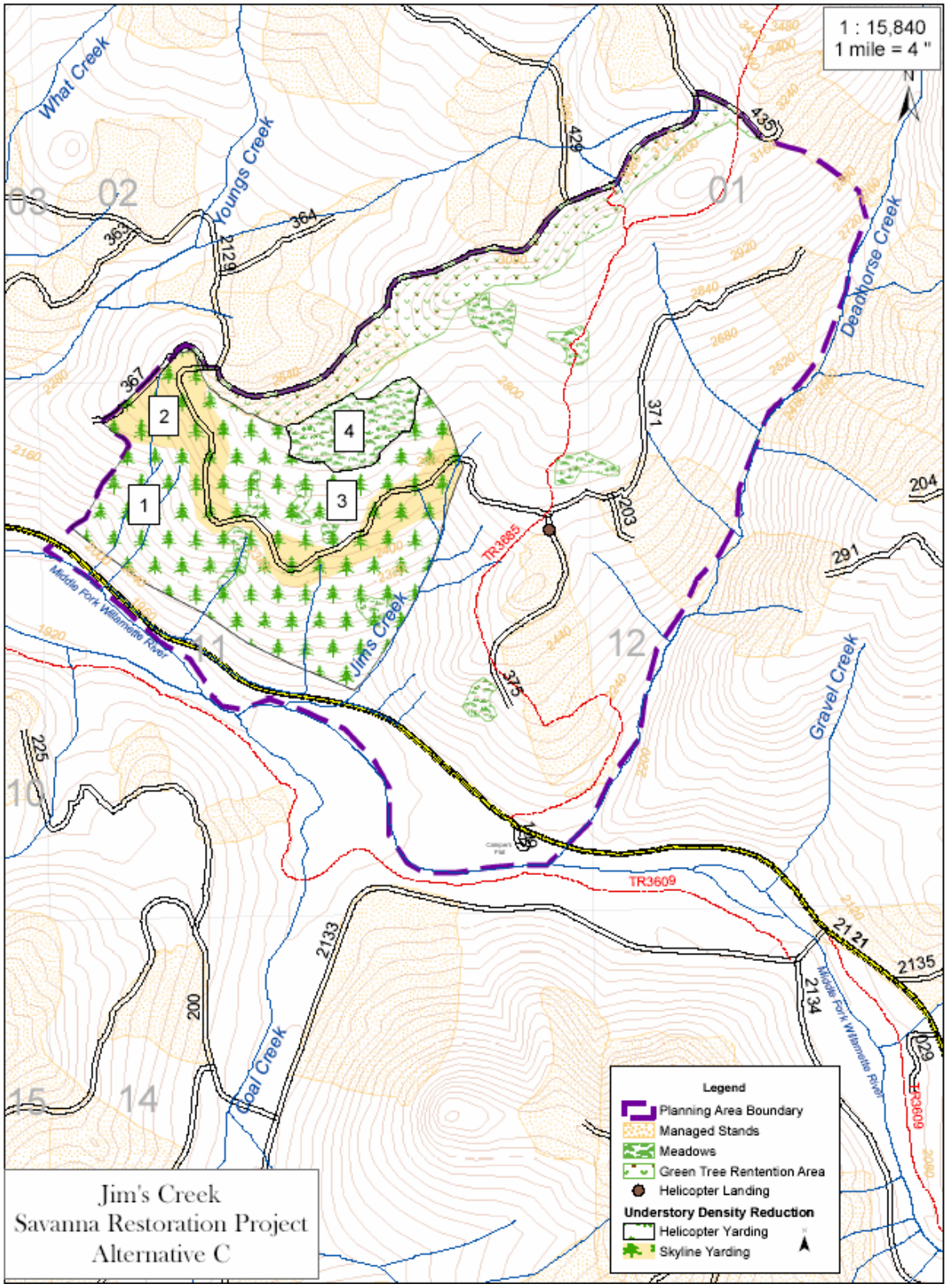

Figure 4 - Alternative C

Table 2 - Alternative C: staged entry

Unit	Ac.	Harvest type	Yarding method	Soil Type	Forest Plan Mgmt. Area	Plant Assoc.	Canopy Cover % post treat.
1	77	Partial Cut 40 TPA*	helicopter	316, 310U	11c, 11d	PSME/HODI/GRASS CDS2 12	40%
2	43	Partial Cut 40 TPA	skyline	310U	11c, 14, 9d	PSME/HODI/GRASS CDS2 12	40%
3	35	Partial Cut 40 TPA	helicopter	310U, 316	9d, 14a	PSME/HODI/GRASS CDS2 12	40%
4	16	thinning	helicopter	2	9d	Blue wildrye – brome GM41 21	10%
Total	171						

*TPA = trees per acre retained

D. Alternative D

This alternative proposes excess tree removal on about the same area as Alternative C, but with differing prescriptions. This alternative responds to the uncertainty some have expressed regarding what type of restoration treatment may be most successful. It provides three different approaches to making the residual pines and oaks more vigorous, with the idea that with the passage of time it will become apparent which alternative treatment is the most successful, and adaptive management can then be employed to determine which technique should be applied over the entire area. It also includes all the associated restoration activities mentioned in Alternative A.

On 65 acres (units 1A, B, and C as shown on the following map), understory trees would be removed to result in an average retention of 5 to 15% of the stand (about 20 trees per acre, similar to the removal prescribed in Alternative A). In this area it is estimated that up to two percent would be in openings from one quarter to one acre in size and less than one percent would remain more or less at its current density. On another 49 acres, (units 3A, B and C) from 20 to 25 % of the stand would be retained (again the largest trees in the stands,) similar to that proposed in Alternative C, with the idea that more trees would be removed in the future if the heavier removal iteration performed well. On about 42 acres (units 2A, B, and C, that area containing most of the meadows where most of the larger oaks remain) trees competing with live oaks would be removed (generally within a radius equal to the height of the trees to be released). Unit four, 16 acres of meadow pine thinning, would be the same as proposed under alternatives A, C, and E.

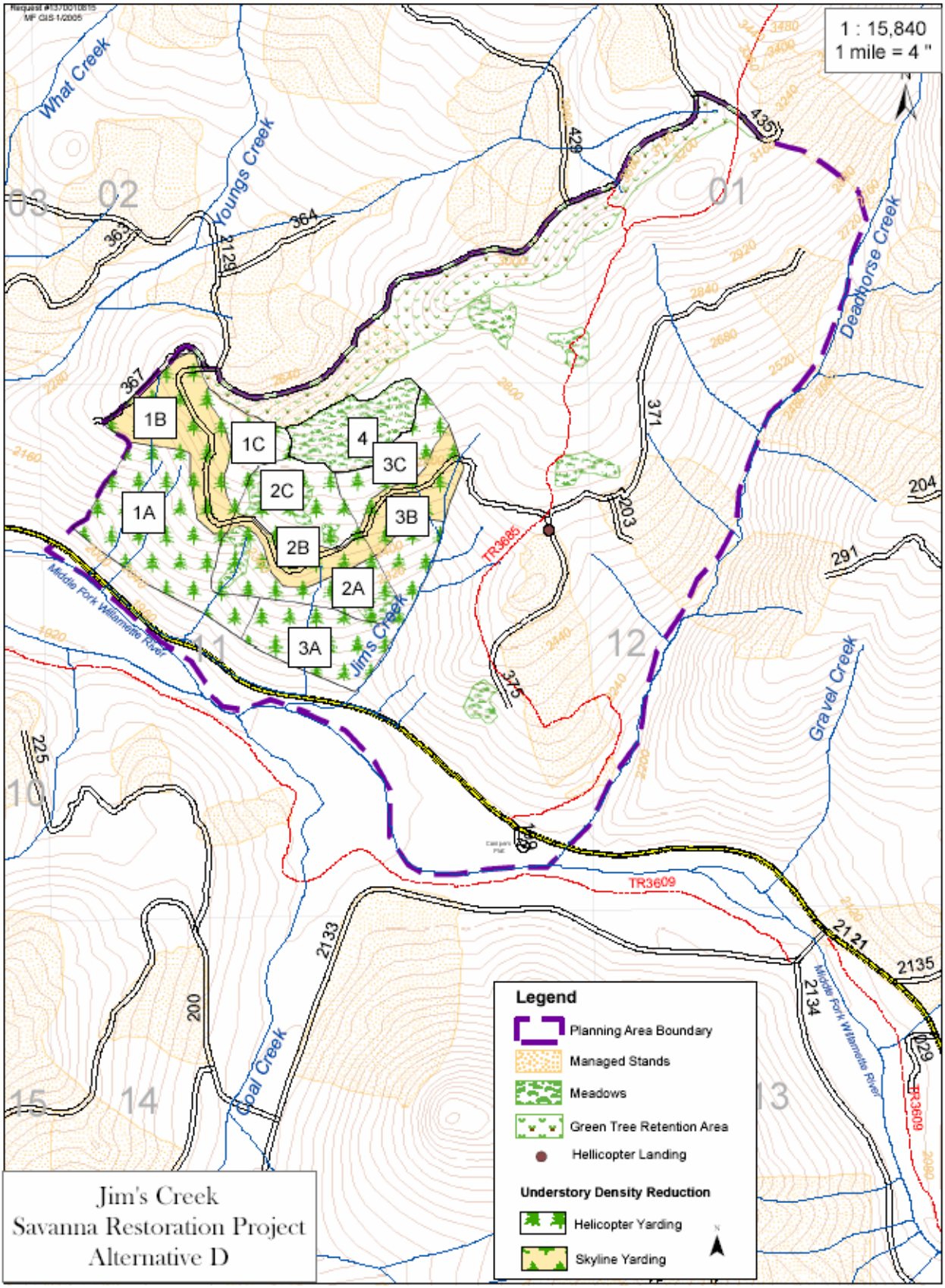

Figure 5 - Alternative D

The fuels generated by the harvest would be reduced by hand piling and burning. Snags would also be created throughout the areas proposed for harvest if natural mortality does not create sufficient number within five years.

The removal of the excess trees described above would be accomplished using a timber sale to avoid an unacceptable increase in fuel loading. Trees would be removed by cable machinery capable of suspending at least one end of the logs above the ground surface where it is feasible to do so from the existing road. In areas where that kind of cable removal is not feasible, helicopters would be used to achieve full suspension of logs. Altogether, excess tree removal would occur on a total of about 171 acres. The initial tree removal entry would generate about 3.4 million board feet of merchantable timber products. The fuels generated by the harvest would be reduced by hand piling and burning. Snags would also be created throughout the areas proposed for harvest if natural mortality does not create sufficient number within five years.

The proposed overstory canopy reduction would occur within all class II and IV riparian areas (as those areas were also part of the original savanna) with the exception of an average 50 feet either side of stream channels. A full two tree height untreated buffer would be maintained to protect all fish bearing stream channels.

No new roads would be built; the existing roads 2129.371, 375, and 367 would be maintained before and after use, then closed once all cultural activities are completed. Maintenance of Road 2129 would occur to facilitate log removal, including replacement of the Young's Creek culvert.

Green tree retention, culvert replacement, activities within the plantations, snag creation, application of prescribed fire to maintain the savanna, and all other associated restoration activities would occur as described fully under Alternative A. Based upon the net acres of harvest (not including riparian buffers and meadows) Alternative D would require retention of at least 15 acres of green tree retention clumps. The green tree retention area delineated on the preceding map encompasses 48 acres.

Implementation of this alternative would require a site-specific, non-significant Forest Plan amendment as described above for the Proposed Action in Section I. There are several Forest Wide and Management Area standards and guidelines with which this proposal may not fully comply. Specifically, Forest Wide trail management guidelines may have to be modified for this specific area, as well as timber harvest guidelines for scenic Management Areas 11c and 11d.

Table 3 - Alternative D: multiple methods

Unit	Acres	Harvest methods	Yarding method	Soil type	Forest Plan Management. Area	Plant Association	Canopy Cover% post treat.
1a	34	Partial Cut 20 TPA*	helicopter	316, 233	11c, 11d	PSME/HODI/GRASS CDS2 12	20%
1b	22	Partial Cut 20 TPA	skyline	316, 233	14a, 11c	PSME/HODI/GRASS CDS2 12	20%
1c	9	Partial Cut 20 TPA	helicopter	316	14a, 9d	PSME/HODI/GRASS CDS2 12	20%
2a	16	Oak release; very light Partial Cut	helicopter	310U	9d	PSME/HODI/GRASS CDS2 12	60%
2b	9	Oak release; very light Partial Cut	skyline	310U	9d	PSME/HODI/GRASS CDS2 12	60%
2c	16	Oak release; very light PC	helicopter	310U	9d	PSME/HODI/GRASS CDS2 12	60%
3a	26	Partial Cut 40 TPA	helicopter	316, 310U	11c, 11d	PSME/HODI/GRASS CDS2 12	40%
3b	12	Partial Cut 40 TPA	skyline	316,310U	9d, 14a	PSME/HODI/GRASS CDS2 12	40%
3c	11	Partial Cut 40 TPA	helicopter	310U, 316	14a	PSME/HODI/GRASS CDS2 12	40%
4	16	thinning	helicopter	2	9d	Blue wildrye – brome GM41 21	10%
Total	171						

*TPA = trees per acre retained

E. Alternative E

This alternative most directly addresses the purpose and need for action and would accomplish restoration of the project area the most quickly. It is similar in concept to Alternative A except it would remove all trees excess to the original savanna condition on the approximately 455 acres of the planning area not affected by past harvest or within meadows and fish-bearing stream riparian reserves. It also includes all the associated restoration activities mentioned in Alternative A.

The Alternative would open up the stand to provide for reestablishment of the native bunchgrass and create favorable conditions for development of natural or managed ponderosa pine and Oregon white oak regeneration. Approximately 455 acres would be treated initially with understory density reduction. This alternative also includes additional restoration activities as described below. The intent of this proposal is that the excess trees in a given area would all be removed at the same time to provide for the quickest recovery of bunchgrass and oak regeneration. This would avoid future ground disturbing activities that could damage recovering vegetation and provide additional risk of noxious weed introduction.

Approximately 90 percent of the younger age class Douglas-fir, incense cedar, and grand-fir would be removed to maintain an average of about 20 trees per acre, as described under Alternative A. The fuels generated by the harvest would be reduced by hand piling and burning. Snags would also be created throughout the areas proposed for harvest if natural mortality does not create sufficient number within five years.

The removal of the understory trees described above would be accomplished using a timber sale to reduce fuels accumulations. Trees would be removed by cable machinery capable of suspending at least one end of the logs above the ground surface where it is feasible to do so from the existing road. In areas where that kind of cable removal is not feasible, helicopters would be used to achieve full suspension of logs. The tree removal entry would generate about 11.9 million board feet of merchantable timber products.

No new roads would be built; the existing Road 2129.371 would be maintained before and after use, then closed once all cultural activities are completed. Maintenance of Road 2129 would occur to facilitate log removal. The culvert through which Young's Creek crosses Road 2129 would be replaced, as this culvert is undersized and in poor condition.

The proposed overstory canopy reduction would occur within all class II and IV riparian areas (as those areas were also part of the original savanna) with the exception of an average 50 feet either side of stream channels. A full two tree height untreated buffer would be maintained to protect all fish bearing stream channels.

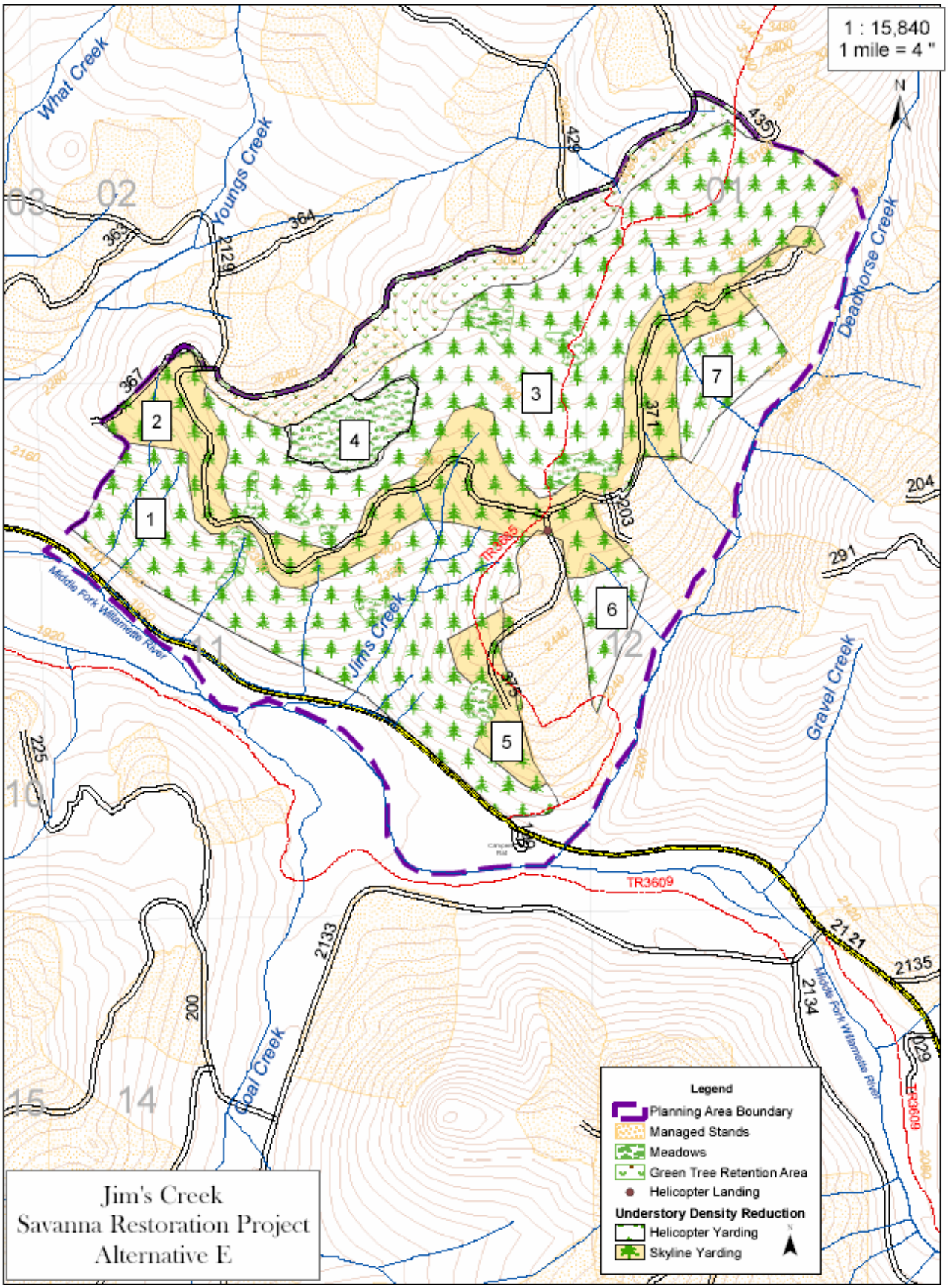

Figure 6 - Alternative E

Green tree retention, culvert replacement, activities within the plantations, snag creation, application of prescribed fire to maintain the savanna, and all other associated restoration activities would occur as described fully under Alternative A. Based upon the net acres of harvest (not including riparian buffers and meadows) Alternative E would require retention of at least 44 acres of green tree retention clumps. The green tree retention area delineated on the preceding map encompasses 48 acres.

Implementation of this alternative would require a site-specific, non-significant Forest Plan amendment as described above for the Proposed Action in Section I. There are several Forest Wide and Management Area standards and guidelines with which this proposal may not fully comply. Specifically, Forest Wide trail management guidelines may have to be modified for this specific area, as well as timber harvest guidelines for scenic Management Areas 11c and 11d.

Table 4 - Alternative E: full restoration

Unit	Acres	Harvest method.	Yarding method	Soil Type	Forest Plan Management Area	Plant Association	Canopy Cover% post treat.
1	126	Partial Cut 20 TPA*	helicopter	316, 310U	11c, 11d, 14a	PSME/HODI/GRASS CDS2 12	20%
2	99	Partial Cut 20 TPA	skyline	316, 310U, 233, 3	14a, 9d, 11c	PSME/HODI/GRASS CDS2 12	20%
3	169	Partial Cut 20 TPA	helicopter	316, 310U, 3	14a, 9d	PSME/HODI/GRASS CDS2 12	20%
4	16	thinning	helicopter	2	9d	Blue wildrye – brome GM41 21	10%
5	14	Partial Cut 20 TPA	skyline	316	11c, 14a, 11d	PSME/HODI/GRASS CDS2 12	20%
6	13	Partial Cut 20 TPA	helicopter	316	14a, 11c	27	20%
7	18	Partial Cut 20 TPA	helicopter	316	14a	27	20%
Total	455						

*TPA = trees pre acre retained

F. Forest Plan Compliance and Need for a Forest Plan Amendment

Implementation of any action alternative would require a site-specific, non-significant Forest Plan amendment as per 36CFR 219.10. There are several Forest Wide and Management Area standards and guidelines with which these proposals may not fully comply. Specifically, Forest Wide trail management guidelines may have to be modified for this specific area, as well as timber harvest guidelines for scenic Management Areas 11c and 11d. The trail guidelines (FW-046 to 048) are essentially scenic in nature and they restrict the amount of even-aged timber harvest over time within trail corridors and trail frontage. While the proposed restoration harvest would not constitute even-aged harvest (see Bailey, 2005b), the proposed excess tree removal would substantially change the visual character of the area, even though it is designed to re-create the characteristic landscape

Similarly, the scenic management guidelines for timber harvest (MA-11c-04 to 08 and MA-11d-07 to 16) do not directly address the potential need for extensive, uneven-aged harvest for the purpose of restoring a characteristics landscape, a specific desired future condition for scenic areas (Forest Plan pages IV-205 and 207).. The scenic guidelines apply specifically to even-aged regeneration harvest units size and amount of area harvested over time, but the size of the proposed harvested areas in these alternatives would exceed harvest unit size restrictions by a factor of 30.

The Jim's Creek Savanna Restoration proposal entails a different type of silvicultural technique and a more comprehensive landscape approach than anticipated by the Forest Plan and its prescriptions. Restoration of historic, different forest habitat and conditions is not addressed in the Forest Plan standards and desired future conditions for trails and scenic resources.

A Forest Plan amendment, as mentioned in the proposed action description above, could exempt this project from strict compliance with seven specific Forest Plan standards and guidelines as discussed below, is a component of all action alternatives. Rationale as to why this project should be exempt from compliance with these standards and guidelines is also presented:

Trails

Only Alternatives A and E harvest trees within the trail corridor. FW-046 specifies that scheduled even-aged harvest should not exceed 7% (for class III trails) within the trail corridor during the first ten years following plan implementation. Alternative A would harvest about 23% of the Class III trail corridor and Alternative E harvests about 70% . As explained in the Silvicultural Prescription (Bailey, 2005b) and the Recreation section of Chapter III, the proposed harvest does not constitute even-aged harvest. FW-050

specifies that Class III trail corridors shall be managed to achieve a visual quality objective of partial retention. Partial Retention is defined (Forest Plan FEISI, page III-114; USDA, 1990b) as where human activities may be evident but remain subordinate to the characteristic landscape. It is the restoration of that characteristic landscape that requires the large area of harvest prescribed.

FW-047 specifies that the amount of trail frontage affected by harvest activities should be limited to 600 lineal feet per mile per ten year period. No silvicultural systems are specified. Alternative A affects about 1,848 feet of the trail length, equating to 23% of the entire class III trail segment, and Alternative E affects about 6896 feet of the trail, about 70% of it's total length. Though the harvest included in these two alternatives would change the visual character of this trail segment, the change is overall a positive one in that it would facilitate the restoration of the characteristic landscape. Aside from the short-term effects of slash disposal that would be evident until the native grass cover becomes established, this harvest would create a diverse hiking experience with enhanced views of large tree stems, surrounding ridges and valleys, and an increased diversity of flowering plants once the native ground vegetation is reestablished.

Scenic Allocations

All action alternatives potentially would not comply with the following scenic standards and guidelines, but they would promote achievement of the scenic Desired Future Conditions (Forest Plan pages IV-205 and 207) in terms of restoring the characteristic landscape.

MA-11c-04 specifies that scheduled even-aged harvest should not exceed 10% of the suitable and available lands within the management area during the first ten years following Forest Plan implementation. Some variation is permitted when site specific conditions warrant different rotations lengths or silvicultural systems. As mentioned above, the proposed harvest is not even-aged, it is uneven-aged. However, its appearance would be similar to a shelterwood harvest, an even-aged silvicultural system, prior to shelterwood removal (which is typically done if the shelterwood harvest is indeed an even-aged silvicultural prescription). Alternative harvests from about 0.7 to1% of the 11c Management Area within the Hill's Creek Reservoir and Upper Middle Fork Fifth-field watersheds.

MA-11c-05 specifies that maximum size of even-aged regeneration harvest units should be 15 acres. Again, the proposed harvest is not even-aged, though it would initially be similar in appearance to some even-aged techniques. Alternative unit sizes range from 14 to 169 acres, but these units were designated primarily to facilitate analysis of effects based upon differing logging systems and prescriptions (in the case of Alternative D). Since the harvest units are contiguous in all alternatives, the total amount of proposed

harvest, ranging from 171 to 455 acres, would, be a better measure of how the alternatives relate to scenic standards and guidelines prescribing unit sizes. If harvest units were limited to 15 acres in this area, the characteristic landscape could not be restored, and the application of prescribed maintenance burning would be problematic at best and relatively cost inefficient to apply piece meal across harvest units that are smaller than 15 acres.

MA-11d-08 specifies that the maximum size of even-aged regeneration harvest units should be 8 acres. Roadside frontage zones in major travel corridors (such as Road 21) should have a maximum unit size of 3 acres. Contrast in form, line, color, and texture with the characteristic landscape should be minimized through maintenance of understory vegetation in road frontage zones. The proposed harvest is not even-aged, though it would initially be similar in appearance to some even-aged techniques. Alternative unit sizes range from 14 to 169 acres, but these units were designated primarily to facilitate analysis of effects based upon differing logging systems and prescriptions (in the case of Alternative D). Since the harvest units are contiguous in all alternatives, the total amount of proposed harvest, ranging from 171 to 455 acres, would, be a better measure of how the alternatives relate to scenic standards and guidelines prescribing unit sizes. If harvest units were limited to 8 acres in this area, the characteristic landscape could not be restored, and the application of prescribed burning would be problematic at best and relatively cost inefficient to apply piece meal across harvest units that are smaller than 8 acres. It is the restoration of that characteristics landscape that requires the large area of harvest prescribed.

MA-11d-10 specifies that stumps should be flush cut. This requirement responds to the perception that a stump is a negative visual element and is a solution to the short-term condition of stumps being visible immediately after harvest activities are completed. Flush-cutting stumps is an expensive and somewhat difficult task to do. Its effectiveness is questionable since the cut off stump would still be sitting on the ground looking more or less like a stump. The prescribed slash disposal is to occur in the winter months and would not likely produce fires hot enough to consume a cut-off stump. This scenic management area extends up the slope above Road 21 (the feature this scenic corridor is centered on) as far as 550 feet. It is doubtful that stumps could be seen from the road at that distance. Additionally, a portion of the road frontage consists of vertical rock faces and stumps above these cut banks cannot be readily seen from the road. Stumps on the edge of the road would be visible immediately after harvest but would soon be obscured by the planted native bunchgrass. The expense of flush-cutting stumps may not be justified in this situation.

G. Alternatives Considered But Not Fully Developed and Analyzed:

The following alternatives were considered during the development of this restoration proposal but were determined not to warrant full development and analysis. They were not fully analyzed because of feasibility problems, because they do not respond well to the purpose and need for action, would involve excessive resource risk, or were likely to be unacceptable to the general public. Most of these alternatives have been identified and discussed during the field trips that have occurred over the last four years. Some of the alternatives below respond to the need for restoration without using a commercial timber sale. Some people have expressed concern regarding the sale of publicly owned trees. The Northwest Forest Plan (NWFP) does provide for the production of commercial timber products on Matrix Lands (NWFP page C-39). The NWFP Purpose and Need statement identifies the need for a sustainable supply of timber products (USDA/USDI. 1994, page 1-4). The Jim's Creek project area is entirely within lands designated as Matrix. Specific rational for why we choose not to fully evaluate the following alternatives is provided below.

Restoration by Underburning: This alternative would not fell and/or remove trees and relies upon prescribed fire to thin out the 100 year age class of Douglas-fir that has encroached upon the savanna. Initially this alternative may appear to be very intuitive. The cessation of prescribed burning by the Native Americans and the commencement of fire suppression has caused the loss of most of the original savanna vegetation. From observations of the effects past occurrences of underburning had in these types of forests, it is clear that underburning alone cannot achieve the restoration of savanna conditions in this closed canopy forest of fire resistant trees. The frequent, low-intensity fires that maintained the original savanna vegetation and allowed for the persistence of the relatively thin-barked Oregon white oak were burning in a fuel bed very different than what exists today on these sites. The prescribed fires of the Native Americans could not have killed older, thick barked trees as those fires were burning in grasses and had relatively short flame lengths and residence times. They merely prevented young, fire-susceptible tree seedlings from becoming large enough to become fire-resistant. We do not expect a fire burning in an entirely different fuel regime to have the same function as one burning under vegetation with a completely different structure. In order for maintenance burns to work it is important to restore the fuel profile mechanically before returning to the past fire regime

A local, recent example illustrates why this alternative cannot accomplish the purpose and need for restoration. In August of 1996 a wildfire burned about 60 acres of the landscape that eventually became included in the Jim's Creek Savanna Restoration project (in the northeast corner of the project area, above Road 371). This fire was one of

many that were started by a large lightning storm on the Middle Fork Ranger District. This particular fire was allowed to burn for three days without fire suppression activities because resources were in short supply and because it was recognized that with the low fuel loading in the general area there was a lower risk than other areas of this fire doing wide-spread damage. The results of this fire are still apparent on the ground today. It was mostly an underburn. Less than ten percent of the trees were killed by the fire and those typically in small patches where the fire killed both young and older trees. This patch mortality was likely due to a greater than average amount of fuel accumulation in localized areas, or the presence of a patch of ladder fuels. In the bulk of the areas that underburned, no trees, or only the smallest trees were killed. The amount of canopy closure was essentially unchanged by the fire, so there was little benefit from it in terms of restoring the original ground vegetation. There is still insufficient light falling on the forest floor to provide for successful bunchgrass reestablishment or ponderosa pine and Oregon white oak regeneration. Those desired characteristics would not be created by such a fire.

For a long-term restoration perspective, repeated application of fire similar in magnitude to the 1996 event would likely continue to be unsuccessful in further restoration of this area. The use of prescribed fire under drier or winder conditions in an attempt to generate more mortality would risk the loss of the entire stand, including legacy trees. With more moderate fire behavior such as that experienced in the 1996 wildfire, the trees that did not get killed by the first fire would be larger in diameter and have thicker bark than they had during the first fire, and there would be little fuel available to carry a fire of any magnitude. Therefore, even less of such an effect from subsequent burns could be expected. The stand conditions would become progressively less likely to allow fire to restore a savanna.

It is also unlikely that prescribed fire could be applied successfully to this site in mid-summer. Prescribed fires alone would have even less efficacy for restoring a more open forest type than did the 1996 wildfire. They would be burned under less risky scenarios in terms of fuel moisture, relative humidity, and wind to meet operational and safety guidelines. Flame lengths would be shorter with less duration than in the August wildfire. Additionally, prescribed underburning may be counter to the objective of re-establishing the native bunchgrass. The sparse bunchgrass now existing in the underburned areas is stressed from shading. It could be that an underburn would further stress the remnant bunchgrass plants. Bunchgrass plants within the August wildfire received no benefit of increased sunlight. This stress with lack of positive impacts may have actually killed the bunchgrass that had persisted under the forest canopy, rather than put it on a path to restoration. This is in contrast to the positive response of bunchgrass in

the four managed plantations in the Jim's Creek area (see Bailey 2005b in the Analysis File).

Areas near the Jim's Creek project area containing similarly structured forest also burned during the same fire occurrence and these stands did experience stand replacement fire. Relying on late-season fire, whether natural or prescribed, to generate restorative benefits without a concurrent re-structuring of the vegetation being burned would entail a risk of losing the entire stand, including the legacy trees. Even though there is not enough fuel under these forests to kill trees by stem scorch, they do have a dense canopy, which can be killed by radiant heat or crown fire if fires burn during extreme conditions. Even a prescribed a fire regime that could kill the trees excess to a savanna structure would create dead tree stems and crowns that would eventually become ground fuels. The periodic burning critical to maintaining a savanna forest and the grass on the forest floor could not be done with such fuels present, or the remaining stand could be killed. So the surest way to provide for savanna restoration in this area is to re-create a fuels complex that allows for comparatively frequent, low-intensity fore events. That would require mechanical manipulation of fuels prior to reintroducing fire.

Regeneration Harvest under Forest Plan Standards: This alternative was initially conceived to illustrate how the proposed action contrasts with standard forest management in Matrix lands as directed by the Forest Plan as amended by the Northwest Forest Plan. This alternative would entail dispersed regeneration harvest units with green tree retention on blocks less than 60 acres in size in Matrix, and less than 8 to 15 acres in the scenic allocations. This would be followed by dense reforestation of commercial stands. This alternative approach would not meet the purpose and need for savanna restoration. Additionally, there are already examples of this type of forest management in the project area. Therefore, there is no need for creating additional examples of this management technique for comparison. This treatment would not meet the purpose and need for action.

Restoration by Tree Removal but No Sale of Removed Trees: This alternative would, after full implementation, essentially resemble the Proposed Action in appearance and environmental effects. It would provide for removal of the similar amounts of the 100 year age class understory, but that removal would not be accomplished using a timber sale. This alternative would respond positively to the purpose and need for restoration and was originally discussed as a way to achieve restoration while avoiding the sale of trees. Some commentors prefer not to have trees sold.

While the environmental impacts of this alternative would be essentially the same as the proposed action, the social and economic impacts would be much greater. The cost of tree removal would not be subsidized by their use for lumber products. The costs of

felling, yarding, loading, and transportation of the tree stems; and abatement of slash generated by those actions, would have to be born by appropriated wildlife and botanical habitat improvement funding. It is estimated that full restoration of the Jim's Creek area using this approach would cost in excess of one million dollars, depending upon the degree of tree removal and slash reduction. Additionally, locating an area to deposit and store the tree stems that would have to be removed is problematic. Ultimately, an area capable of holding the contents of over 2000 log trucks would have to be located. This area would have to be able to hold a pile of tree stems about 90 feet wide, 50 feet tall and about 1000 feet long. Such a pile of dead wood would create environmental problems of its own, the danger of fire being of greatest concern.

This alternative was not fully developed because it is logistically and financially infeasible. Appropriated wildlife and botanical habitat improvement funding to implement an alternative such as this is not readily available.

Restoration by Tree Killing but no Removal of Killed Trees: This alternative would reduce competition from excess trees in the 100 year age class by killing them, either by girdling or felling. It responds to some of the cost problems presented by the above alternative by avoiding the removal of the excess tree stems. This alternative would partially respond to the purpose and need; the stand density would be reduced such that grass, oak and pine could regenerate, but the prescribed burning that would be needed to maintain the open nature of the forest could not occur without incurring a huge risk of loosing all retained trees and re-developing vegetation, as there would be large amount of fuel on the ground resulting from implementation of this alternative. Treatment of slash would again be very expensive, and considerably problematic if the tree stems themselves remained on the ground.

This alternative, especially the felling only option, would create conditions that would be very conducive to the development of a bark beetle epidemic. Given the number of trees and the area affected, such a beetle out break could potentially threaten the retained trees as well as live trees outside the treatment areas and the planning area. Additionally, falling trees and leaving them on the ground would also present a substantial long-term risk for future hot wildfires, considering the amount of large wood that would be retained on site.

Smaller Initial Acreage of Treatment: This approach would be to apply treatments similar to those described in the fully developed Alternatives A, C, or D on a much smaller area, in the neighborhood of 10 to 30 acres. This alternative would respond to the concerns of some that are unsure the restoration of this savanna would succeed, therefore the initial treatments should be very tentative. This strategy was ultimately not considered for full discussion and analysis. It would be somewhat similar to the standard

approach alternative (see above), and more importantly would not be especially effective in accomplishing restoration of landscape savanna conditions. Such a tentative approach would accomplish little in providing important wildlife habitat since so little would be produced initially. Many more oak and pines would succumb to suppression and competition mortality while the tentative treatment is being evaluated. It would also not be in scale with natural landscape patterns. This is important in relation to the cost and feasibility of future underburning to maintain savanna conditions. Small blocks of restoration would not lend themselves to being placed on topographic or other features that would provide for safe and efficient application of prescribed fire. If the prescribed fire could not be applied efficiently in the future, it would likely not be used as frequently as it should to maintain savanna conditions.

The ID Team has concluded that there is not as much uncertainty regarding the potential effectiveness of the proposed actions as some people have expressed. This greater certainty is evidenced by the successful development of many of the savanna traits and species in the four plantations within the planning area. These successful small-scale examples demonstrate that bunchgrass and Oregon white oak can be reestablished even without supplemental planting. The retained trees did not blow over to any large extent or otherwise experience high amounts of mortality, which was a concern of those proposing a more tentative approach. There does not appear to be value in fully developing such a tentative restoration alternative that does not go very far in accomplishing the purpose and need.

Release of individual oak and/or pine only across the entire area: This alternative was not fully considered because it would not move the area towards the desired condition of a functional savanna which could be sustained over time.

Releasing just oaks would make oak or pine regeneration difficult. Insufficient clearing would occur for bunchgrass reestablishment across the landscape. The effective release of pine, which are being impinged upon more from a below-ground standpoint than from shading competition, would require removal of as many or more trees than would Alternative E . It would not provide for retention of sufficient trees to replace the savanna legacy trees which succumb to mortality over time.

One way to address pine release from competition would be to remove all other trees within the rooting zone. Ponderosa pine can have roots extending as far as five crown radii from the tree stem (Smith, 1964; Curtis, 1964). With a crown radius averaging 20 feet , one would have to clear a circle 200 feet in diameter (0.7 acres) to eliminate all direct root competition for an individual tree. With about 2 large pine per acre on average in these stands, releasing all pine this way would require the cutting of all other trees.

Another approach to release trees from competition would be to clear a radius of one tree height. This would result in an ever larger area cleared per tree. This type of release would not create the desired savanna condition. Therefore, this alternative was not fully developed and analyzed.

Road Construction, Skyline, or Ground-based Yarding: Most of the excess trees in any alternative, both those fully developed and those not fully considered, could be removed through more conventional and cost effective skyline yarding if the project area was more completely roaded. The action alternatives rely on helicopters to remove most of the excess trees in recognition of the impact on water quality that could be created by extensive road construction. Given the current high density of roads in this watershed and the presence of two listed fish species in the Middle Fork river, we determined additional road construction was not a reasonable means with which to remove excess trees.

Additionally, from a strict feasibility standpoint, more acreage in all the action alternatives could be accessed with the cheaper skyline removal technology. Nearly all the lands below road 2129.371 could technically be skyline yarded without the need for additional road construction. Skyline yarding requires clearing of a straight corridor within which to string the main cable. On this landscape, creating skyline corridor of any substantial length would invariably require cutting one or more savanna legacy trees. These remaining survivors are too important to lose even a few, so the amount of proposed skyline corridors was limited to areas within sight of the road to avoid the potential necessity of having to cut a legacy tree.

Portions of the project area could also be yarded by ground-based systems such as tracked vehicles. Such yarding methods would also require a more extensive road system to be constructed. Given the fine-textured nature of the soils (they are prone to erosion and compaction) and the desire to protect residual native grasses, ground-based yarding was determined to be too impactful to fully consider.

H. Mitigation Common to All Alternatives

In response to analysis findings and public comments, mitigation measures were developed to reduce or eliminate undesirable environmental impacts the various alternatives might cause. The following mitigation measures are a part of the action alternatives. Most of the measures implement established Forest Plan standards and guidelines to comply with management direction and environmental laws. The list also briefly indicates what resources the mitigations protect. Specific details can be found in the Analysis File under individual resource prescriptions.

1. General Standards for all Activities:

Activities will comply with the standards and guidelines in the Willamette Forest Plan as amended by the Northwest Forest Plan.

Activities will comply with the executive orders specifying wetland and flood plain protection (see the relevant discussions in Chapter III).

The General Water Quality Best Management Practices (BMP's) of Pacific Northwest Region (USDA, 1988c) applicable to proposed actions such as timber harvesting will be practiced in each alternative (see Murdough, et al, 2005, in the Analysis File).

2. Specific Measures: (for more detail, see Alternative A and E descriptions)

- Helicopter yarding (as opposed to road construction and cable yarding)– to protect cultural resources, soil disturbance and compaction, legacy tree damage, water quality. More of the project area is feasible to skyline yard than the areas designated for skyline yarding on the Alternative maps. Skyline yarding was limited to those areas within several hundred feet of existing roads. Skyline yarding requires that a straight cable corridor be established. Creation of such a corridor over a slope length much more than several hundred feet would inevitably create the need to remove a savanna legacy tree. Helicopter yarding has been proposed in many places to avoid that outcome;
- Partial or full log suspension in areas not helicopter yarded – to limit soil disturbance and compaction, and to protect legacy trees and water quality;
- Duff, litter, and slash pullback around all legacy ponderosa pine and Oregon white oak– to provide for general biodiversity through protection of legacy trees and protect cultural resources;
- Riparian buffers – full site potential tree height buffers on permanent streams to protect water temperature, and a no treatment buffer averaging 50 feet either side of ephemeral channels to reduce the probability that soil would entire the stream channel, provide for channel stability, wildlife dispersal habitat, and survey and manage species habitat;
- Seasonal restrictions (3/1 to 7/15) on helicopter flight while in the project area– to protect spotted owls;
- Seasonal Restrictions (1/15 to 7/31) on helicopter flight anywhere outside of a straight-line flight path between the helicopter landing and the service landing -to protect peregrine falcons; subject to waiver based upon occupancy and breeding status;
- Snag creation in all activity areas, including shelterwood stands; snag creation will only occur using 100 year old cohort trees; – to provide replacement to mitigate removal of existing snags for safety purposes; - wildlife habitat;
- Cleaning of timber harvest, road maintenance, and culvert replacement machinery prior to entering National Forest lands – to avoid noxious weed spread;

- Use weed-free fill for road and landing reconstruction - to avoid noxious weed spread;
- Treatment of noxious weeds prior to road use by manual and mechanical methods – to enhance general biodiversity and to avoid noxious weed spread;
- Covering of St. Johnswort at the helicopter landing location with either plastic, gravel, dirt or all three prior to construction – to eliminate these plants and avoid their spread;
- Revegetation of the project area (including roads) with native species after disturbances are completed – to protect soil, water quality, biodiversity, and to avoid noxious weed spread;
- Compliance with State smoke management guidelines – to protect air quality;
- Slash burning would occur only under conditions where the duff moisture content is greater then 30 percent – to protect soil, cultural resources legacy trees, and riparian areas. Fuels created by the excess tree removal would be hand-piled and burned (rather than using the cheaper and more efficient broadcast burning);
- No new road construction would occur – to reduce erosion, protect listed fish species, avoid wildlife habitat disturbance, and protect cultural resources;
- Resurface haul route roads 2129, 2129.367, 371, and 375 – to protect water quality;
- Road closure for roads 2129.367, 371, 375, and 435 – to avoid noxious weed spread, protect water quality, and limit wildlife disturbance;
- Replacement of culverts that are nor properly functioning or that are close to failure– to protect water quality;
- Placement of sediment trapping structures prior to the commencement of tree removal in the Road 21 ditch line and within 175 feet either side of the Jims Creek crossing of the 2129.371 road – to protect water quality and fish habitat;
- Yard away from (not across) all stream channels, to protect wetlands meadows, soil, biodiversity, and water quality;
- Directional falling away from streams, meadow edges and cultural sites – to protect water quality, biodiversity and cultural resources;
- Documentation of culturally modified trees that need to be removed for safety reasons – to preserve the information they provide.
- Location of clumped green tree retention area (see NWFP page C-41) on the north slope on the north edge of the project area (see Alternative maps) – to provide spotted owl and other late-successional forest dependant species habitat connections; maintains a habitat connection to mitigate for the create of open forest.
- High stumping of snags felled for safety purposes, where feasible – to provide additional down wood wildlife habitat;
- Retention of five or more trees per acre than the desired future condition - to mitigate against unanticipated mortality and to provide for trees to mitigate snag removal.

3. Best Management Practices (USDA, 1988c), as follows (see also the Fisheries/Watershed report for more details on these practices):

T-5: Limiting the Operating Period of timber Sale Activities

Objective: To ensure the purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract (TSC).

T-6: Protection of Unstable Areas

Objective: To provide for identification and appropriate management prescriptions for unstable lands.

T-7: Streamside Management Unit Designation

Objective: To designate a riparian area along streams and wetlands where prescriptions are made that will minimize potential adverse effects of nearby logging and related land disturbance activities on water quality and beneficial uses.

T-8: Stream Course Protection (Implementation and Enforcement)

Objective: 1) To protect the natural flow of streams, 2) to provide unobstructed passage of storm flows, and 3) to prevent sediment and other pollutants from entering streams.

T-13: Erosion Prevention and Control Measures During Timber Sale Operations

Objective: To ensure that the Purchaser's operations shall be conducted to minimize soil erosion.

T-14: Re-vegetation of Areas Disturbed by Harvest Activities

Objective: To establish vegetative cover on disturbed sites to prevent erosion and sedimentation. Re-vegetation should be considered mitigation for the spread of weed species.

T-15: Log Landing Erosion Prevention and Control

Objective: To reduce the impacts of erosion and subsequent sedimentation, on log landings, by use of mitigating measures.

R-7: Control of Surface Road Drainage Associated with Roads

Objective: 1) To reduce minimize the erosive effects of water concentrated by road drainage features, 2) to disperse runoff from or through the road, and 3) to minimize the sediment generated from the road.

R-9: Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects

Objective: To minimize erosion of and sedimentation from disturbed ground on incomplete projects.

I. Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table below is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. This table is a very brief summary of the effects discussion contained in the following Environmental Consequences section (Chapter III)

Table 5 - Alternative Comparison Chart

Jim's Creek Savanna Restoration Project

Issues/evaluation criteria	**Alternative A –** Proposed Action	**Alternative B** – No Action	**Alternative C – staged entry**	**Alternative D – multiple methods**	**Alternative E – full restoration**
Acres of Excess Tree Removal	241	0	171	171	455
Road Reconstruction – mi.	3.5	none	3.5	3.5	4.25
Road Closure – mi.	3	none	3	3	3
Water Quality/Fish Habitat					
change in water temp.	none	none	none	none	none
aggregate recovery % (ARP) Buck Cr. 6th field	79.6	80	79.7	79.7	79.0
ARP; PSUB 21-1	75.7	84.4	80.1	80.1	62.9
ARP; PSUB 21-G	80.8	81.4	80.8	80.8	80.1
potential soil movement - tons	1258	115	838	838	2251
Late-Successional Habitat					
acres of LS habitat. modified	108	none	171	140	131
acres of LS habitat removal	132	none	none	31	323
owl habitat degraded	59	none	132	102	71
owl habitat removed	133	none	none	30	321
owl home range habitat remaining	#1088-36% #3235-62%	#1088-43% #3235-62%	#1088-38% #3235-62%	#1088-38% #3235-62%	#1088-36% #3235-58%
Biodiversity					

Issues/evaluation criteria	**Alternative A –** Proposed Action	**Alternative B** – No Action	**Alternative C – staged entry**	**Alternative D – multiple methods**	**Alternative E – full restoration**
big game habitat effectiveness index (HEI)	0.53	0.52	0.52	0.52	0.53
percent forage increase	6	none	4	4	11
acres of savanna created	217	none	none	65	423
acres of meadow improved	31	none	28	28	43
probability of restoration success	high	none	low to moderate	High -81 acs. Low to moderate – 90 acs.	high
average patch size	225 acres	none	155 acres	62 acres	439 acres
approximation of historic landscape conditions	low	none	none	none	low
Change in Fire Regime Condition Class	From a 3 to a 1 on 241 acres	none	From a 3 to a 1 on 171 acres	From a 3 to a 1 on 171 acres	From a 3 to a 1 on 455 acres
Fuels and Fire					
fuel loading; tons/ acre	10	28	10	10	10
Total acres of fuels redcution	241	none	171	171	455
change in fuel structure (fuel model	2	10	2	2	2
likelihood of crown fire spread	none	high	none	none	none
Cultural Resources					
acres of cultural plants restored	241	none	171, partially	171, partially	455
Soil Productivity					
% cumulative detrimental soil conditions	4.9	4.4	4.8	4.8	5.3
Air Quality					
amount of particulates: tons	180	none; 977 for a wildfire	128	128	341
Economics					

Issues/evaluation criteria	**Alternative A –** Proposed Action	**Alternative B** – No Action	**Alternative C – staged entry**	**Alternative D – multiple methods**	**Alternative E – full restoration**
Present Net Value	$478,549	$-143,510	$-25,465	$109,989	$1,110,252
$s available for restoration	$1,032,224	none	$371,999	$498,078	$2,009,970
Noxious Weeds					
acres of ground disturbance	241	none	171	171	455
disturbance adjacent to roads: miles	3.2	none	2.9	2.9	3.4
Recreation					
feet of trail affected	2,900	none	none	none	8,250
feet of temp. trail closure	5,000	none	1,000	1,000	10,000
Scenic					
characteristic landscape restored	241 acres	none	none	65 acres	455 acres