Appendix D
Vegetative Strata

Table of Contents

1 Introduction D-1
2 Vegetative Strata D-3
2.1 Strata A D-3
2.1.1 Effects of Alternatives B, C, and D D-3
2.2 Strata B D-4
2.2.1 Effects of Alternatives B, C, and D D-4
2.3 Strata C D-5
2.3.1 Effects of Alternatives B, C, and D D-5
2.4 Strata D D-6
2.4.1 Effects of Alternatives B, C, and D D-6
2.5 Strata E D-7
2.5.1 Effects of Alternatives B, C, and D D-8
2.6 Strata F D-9
2.6.1 Effects of Alternatives B, C, and D D-10
2.7 Strata G D-10
2.7.1 Effects of Alternatives B, C, and D D-11
2.8 Strata H D-12
2.8.1 Effects of Alternatives B, C, and D D-12
2.9 Strata I D-13
2.9.1 Effects of Alternatives B, C, and D D-14
2.10 Strata J D-15
2.10.1 Effects of Alternatives B, C, and D D-15
2.11 Strata K D-16
2.11.1 Effects of Alternatives B, C, and D D-17
2.12 Strata L D-17
2.12.1 Effects of Alternatives B, C, and D D-18
3 Literature Cited D-19

Tables

Table D-1. Strata A Metrics for Existing Condition and Alternatives B, C, and D in 2011 .....D-3
Table D-2. Strata B Metrics for Existing Condition and Alternatives B, C, and D in 2011.....D-4
Table D-3. Strata C Metrics for Existing Condition and Alternatives B, C, and D in 2011.....D-5
Table D-4. Strata D Metrics for Existing Condition and Alternatives B, C, and D in 2011 .....D-6
Table D-5. Strata E Metrics for Existing Condition and Alternatives B, C, and D in 2011.....D-8
Table D-6. Strata F Metrics for Existing Condition and Alternatives B, C, and D in 2011.....D-10
Table D-7. Strata G Metrics for Existing Condition and Alternatives B, C, and D in 2011 .....D-11
Table D-8. Strata H Metrics for Existing Condition and Alternatives B, C, and D in 2011 .....D-12
Table D-9. Strata I Metrics for Existing Condition and Alternatives B, C, and D in 2011.....D-14
Table D-10. Strata J Metrics for Existing Condition and Alternatives B, C, and D in 2011.....D-15
Table D-11. Strata K Metrics for Existing Condition and Alternatives B, C, and D in 2011 .....D-16
Table D-12. Strata L Metrics for Existing Condition and Alternatives B, C, and D in 2011.....D-18

Figures

Figure D-1. Scriver Integrated Restoration Project Strata Common to all Alternatives D-2

1 Introduction

Vegetative strata (i.e., groupings of forested stands) were identified from the silvicultural prescriptions and potential applications across the Project area based on marking guidelines that would be used to meet Project specific vegetation and wildlife objectives under each alternative. Using strata differentiate and display the effects on the forested vegetation described in section 3.2 of the Supplemental Draft Environmental Impact Statement (Forest Service 2012). Stratifying the area based on similar vegetative conditions and/or geographic locations and common treatment themes allows a more robust depiction of likely outcomes across proposed treatment areas as well as providing the range of conditions that make up overall averages used to describe conditions. Stratification also allows the Forest Vegetation Simulator modeling analysis to more clearly display differences between Alternative A and the action alternatives, and how each accomplishes the vegetation resource objectives defined in Purpose 1 (section 1.5 of Forest Service 2012). However, only the effects of Alternatives B, C, and D are described below. The effects of Alternative A are assumed to remain the same as the existing condition.

Strata A, Strata B, and Strata D represent Potential Vegetation Group[1] (PVG) 5 and PVG 6 habitat types assigned to the mixed1 fire regime (Figure D-1). The strata are in the northeast portion of the Project area (Attachment B). Many of the stands in the area were harvested in the Bear Wallow II Timber Sale that occurred in the mid-1990s and the area is due south of the Frontier Timber Sale harvested in 2012. Plantations are common throughout the area. Some of the stands in this area are large tree size class with a high component of ponderosa pine (*Pinus ponderosa*) in the overstory. However, recent projects were focused on the overstory and conditions in the understory have long-term consequences for the replacement of large ponderosa pine.

Strata E, Strata F, Strata G, Strata H, Strata K, and Strata L are on the western portion of the Project area (Attachment B). Stands are PVG 6 habitat types assigned to the mixed1 fire regime (Figure D-1). Current conditions are in part a product of timber harvest from the 1950s to the 1970s. Although some small plantations occur in the area, stands are generally large tree size class. Past harvest treatments removed large ponderosa pine and Douglas-fir (*Pseudotsuga menziesii*), leaving behind grand fir (*Abies grandis*). Some ponderosa pine and Douglas-fir have since succeeded into the overstory, but the largest trees in the stands are generally grand fir. Lack of disturbance since the timber harvest has produced an understory dominated by grand fir.

Strata I and J represent the 2 PVG habitat types assigned to the nonlethal fire regime (Figure D-1). The strata are located in the southeast portion of the Project area on the ridge between Scriver Creek and Pinney Creek (Attachment B). Areas not proposed for treatment within the portion of the Project area are primarily riparian conservation areas (RCAs).

[1] A complete description of all PVGs is included in Attachment A.

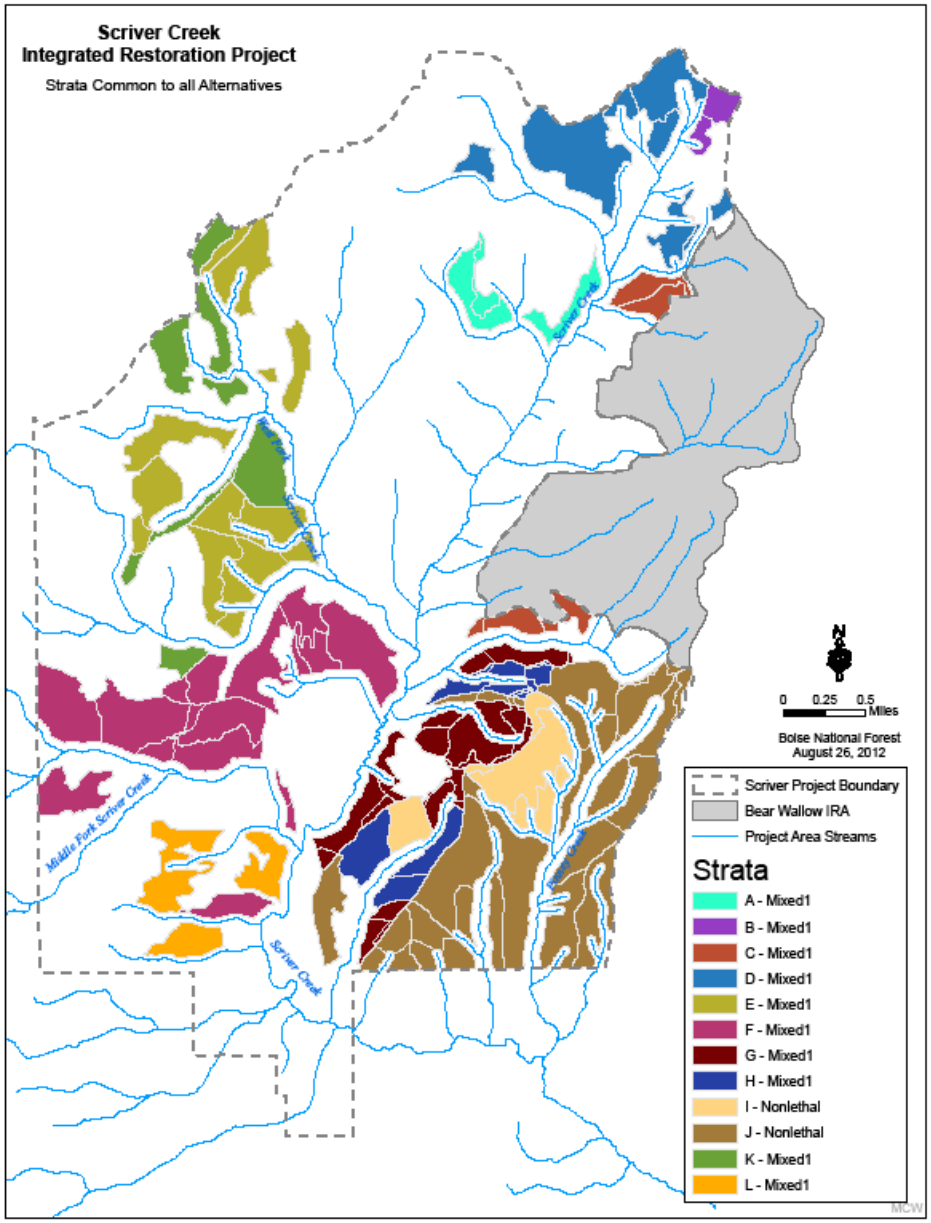


Figure D-1. Scriver Integrated Restoration Project Strata Common to all Alternatives

2 Vegetative Strata

2.1 STRATA A

Strata A includes 102 acres that are classified as large tree size class with a total stand basal area of 154 square feet per acre (ft^2/acre) (Table D-1). Overstory composition is primarily ponderosa pine and Douglas-fir and the understory is dominated by grand fir. The total canopy cover is about 73 percent, the majority of which is in the understory. The silvicultural objective for this strata would be to maintain the existing overstory created by the most recent harvest but reduce tree density in the understory. The target basal area would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Treatments would focus on reducing the grand fir in the understory and enhancing structural diversity by developing ponderosa pine and Douglas-fir dominated clumps and groups, and creating openings for regeneration.

Table D-1. Strata A Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternatives	Basal Area (ft2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	154	73	26	47	38	41	21	—
B	100	41	26	15	38	41	21	41
C	100	41	26	15	38	41	21	41
D	100	41	26	15	38	41	21	41

2.1.1 Effects of Alternatives B, C, and D

Effects on Strata A would be the same for all three alternatives. All three alternatives would retain the existing overstory, including all trees ≥20 inches diameter at breast height (d.b.h.) (TH-9). In addition, each alternative retains all ponderosa pine ≥8.0 inches d.b.h. to maintain and increase the ponderosa pine component. The tradeoff of retaining the trees described in TH-9 would be a basal area of 100 ft^2/acre rather than the target of 80 ft^2/acre (Table D-1). Treatments in the understory would reduce the overall tree density to 41 percent of the existing condition with an emphasis on retaining ponderosa pine and Douglas-fir in groups of variable frequency and size.

Restoration augmentation of ponderosa pine would occur in Strata A as described by TH-10. Restoration augmentation of ponderosa pine would be desirable in openings to maintain the presence of ponderosa pine over time. Augmentation would consist of planting ponderosa pine seedlings in openings developed through harvest activities. Planting would be accomplished using a hoedad or dibble bar. No mechanical seedbed preparation would occur. The structural diversity developed in this stratum would be highly variable after treatment. Openings created by the understory treatment would be of variable size but should be large enough that planted ponderosa pine growth would keep pace with natural regeneration of Douglas-fir and grand fir as well as the resprouting shrub layer.

Strata A is surrounded by plantations proposed for treatment. Treatments in the understory in Strata A would blend spatially with the proposed treatments in the adjacent plantations, creating a larger patch of similar conditions in the smaller-diameter trees.

2.2 STRATA B

Strata B includes 37 acres and is comprised of one PVG 6 stand. Although this PVG 6 stand is assigned to the mixed1 fire regime, it is unique because subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*) occur with some frequency along with large ponderosa pine. Large Douglas-fir trees are rare (Table D-2). Ponderosa pine and grand fir comprise the majority of the understory. Strata B is classified as a large tree size class with a total stand basal area of 88 ft^2/acre. The total canopy cover is about 34 percent, half of which is in the understory. The silvicultural objective for this strata would be to retain the existing overstory and increase the proportion of ponderosa pine in the understory by reducing grand fir. The basal area objective would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Treatments would focus on retaining groups of ponderosa pine and Douglas-fir in the overstory and developing groups and openings in the understory for ponderosa pine regeneration.

Table D-2. Strata B Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternative	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	88	34	17	17	43	7	50	—
B	80	28	17	11	43	7	50	18
C	80	28	17	11	43	7	50	18
D	80	28	17	11	43	7	50	18

2.2.1 Effects of Alternatives B, C, and D

Effects on Strata B would be the same for all three alternatives. All three alternatives retain the existing overstory, comprised of all trees ≥20 inches d.b.h. (TH-9). In addition, all ponderosa pine ≥8.0 inches d.b.h. would be retained to increase the ponderosa pine component. The basal area objective of 80 ft^2/acre would be achieved. Treatments in the understory would maintain 18 percent of the existing trees. The amount of grand fir would be reduced, encouraging clumps and groups dominated by ponderosa pine to develop and creating openings for regeneration. Seed-bearing grand fir would be common in the overstory, and though ponderosa pine regeneration would develop in openings, over time grand fir regeneration would likely begin to replace the understory grand fir removed by the treatments.

2.3 STRATA C

Strata C includes 105 acres and is comprised of three PVG 6 and one 25-acre PVG 2 stand immediately adjacent to the Bear Wallow Inventoried Roadless Area (IRA). Strata C is three discontinuous units, one located in the northeast portion of the Project area adjacent to the IRA, and two located in the east-central portion of the Project area near the southern boundary of the IRA (Attachment B). These four stands have been grouped together to address possible differences in application of the silvicultural prescription and/or slash treatments due to proximity of the stands to the IRA boundary.

The overstory is predominately ponderosa pine and Douglas-fir (Table D-3). Large grand fir trees are rare. The majority of the understory is a ponderosa pine and Douglas-fir mix. Strata C is classified as large tree size class with a basal area of 148 ft^2/acre. Canopy cover is 63 percent, the majority of which is in the understory.

The silvicultural objective for Strata C would be to increase the ponderosa pine species composition and reduce the density and continuity of the understory. The target basal area would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). The treatments would be to thin small- to medium-diameter ponderosa pine and Douglas-fir, develop understory groups, and break up the continuity of ladder fuels. Treatment would focus on developing a greater diversity of within stand structure with overstory groups focused on large ponderosa pine with a diversity of understory groups and openings.

Table D-3. Strata C Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternative	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	148	63	17	46	69	28	3	—
B	86	36	14	22	83	14	3	55
C	Not Treated							
D	Not Treated							

2.3.1 Effects of Alternatives B, C, and D

Strata C would be treated under Alternative B and not Alternatives C and D. Therefore, effects from Alternatives C and D would be similar to the current condition. Alternative B would retain all ponderosa pine ≥16.0 inches to maintain the dominance of ponderosa pine (TH-9). In addition, Douglas-fir and grand fir that exhibit legacy tree characteristics (Van Pelt 2008) would be retained (TH-6). The tradeoff of retaining the trees described in TH-6 and TH-9 would be a basal area of 86 ft^2/acre rather than the objective of 80 ft^2/acre (Table D-3). Treatments in the overstory would increase the species composition of ponderosa pine. Treatments would also reduce small- to medium-sized trees to 55 percent of the existing condition and develop groups dominated by ponderosa pine and Douglas-fir. Openings should regenerate naturally to ponderosa pine and Douglas-fir.

Under the proposed treatment, Strata C would contrast with the adjacent IRA. The primary difference between this strata and the IRA would be the species composition of the overstory and understory and the structural diversity created by developing groups and openings throughout the stands. The southerly stands would contribute to the large tree patches in this area would transition compositionally with Strata I and Strata J and would contribute to the patches that would be developed by treatments in Strata G and Strata H. Without treatment, these stands would blend in with surrounding untreated areas.

2.4 STRATA D

Strata D includes 321 acres that is classified as large tree size class with a total stand basal area of 94 ft^2/acre (Table D-4). Overstory composition is predominately ponderosa pine with an equal mix of Douglas-fir and grand fir. The understory is dominated by Douglas-fir and grand fir. Total canopy cover is about 47 percent, the majority of which is in the understory. The harvest conducted through the Bear Wallow Timber Sale focused on reducing large grand fir. There are existing small openings, some with aspen and some with ponderosa pine seedlings. However, the trees are not grouped, making the structure relatively uniform.

Table D-4. Strata D Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternative	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	94	47	15	32	48	28	24	—
B	80	40	15	25	51	28	21	77
C	80	40	15	25	51	28	21	77
D	82	40	16	24	48	28	24	71

The silvicultural objective for Strata D would be to develop more structural heterogeneity in the overstory and increase the proportion of ponderosa pine in the understory by reducing grand fir. The basal area objective would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Treatments would develop overstory clumps and groups that feature ponderosa pine, develop understory groups, and create openings for ponderosa pine regeneration.

2.4.1 Effects of Alternatives B, C, and D

All ponderosa pine ≥8.0 inches d.b.h. would be retained under all three alternatives (TH-9) to maintain and increase the ponderosa pine component. Under Alternatives B and C, all Douglas-fir and grand fir that exhibit legacy tree characteristics (Van Pelt 2008) would be retained (TH-6). Under Alternative D, all Douglas-fir and grand fir trees ≥20 inches d.b.h. would be retained (TH-9).

Alternatives B and C would achieve the basal area objective while Alternative D, due to TH-9, would exceed the basal area objective by 2 ft^2/acre (Table D-4). This additional basal area under Alternative D would equate to approximately 0.2 more Douglas-fir trees per acre and about 0.6 more grand fir trees per acre. Therefore, Alternative D would result in a slightly lower composition of large tree size class ponderosa pine compared to Alternatives B and C.

Alternatives B and C would remove some large Douglas-fir and grand fir to develop overstory groups. Alternative D would retain overstory groups similar to the current condition. All three alternatives would reduce the total number of trees in the understory with an emphasis on grand fir, which would develop groups dominated by ponderosa pine and Douglas-fir along with expand existing openings. These expanded openings would increase growth of existing ponderosa pine seedlings and facilitate additional ponderosa pine regeneration. Alternative D would be structurally different from Alternatives B and C due to overstory retention. Although Alternative D would not achieve the basal area objective, it would get close, resulting in a total stand canopy cover that is similar between the alternatives. Alternatives B and C retain slightly less of the overstory canopy cover and slightly more in the understory compared to Alternative D. Alternatives B and C would retain about 77 percent of the understory trees and Alternative D would retain about 71 percent of these same-sized trees. Therefore, Alternatives B and C would develop a greater diversity of understory clumps and groups than Alternative D (Youngblood 2005; Triepke et al. 2011).

Strata D abuts the plantations proposed for treatment in Alternatives B, C, and D as well as Strata B. One stand adjoins a stand currently being treated through the Frontier Timber Sale. Surrounding areas not being treated during the Frontier Timber Sale and not proposed for treatment under the Scriver Creek proposed alternatives are primarily large tree size class with a later-seral species composition. Alternatives B and C would develop overstory conditions that appear similar to stands treated by the Frontier Timber Sale and contrast with adjoining untreated stands that may have a lower species composition of ponderosa pine. Alternative D would be more transitional, as the overstory would contain slightly more Douglas-fir and grand fir. Under all three alternatives, the understory would blend in with the treatments to smaller-sized trees proposed for the plantations.

2.5 STRATA E

Strata E includes 471 acres with mostly east-to-southeast aspects. The strata is made up of several discontinuous units generally located in the northwestern to west central portion of the Project area intermixed with Strata F, Strata K, and Strata L (Attachment B). Stand density is high throughout, with grand fir being the dominant component (Table D-5). Grand fir comprises more than half the overstory composition. The overstory is relatively uniform without easily distinguishable groups.

Table D-5. Strata E Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternative	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	184	107	29	78	24	24	52	—
B	80	48	19	29	42	12	46	44
C	80	48	19	29	42	12	46	44
D	109	58	29	29	24	23	53	44

Strata E is classified as large tree size class with a basal area of 184 ft^2/acre. This strata has the highest basal area of the 10 PVG 6 strata. Total canopy cover is 107 percent, the majority of which is in the understory. Species composition of the understory is almost exclusively grand fir; understory ponderosa pine and Douglas-fir are rare throughout the area.

The silvicultural objective in the overstory would be to decrease the density of grand fir, increase the presence of ponderosa pine and Douglas-fir, and develop structural heterogeneity. The objective in the understory would be to develop openings. The basal area objective would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Treatments would be designed to remove grand fir in the overstory clumps and groups and develop clumps and groups dominated by ponderosa pine and Douglas-fir. Treatments in the understory would reduce the continuity of grand fir and develop openings for regenerating ponderosa pine and Douglas-fir.

2.5.1 Effects of Alternatives B, C, and D

All ponderosa pine ≥8.0 inches d.b.h. would be retained under all three alternatives (TH-9) to maintain and increase the ponderosa pine component. Under Alternatives B and C, all Douglas-fir and grand fir that exhibit legacy tree characteristics (Van Pelt 2008) would be retained (TH-6). Under Alternative D, all Douglas-fir and grand fir trees ≥ 20 inches at d.b.h. would be retained (TH-9).

Though Alternatives B and C would meet the 80 ft^2/acre basal area objective, Alternative D would maintain 109 ft^2/acre due to TH-9 (Table D-5). Of this, 53 ft^2/acre would be large grand fir. Alternatives B and C would maintain about 25 ft^2/acre of large grand fir and about 1 ft^2/acre of Douglas-fir under TH-6. The basal area of ponderosa pine would be the same across the alternatives. Under Alternatives B and C, about 70 percent of the large Douglas-fir and about 48 percent of the large grand fir would be removed. There are more grand fir than Douglas-fir that potentially meet TH-6, therefore a greater proportion of the trees removed would be Douglas-fir even though this conflicts with the objective to increase the presence of Douglas-fir as well as ponderosa pine. The effect would be the tradeoff of achieving the basal area objective and retaining trees with legacy-like characteristics, which are primarily grand fir in Strata E.

Structural diversity within the stands would be different between Alternatives B and C, and Alternative D. All three alternatives would produce similar structural conditions in the understory since all three would remove about the same number of trees 5.0–19.9 inches d.b.h. However, under Alternatives B and C, canopy cover would be 48 percent, 19 percent of which would be in the overstory. Under Alternative D, the canopy cover would be 58 percent,

29 percent of which would be in the overstory. The understory canopy cover of all three alternatives would be 29 percent. Therefore, openings would likely exhibit a different size and arrangement under Alternatives B and C compared to Alternative D due to the trees retained in the overstory. The arrangement of overstory and understory groups would potentially produce more and/or larger and less shaded openings under Alternatives B and C compared to Alternative D (Youngblood 2005; Triepke et al. 2011). Larger openings would facilitate growth and development of ponderosa pine and Douglas-fir regeneration groups over time. Openings under Alternative D would be smaller and more shaded than under Alternatives B and C. In addition, the number of large seed-bearing grand fir would be twice that of ponderosa pine and Douglas-fir. Over time, ponderosa pine and Douglas-fir could become rarer across the strata. For this reason, the implementation of TH-10 would focus on Strata E in order to increase the presence of young ponderosa pine. The success of ponderosa pine dominated groups growing into larger tree size classes would more likely occur under Alternatives B and C where openings would be larger and competition with natural grand fir would be lower compared to Alternative D. Openings under Alternative D would likely result in more natural grand fir that would compete with planted as well as natural ponderosa pine and Douglas-fir regeneration.

Adjacent areas that are not proposed for treatment are mostly large tree size class with composition and structure similar to Strata E, Strata F, Strata K and Strata L. Alternatives B and C would develop overstory species composition that would contrast with adjacent areas not proposed for treatment. Overstory of Alternative D would remain similar to surrounding areas. All three action alternatives would develop structural diversity of groups and openings that would appear different from untreated areas.

2.6 STRATA F

Strata F includes 703 acres of mostly southerly aspects. The strata is located in the west-central portion of the Project area near Strata E, Strata K, and Strata L (Attachment B). Strata F and Strata L represent similar conditions but were identified as separate strata to facilitate alternative comparison. Strata F would be treated under all alternatives while Strata L would only be treated under Alternatives C and D.

Strata F has a higher proportion of ponderosa pine and Douglas-fir than Strata E and overall tree density is lower. The current basal area is 134 ft^2/acre (Table D-6). Canopy cover is 78 percent, most of which is in an understory dominated by grand fir. While the proportion of Douglas-fir in the overstory and understory is similar to Strata E, the amount of ponderosa pine in the overstory and understory is greater in Strata F than Strata E. The overstory of Strata F is a mix of ponderosa pine and grand fir with lesser amounts of Douglas-fir. The silvicultural objective would be to increase ponderosa pine and Douglas-fir and decrease grand fir in the overstory and understory. Groups containing legacy ponderosa pine are common over the strata and the objective would be to highlight these groups. The basal area objective would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Treatments would focus on restoring existing overstory groups, developing ponderosa pine dominated groups in the understory, and creating openings for regeneration.

Table D-6. Strata F Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternative	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	134	78	20	58	45	24	31	—
B	80	44	18	26	53	15	32	50
C	80	44	18	26	53	15	32	50
D	88	47	20	27	45	24	31	50

2.6.1 Effects of Alternatives B, C, and D

All ponderosa pine ≥8.0 inches d.b.h. would be retained under all three alternatives (TH-9). Under Alternatives B and C, all Douglas-fir and grand fir that exhibit legacy tree characteristics (Van Pelt 2008) would be retained (TH-6). Under Alternative D, all Douglas-fir and grand fir trees ≥20 inches at d.b.h. would be retained per (TH-9).

Though Alternatives B and C would meet the 80 ft^2/acre basal area objective, Alternative D would maintain 88 ft^2/acre due to TH-9 (Table D-6). As with Strata E, more Douglas-fir than grand fir would be removed under Alternatives B and C because more grand fir than Douglas-fir would likely exhibit legacy characteristics. However overstory groups in Strata F would contain an overall higher proportion of large ponderosa pine than Strata E, but Alternatives B and C would develop a greater number of ponderosa pine dominated groups than Alternative D.

Strata F would vary structurally by alternative as described for Strata E except that Strata F would produce less total canopy cover after treatment. Alternatives B and C would likely produce more, larger, and less-shaded openings than Alternative D. Effects of the alternatives on regeneration would be similar to those described for Strata E. However, all alternatives would likely produce regeneration groups with a higher proportion of ponderosa pine seedlings than would potentially occur in Strata E due to higher species composition of large ponderosa pine.

2.7 STRATA G

Strata G includes 290 acres of mostly north and northwest aspects. The strata is in the large tree size class with an overstory dominated by ponderosa pine and Douglas-fir and, to a lesser extent, grand fir (Table 4). The basal area is 144 ft^2/acre and canopy cover is 70 percent, most of which is in the understory.

Table D-7. Strata G Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternative	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	144	70	20	50	35	41	24	—
B	80	40	16	24	43	45	13	47
C	80	40	16	24	43	45	13	47
D	82	40	20	20	34	43	23	40

The silvicultural objective for Strata G would be to reduce the composition of grand fir in the overstory, and to decrease the density and continuity of the understory to develop a more structurally diverse condition representative of the ecotone between the nonlethal and mixed1 fire regime. The basal area objective would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Treatments would be used to adjust the species composition in the overstory, develop understory groups, and break up the continuity of ladder fuels. Treatment would focus on developing a greater diversity of within-stand structure with overstory groups of large ponderosa pine and Douglas-fir.

2.7.1 Effects of Alternatives B, C, and D

All ponderosa pine ≥16.0 inches d.b.h. would be retained to maintain the dominance of ponderosa pine under all alternatives (TH-9). In addition, under Alternatives B and C, Douglas-fir and grand fir that exhibit legacy tree characteristics (Van Pelt 2008) would be retained (TH-6). Under Alternative D, all Douglas-fir and grand fir trees ≥20 inches d.b.h. would be retained (TH-9).

Alternatives B and C would achieve the basal area objective. However, the tradeoffs of retaining the trees described in TH-6 and TH-9 would result in a basal area of 82 ft^2/acre for Alternative D, which is slightly over the objective of 80 ft^2/acre. Treatments would reduce small- and medium-sized trees, developing groups dominated by ponderosa pine. However, structural diversity and species composition of the overstory would be different between Alternatives B and C, and Alternative D similar to the situation described for Strata I. As with Strata I, Alternative D would produce a basal area close to the 80 ft^2/acre but would result in fewer small- to medium-sized trees compared to Alternatives B and C. All three alternatives would produce 40 percent total canopy cover. However, Alternatives B and C would produce less canopy cover in the overstory and more in the understory than Alternative D. Alternatives B and C would retain 47 percent of the understory and Alternative D 40 percent, which would produce a structure of clumps, groups and openings that would be different between Alternatives B and C and Alternative D (Youngblood 2005; Triepke et al. 2011). The structure under Alternatives B and C would be a greater diversity of overstory and understory groups containing different sized trees as well as a greater diversity of different sizes and arrangements of groups. Alternative D would produce smaller or less frequent understory groups.

The species composition of the large trees would be 43 percent ponderosa pine under Alternatives B and C and 34 percent ponderosa pine under Alternative D. Alternatives B and C would retain fewer seed-bearing grand fir, which would potentially result in a greater presence of ponderosa pine and Douglas-fir regeneration, but a greater mix of ponderosa pine, Douglas-fir, and grand fir under Alternative D.

Strata G abuts Strata H, Strata I, and Strata J. Areas not proposed for treatment would be primarily riparian conservation areas. With treatment, Strata G would contrast the untreated areas and blend into Strata H, Strata I, and Strata J, creating a patch of similar but more diverse conditions. However, the species composition and the structure would vary depending on the alternative.

2.8 STRATA H

Strata H includes 166 acres. Strata H is classified as medium tree size class and, as such, was differentiated from Strata G even though stands are in a similar topographical setting. The basal area is 118 ft^2/acre (Table D-8). The canopy cover is 70 percent, the majority of which is in the understory. Large trees per acre average 7.4, most of which are ponderosa pine and Douglas-fir. The overstory is predominately Douglas-fir and ponderosa pine; and, ponderosa pine makes up about 17 percent of the understory.

Table D-8. Strata H Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternatives	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	118	70	8	62	38	38	24	—
B	80	48	8	40	38	38	24	68
C	80	48	8	40	38	38	24	68
D	80	48	8	40	38	38	24	68

The silvicultural objective for Strata H would be to reduce the composition of grand fir in the overstory, and to decrease the density and continuity of the understory to develop a more structurally diverse condition representative of the ecotone between the nonlethal and mixed1 fire regime. This objective would include reducing the understory density and developing greater within-stand diversity through the development of clumps and groups that would carry forward as the stands progress into the large tree size class. The basal area objective would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Proposed treatments would thin small- and medium-diameter trees, emphasizing removal of grand fir in favor of ponderosa pine and Douglas-fir to develop greater within-stand diversity and improve the species composition of the overstory as the strata succeeds into the large tree size class.

2.8.1 Effects of Alternatives B, C, and D

All ponderosa pine ≥16.0 inches d.b.h. and all Douglas-fir ≥20 inches d.b.h. would be retained to maintain the dominance of these two species under all alternatives (TH-9). Grand fir that exhibit legacy tree characteristics (Van Pelt 2008) would be retained under Alternatives B and C (TH-6). Under Alternative D, all grand fir trees ≥20 inches d.b.h. would be retained (TH-9).

All three alternatives would achieve the basal area objective (Table D-8). Though TH-9 has different criteria for Alternative D compared to Alternatives B and C, the alternatives would result in the same outcomes even though there are large grand fir that could be removed under Alternatives B and C (section 3.2.5.1.4.2 and Table 3.22 in Forest Service 2012). However, with thinning from below, the basal area objective would be achieved by removing trees less than or equal to 20 inches d.b.h. Even though the basal area would drop 38 ft^2/acre, 68 percent of the trees between 5.0 and 19.9 inches d.b.h. would be retained, which would develop a diversity of clumps, groups, and openings in the stands.

By 2030, the species composition of large grand fir would remain similar to the existing conditions. Large ponderosa pine would decline and Douglas-fir would comprise the majority of the species composition in the overstory (section 3.2.5.1.6.2 and Table 3.26 in Forest Service 2012). This lack of change would occur because even though the treatment emphasis would be to promote ponderosa pine, there are currently about one ponderosa pine for every two Douglas-fir in the overstory.

Strata H is intermixed with Strata G. These two strata would blend across each other since even though Strata H is medium tree size class and Strata G is large tree size class, treatments in the understory would develop groups and openings. Patterning with Alternatives B and C would create more structural similarities between Strata G and Strata H, since Alternative D would develop a different structure in Strata G.

2.9 STRATA I

Strata I includes 254 acres with mainly southerly aspects. The strata is classified as a large tree size class with a basal area of 137 ft^2/acre. Canopy cover is 59 percent, most of which is in the understory (Table D-9). Overstory is mostly ponderosa pine with some Douglas-fir. Understory is a mix of ponderosa pine and Douglas-fir that is relatively continuous throughout the stands.

The silvicultural objective for this strata would be to develop vegetative conditions that provide habitat for whiteheaded woodpecker. The emphasis would be to develop large ponderosa pine in overstory groups with a discontinuous understory made up of groups of different-sized trees interspersed with openings that would facilitate application of prescribed fire. These understory groups would provide for continued recruitment of ponderosa pine into the overstory. The target basal area would be 60 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Treatments would be designed to reduce ladder fuels and develop ponderosa pine dominated clumps and groups in the overstory and understory, as well as to create regeneration openings.

Table D-9. Strata I Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternative	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	137	59	15	44	63	37	N/A	—
B	60	27	12	15	93	7	N/A	41
C	60	27	12	15	93	7	N/A	41
D	62	24	15	9	65	35	N/A	34

2.9.1 Effects of Alternatives B, C, and D

All ponderosa pine≥ 20 inches d.b.h. would be retained under all alternatives (TH-9). Douglas-fir that exhibit legacy tree characteristics (Van Pelt 2008) would be retained under Alternatives B and C (TH-6). Under Alternative D, all Douglas-fir ≥20 inches d.b.h. would be retained (TH-9).

Alternatives B and C would achieve the basal area objective. However, the tradeoff of retaining the trees described in TH-9 per Alternative D would be a basal area of 62 ft^2/acre rather than the objective of 60 ft^2/acre (Table 1). This additional basal area under Alternative D compared to Alternatives B and C would equate to approximately 5.8 more large Douglas-fir trees per acre. Therefore, Alternative D would result in a large tree species composition for ponderosa pine that would be lower than Alternatives B and C. Alternatives B and C would produce overstory groups dominated by ponderosa pine. The overstory groups produced under Alternative D would be similar to the current condition. Therefore the species composition under Alternatives B and C would likely be a greater proportion of ponderosa pine compared to Alternative D, where regeneration would potentially be a mix of ponderosa pine and Douglas-fir.

Alternatives B and C would result in a different structural condition than Alternative D. However, all three alternatives would reduce the continuity of ladder fuels by producing discontinuous groups with openings, which would allow for the application of prescribed fire. But under Alternative D, because so much of the basal area would be retained in the overstory after treatment, more trees would be removed from the understory. Alternative D would retain 34 percent of the existing understory (trees 5.0 to 19.9 inches d.b.h.) and Alternatives B and C would retain 41 percent. Alternative D would result in a canopy cover less than Alternatives B and C, with a greater amount in the overstory and less in the understory. Alternatives B and C would produce a greater variety of understory clumps and groups than Alternative D; Alternative D would appear structurally different, as understory groups would likely be fewer and smaller (Youngblood 2005; Triepke et al. 2011). As a result, Alternative D would result in a different recruitment rate for ponderosa pine into the overstory than Alternatives B or C. By 2030, Alternatives B and C would produce 5.0 more large ponderosa pine per acre than Alternative D (section 3.2.4.1.3.2 and Table 3.9 in Forest Service 2012).

Strata I is surrounded by Strata J to the north, east, and south and is intermixed with Strata G and Strata H to the west. Treatments under Alternatives B and C would differentiate Strata I from surrounding untreated areas (primarily riparian conservation areas) and other strata. Under these two alternatives, the 254 acres that comprise this strata would be the only portion of the landscape within the Project area with a large tree overstory that would be predominately ponderosa pine. Under Alternative D, the overstory species composition for Strata I would blend in with adjacent untreated and other treated strata that maintain conditions with a greater mix of

ponderosa pine and Douglas-fir in the overstory. Under all three alternatives, the understory would contrast with untreated areas that maintain a continuity of ladder fuels.

2.10 STRATA J

Strata J includes 874 acres on primarily southerly aspects. This strata is classified as medium tree size class. The basal area is 107 ft^2/acre and canopy cover is 62 percent, most of which is in the understory (Table D-10). Though the species composition of the overstory is predominately ponderosa pine, the amount of Douglas-fir in the understory exceeds that of ponderosa pine.

Table D-10. Strata J Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternative	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	107	62	6	56	71	29	N/A	—
B	60	38	6	32	71	29	N/A	53
C	60	38	6	32	71	29	N/A	53
D	60	38	6	32	71	29	N/A	53

The silvicultural objective for Strata J would be to develop vegetative conditions that provide habitat for whiteheaded woodpecker. The emphasis would be to produce large ponderosa pine in overstory groups with a discontinuous understory made up of ponderosa pine dominated groups of different sized trees interspersed with openings. The target basal area would be 60 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). The treatment objective would be to thin small- and medium-diameter ponderosa pine and Douglas-fir to develop greater within-stand diversity through development of clumps and groups that would carry forward as the stands progress into the large tree size class.

2.10.1 Effects of Alternatives B, C, and D

All ponderosa pine and Douglas-fir ≥20.0 inches d.b.h. would be retained under all three alternatives (TH-9). Therefore effects would be the same for all alternatives.

The alternatives would achieve the basal area objective (Table D-10). Treatments would result in clumps and groups that would break up the fuel continuity and facilitate application of prescribed fire. As tree sizes increase, the strata would begin to develop a more historical structure as it progresses into the large tree size class. Without additional treatments, by 2030, the species composition of the overstory would be similar to the current conditions for Strata I (section 3.2.4.1.6.2 and Table 3.14 in Forest Service 2012). More than half of the understory is currently Douglas-fir and even though treatments would favor ponderosa pine over Douglas-fir, groups would still contain a relatively high number of Douglas-fir trees. As these groups succeed into the overstory, the species composition of Douglas-fir would increase and ponderosa pine would decline.

Strata J abuts Strata I and Strata G and H to the east. As Strata J ages, it would contribute to large tree size class conditions across the nonlethal fire regime. Although treatments would be similar under all alternatives for Strata J, Alternatives B and C would blend differently with adjacent strata compared to Alternative D.

Strata C, Strata G, and Strata H occur to the west of the ridge that separates Pinney Creek from Scriver Creek on the eastside of the main Scriver Creek stream channel (Attachment B). These strata represent PVG 6 habitat types assigned to the mixed1 fire regime. However, Strata J includes stands that are on the ecotone between the nonlethal fire regime to the southeast (Strata I and J) and the more strongly mixed1 fire regime to the northwest. The habitat types in the stands are grand fir/mountain maple (*Acer glabrum*) habitat type, ninebark phase (PVG 6) and Douglas-fir/ninebark habitat type, ponderosa pine phase (PVG 2) that transition back and forth due to the topography. As such, stands in this area exhibit influences of both the nonlethal and mixed1 fire regimes.

2.11 STRATA K

Strata K includes 254 acres that are similar to Strata E. Stands that comprise Strata K were not included in the Proposed Action (Alternative B) because they do not meet the Partner's in Flight (PIF) criteria of five large ponderosa pine per acre. This strata was developed in response to public comments and is proposed for treatment under Alternatives C and D. The strata is located adjacent to or near Strata E (Attachment B). The basal area is 182 ft^2/acre (Table D-11). Strata K is similar to Strata E in most respects except that it has the fewest large ponderosa pine and the most large grand fir per acre of all the strata. Total canopy cover is 105 percent. Grand fir forms the dominate cover in both the overstory and understory; ponderosa pine and Douglas-fir are rare in the understory.

Table D-11. Strata K Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternatives	Basal Area (ft^2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	182	105	30	75	8	25	67	—
B	Not Treated							
C	84	51	21	30	13	19	68	40
D	109	59	30	29	8	25	67	40

The silvicultural objective would be to decrease the grand fir and increase the ponderosa pine and Douglas-fir both in the overstory and understory. The basal area objective would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Treatments would remove grand fir and develop openings for regenerating ponderosa pine. Any ponderosa pine and Douglas-fir groups that occur in the overstory would be highlighted. Treatments in the understory would reduce the continuity of grand fir and diversify the structure with an emphasis on developing openings for ponderosa pine and Douglas-fir regeneration.

2.11.1 Effects of Alternatives B, C, and D

Effects from Alternative B would be similar to the current condition, since Strata K would not be treated under this alternative. All ponderosa pine ≥8.0 inches d.b.h. would be retained under Alternatives C and D (TH-9) to maintain and increase the ponderosa pine component. Under Alternative C, all Douglas-fir and grand fir that exhibit legacy tree characteristics (Van Pelt 2008) would be retained (TH-6). Under Alternative D, all Douglas-fir and grand fir trees ≥20 inches d.b.h. would be retained (TH-9).

Neither Alternative C nor Alternative D would meet the basal area objective (Table D-11) due to TH-6 for Alternative C and TH-9 for Alternative D. Alternative C would get the closest at 84 ft^2/acre of basal area; Alternative D would maintain 109 ft^2/acre. Under Alternative C, 100 percent of the large ponderosa pine, 48 percent of the large Douglas-fir, and 63 percent of the large grand fir would be retained. Like Strata E and Strata F, many more potentially legacy like grand fir than Douglas-fir occur in Strata K. Therefore, more grand fir than Douglas-fir would be retained under Alternatives B and C, even though this is in conflict with the silvicultural objectives.

Alternative D would retain all of the large trees of all species. Alternative C would result in a total stand canopy cover of 51 percent, with less than half of the total in the overstory. Alternative D would result in a canopy cover of 59 percent, with slightly more than half the total in the overstory. Structural diversity within the stands would be different between Alternative C and Alternative D (Youngblood 2005; Triepke et al. 2011). Alternative C would produce a greater diversity of overstory and understory groups and openings than Alternative D.

Openings would likely exhibit a different size and arrangement under Alternative C compared to Alternative D. Larger openings would facilitate growth and development of ponderosa pine groups over time. The implementation of TH-10 would focus on Strata K in order to increase the presence of young ponderosa pine. Under both alternatives, the number of large seed-bearing grand fir would be several times that of ponderosa pine and Douglas-fir. Under Alternative D, openings would likely be smaller due to the presence of more extensive overstory groups and therefore would receive more shade. Openings would more likely regenerate to grand fir, even those planted with ponderosa pine. Over time, ponderosa pine would become rarer in the stands. The success of groups containing ponderosa pine into larger tree size classes would more likely occur under Alternative C where openings would be larger. The reduction in overstory shade would potentially allow planted ponderosa pine to keep pace with naturally regenerated grand fir, increasing the chances that ponderosa pine would eventually grow into the overstory.

2.12 STRATA L

Strata L includes 174 acres. Stands that comprise Strata L were not included in the Proposed Action (Alternative B) because they do not meet the PIF criteria of five large ponderosa pine per acre. This stratum was developed in response to public comments and is proposed for treatment under Alternatives C and D but not Alternative B. Strata L is located adjacent to or near Strata F (Attachment B). Though it did not meet the PIF criteria, Strata L has a greater number of large ponderosa pine and Douglas-fir per acre than Strata K.

Table D-12. Strata L Metrics for Existing Condition and Alternatives B, C, and D in 2011

Alternative	Basal Area (ft2/acre)	Total Canopy Cover (%)	Overstory Canopy Cover (%)	Understory Canopy Cover (%)	Overstory Species Composition (%)			Percent of Total Trees 5.0–19.9 inches Remaining per Acre in 2011 (%)
					Ponderosa Pine	Douglas-fir	Grand Fir	
A	163	103	17	86	25	41	34	—
B	Not Treated							
C	80	56	17	39	27	44	29	58
D	80	57	17	40	25	41	34	56

The current basal area is 163 ft^2/acre (Table D-12). Canopy cover is 103 percent, most of which is in an understory dominated by grand fir, though ponderosa pine and Douglas-fir comprise about 28 percent of the understory. The silvicultural objective would be to increase ponderosa pine and Douglas-fir and decrease grand fir in the overstory and understory. The basal area objective would be 80 ft^2/acre (Fiedler 2000, Arno and Fiedler 2005, Fiedler et al. 2010). Treatments would feature ponderosa pine and Douglas-fir overstory groups while developing ponderosa pine and Douglas-fir dominated understory groups, and creating openings for regeneration.

2.12.1 Effects of Alternatives B, C, and D

Effects from Alternative B would be similar to the current condition since Strata L would not be treated under this alternative. All ponderosa pine ≥8.0 inches d.b.h. would be retained under Alternatives C and D (TH-9) to maintain and increase the ponderosa pine component. Under Alternative C, all Douglas-fir and grand fir that exhibit legacy tree characteristics (Van Pelt 2008) would be retained (TH-6). Under Alternative D, all Douglas-fir and grand fir trees ≥20 inches d.b.h. would be retained (TH-9).

Alternatives C and D would achieve the basal area objective (Table D-12). Although Strata K has fewer legacy-like Douglas-fir and grand fir than Strata L, treatments under Alternatives C and D in Strata K would result in somewhat similar outcomes. However, Alternative C would result in fewer large grand fir per acre than Alternative D and would improve the species composition of large ponderosa pine and Douglas-fir.

Structurally, Alternatives C and D would be similar though not identical. Alternative C would retain 58 percent of the existing understory and Alternative D would retain 56 percent. Canopy cover for Alternative C would be 56 percent, with 17 percent in the overstory and 39 percent in the understory. Alternative D would produce a canopy cover of 57 percent, with 17 percent in the overstory and 40 percent in the understory. The arrangement of groups and openings would be slightly different between the two alternatives. However, both would likely produce openings that would regenerate to ponderosa pine as well as Douglas-fir, particularly with the number of seed-bearing trees of these species.

3 Literature Cited

Arno, S.F. and C.E. Fiedler. 2005. Mimicking nature's fire: Restoring fire-prone forests in the west. Washington, DC. Island Press.

Crane, M.F. and W. C. Fischer. 1986. Fire ecology of the forest habitat types of central Idaho. U.S. Department of Agriculture, Forest Service, Intermountain Region. General Technical Report INT-218.

Fiedler, C. E. 2000. Silvicultural treatments. USDA Forest Service Proceedings RMRS-P-17, pp. 19-20.

Fiedler, C. E., K. L. Metlen, and E. K. Dodson. 2010. Restoration treatment effects on stand structure, tree growth, and fire hazard in a ponderosa pine/douglas-fir forest in Montana. Forest Science 56(1)18–31.

Forest Service. 2012. Motor Vehicle Use Map Boise National Forest: Emmett Ranger District. Boise National Forest, Boise, ID.

Redmond, R. L., T. P. Tady, F. B. Fisher, M. Thornton, and J. C. Winne. 1998. Executive summary, landsat vegetation mapping of the southwest and central Idaho ecogroups. Contract #53-0261-6-25, submitted to USDA Forest Service, Boise National Forest, Boise, ID

Triepke, F. J., B. J. Higgins, R. N. Weisz, J. A. Youtz, and T. Nicolet. 2011. Diameter caps and forest restoration – Evaluation of a 16-inch cut limit on achieving desired conditions. Albuquerque, NM: U. S. Department of Agriculture, Forest Service Southwestern Region. Forestry Report FR-R3-16-3.

Van Pelt, R. 2008. Identifying old trees and forests in eastern Washington. Washington State Department of Natural Resources, Olympia, WA.

Youngblood, A. 2005. Silvicultural systems for managing ponderosa pine. U. S. Department of Agriculture, Forest Service. General Technical Report PSW-GTR-198.

ATTACHMENT A—DESCRIPTION OF POTENTIAL VEGETATION GROUPS (PVG)

FORESTED VEGETATION MAPPING

Forested vegetation is evaluated using habitat types, which use potential climax vegetation as an indicator of environmental conditions. Habitat types provide a way to describe the mix of vegetative communities that may occur within landscapes based on site potential. For example, subalpine fir habitat types, which generally occur on cooler sites, would support a different mix of vegetative communities than ponderosa pine habitat types, which are found on warmer sites. Existing vegetation is described using cover types, which represent the vegetation on the landscape. Cover types are often an earlier seral stage relative to the climax plant community. Cover types, and associated attributes of tree size class and canopy cover class, were mapped using a Landsat remote sensing classification developed at the University of Montana by Redmond et al. (1998). This information was updated in 2008 to reflect changes from wildland fires and other disturbances.

Forested PVGs were mapped using a modeling process. The Forest was divided into 5th field HU groupings that shared similar larger-scale environmental characteristics, such as climate and geology. Each of these groupings was modeled separately. Models were based primarily on slope, aspect, elevation, and land type associations but could also include forest inventory information, forest timber strata information, cover type information, existing habitat type mapping, and cold air drainage models. Where necessary, some field verification did occur. Modeling rules were developed and processed in ArcGrid. Draft maps were sent to ranger district personnel knowledgeable of the area for review, and refinements were made as necessary.

FOREST VEGETATION—POTENTIAL VEGETATION GROUPS

PVG 1—Dry Ponderosa Pine/Xeric Douglas-fir

This group represents the warm, dry extreme of the forested zone and typically occurs at lower timberline down to 3,000 feet and up to 6,500 feet on steep, south-facing slopes. Ponderosa pine is a dominant cover type that historically persisted due to frequent nonlethal fire. Under such conditions, open, park-like stands of large, old ponderosa pine dominated the area, with occasional Douglas-fir, particularly at higher elevations. Understories are sparse and consist of low- to moderate-density perennial grasses, such as bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*). Shrubs—such as mountain snowberry (*Symphoricarpos oreophilus*) and bitterbrush (*Purshia* DC)—dominate in some areas. This group is scattered throughout the Forest.

PVG 2—Warm, Dry Douglas-fir/Moist Ponderosa Pine

This group represents warm, mild environments at low to middle elevations but may extend upward to 6,500 feet on dry, south-facing slopes. Ponderosa pine, particularly at lower elevations, or large ponderosa pine mixed with smaller size classes of Douglas-fir, are the dominant cover types in this group. Historically, frequent nonlethal fire maintained stands of large, park-like ponderosa pine. Douglas-fir occurred on moister aspects, particularly at higher elevations. Understories are mostly graminoids—such as pinegrass (*Calamagrostis rubescens*) and elk sedge (*Carex garberi*) —with a cover of shrubs, such as common snowberry (*Symphoricarpos albus*), white spirea (*Spiraea betulifolia*), and mallow ninebark (*Physocarpus malvaceus*). This group is found in many places on the Forest.

PVG 3—Cool, Moist Douglas-fir

This group represents the cooler extremes in the Douglas-fir zone and can extend from 6,800 to 4,800 feet following cold air. This group has a relatively minor representation on the Boise National Forest. Ponderosa pine occurs as a major seral species in the warmest extremes of the group. In cold air areas, particularly where cold air accumulates to form frost pockets, lodgepole pine (*Pinus contorta*) may dominate. In some areas, Douglas-fir is the only species capable of occupying the site. Other areas may support grand fir, and adjacent sites are often subalpine fir. The conifer cover types that historically dominated resulted from several factors, including fire frequency and intensity, elevation, and topography. Understories in this group are primarily shrub species, including mountain maple, mountain ash (*Sorbus* L.), and blue huckleberry (*Gaylussacia frondosa*). Several other species—including Scouler's willow (*Salix scouleriana*), thimbleberry (*Rubus parviflorus*), and chokecherry (*Prunus virginiana*) —may occur from disturbance, depending on its intensity. Historical fire regimes were mixed (generally mixed1 where ponderosa pine occurs and mixed2 where other species dominate), creating a diversity of vegetative combinations. Two habitat type phases occur within this PVG: 1) Douglas-fir/mountain maple on the Forest and west side of the Sawtooth National Forest and 2) Douglas-fir/mountain maple–mountain snowberry adjacent to the Forest and on the east side of the Sawtooth National Forest.

PVG 4—Cool, Dry Douglas-fir

Douglas-fir is the only species that occurs throughout this group's entire range. Lodgepole pine may be found in areas with cold air, and quaking aspen (*Populus tremuloides*) is also a common early-seral species. Understories are sparse due to the cool, dry environment and often support pinegrass and elk sedge. Understories of low shrubs—such as white spirea, common snowberry, Oregon grape (*Mahonia* spp.), and mallow ninebark—occur in some areas that represent slightly different environments across the group. The historical fire regime ranged from mixed1 to mixed2, depending on the fuels present at the time of ignition. Organic matter accumulates slowly in this group, so fire effects depend on the interval between fires, stand density and mortality, and other factors. Fire regimes tend to be mixed1 in drier habitat types with discontinuous fuels and mixed2 in habitat types that support lodgepole pine as a major seral species. This group is most common on eastern portions of the Forest, though it may be found in minor amounts at higher elevations in the Douglas-fir zone in other parts of the Forest. In these cases, it is usually found above 6,000 feet on sites too cool to support ponderosa pine. Where it is common, this group occurs at lower elevations in areas beyond the extent of ponderosa pine.

PVG 5—Dry Grand Fir

This group is found throughout the distribution of grand fir; only on the Boise and Payette National Forests; and at elevations ranging from 4,300 to 6,400 feet, often on drier, upper slopes and ridges. Ponderosa pine and Douglas-fir are common cover types that appear to have been maintained by fire regimes that were historically nonlethal to mixed1 in micro-sites. In many areas, this group may have resembled PVG 1 and PVG 2, with open, park-like stands of large ponderosa pine. Mixed species stands were likely restricted to small micro-sites that burned less frequently. Understories are similar to PVG 2; pinegrass, elk sedge, and white spirea are common.

PVG 6—Moist Grand Fir

This group is found at elevations ranging from 3,400 to 6,500 feet and represents moister environments in the grand fir zone. It is found on the northern portion of the Forest and often occurs adjacent to dry grand fir. The two species may intermix depending on topography. Ponderosa pine is common at the drier extremes of the group, and lodgepole pine occurs in colder areas. Western larch (*Larix occidentalis*) may also be present as an early seral species. Douglas-fir and Engelmann spruce cover types also occur in this group. Understories are shrubby and include blue huckleberry, mountain maple, mountain ash, mallow ninebark, and occasionally pachistima (*Pachistima myrsinites*). A conspicuous herb layer is also common in understories, particularly following disturbance. Historical fire regimes were mixed, ranging from mixed1 to mixed2, in part due to the wide environment represented by this group. Where ponderosa pine was maintained as a common seral species, fires were more often mixed1 because ponderosa pine produces a heavy seed that generally disperses only short distances. Ponderosa pine is found in both phases of the grand fir/mountain maple habitat type and the grand fir/twinflower (*Linnaea borealis*) habitat type, twinflower phase. In other areas where western larch, Douglas-fir, or lodgepole pine were maintained as common seral species, mixed2 fire may have been more common. Mixed2 areas include the following: the grand fir/blue huckleberry habitat type; grand fir/twinflower habitat type, beargrass (*Xerophyllum* Michx.) phase; grand fir/queencup beadlily habitat type; grand fir/beargrass habitat type; grand fir/dwarf huckleberry (*Gaylussacia dumosa*) habitat type; and grand fir/western goldthread () habitat type. This difference within the PVG reflects a split described by Crane and Fischer (1986) of the grand fir habitat types in the Grand Fir Habitat Types Fire Group into warm, dry, cool, and moist subgroups.

PVG 7—Warm, Dry Subalpine Fir

This group is common and found in warmer, drier environments in the subalpine fir zone at elevations from 4,800 to 7,500 feet. At lower elevations on the Forest, this group is found on steep, north-to-east aspects but shifts to south-to-west aspects as elevation increases. On the eastern part of the Forest, the group is found on more rolling topography. Adjacent sites at lower elevations are Douglas-fir or grand fir, and these commonly intermix with subalpine fir where topography controls cold air flow. Douglas-fir is the most common cover type throughout the group. Ponderosa pine may be found at the warmest extremes, particularly where this group grades into the Douglas-fir or grand fir zone. Lodgepole pine or Engelmann spruce may occur at cool, moist extremes, but these cover types rarely dominate. Understories are commonly shrubby and include mountain maple, mountain ash, serviceberry (*Amelanchier* spp.), and Scouler's

willow. On the eastern portion of the Forest, graminoids comprise the majority of the cover under the tree layer. Fire regimes were historically mixed2, though mixed1 fires may have occurred where ponderosa pine was maintained.

PVG 8—Warm, Moist Subalpine Fir

This group occurs mainly north of Cascade, Idaho, and is as a relatively minor PVG on the Forest. It becomes better represented on the Nez Perce National Forest. Elevations generally range from 5,000 to 7,200 feet but may follow cooler air down to 4,500 feet. This group occurs on moist, protected areas such as stream terraces; toe slopes; and steep, northerly aspects. Cover types include lodgepole pine, western larch, Douglas-fir, and Engelmann spruce but the presence and combination of these species depend on site conditions and past disturbances. Dense shrubs are common under the tree cover and include Sitka alder (*Alnus viridis*), menziesia (*Menziesia* Sm.), blue huckleberry, Utah honeysuckle (*Lonicera utahensis*), mountain maple, mountain ash, and serviceberry. Fire in this group was historically more lethal, though underburns may have occurred on rare occasions. Ignitions likely occurred in adjacent areas due to the location of this group. Whether these areas burned or not may have depended on the weather prior to and at the time of ignition.

PVG 9—Hydric Subalpine Fir

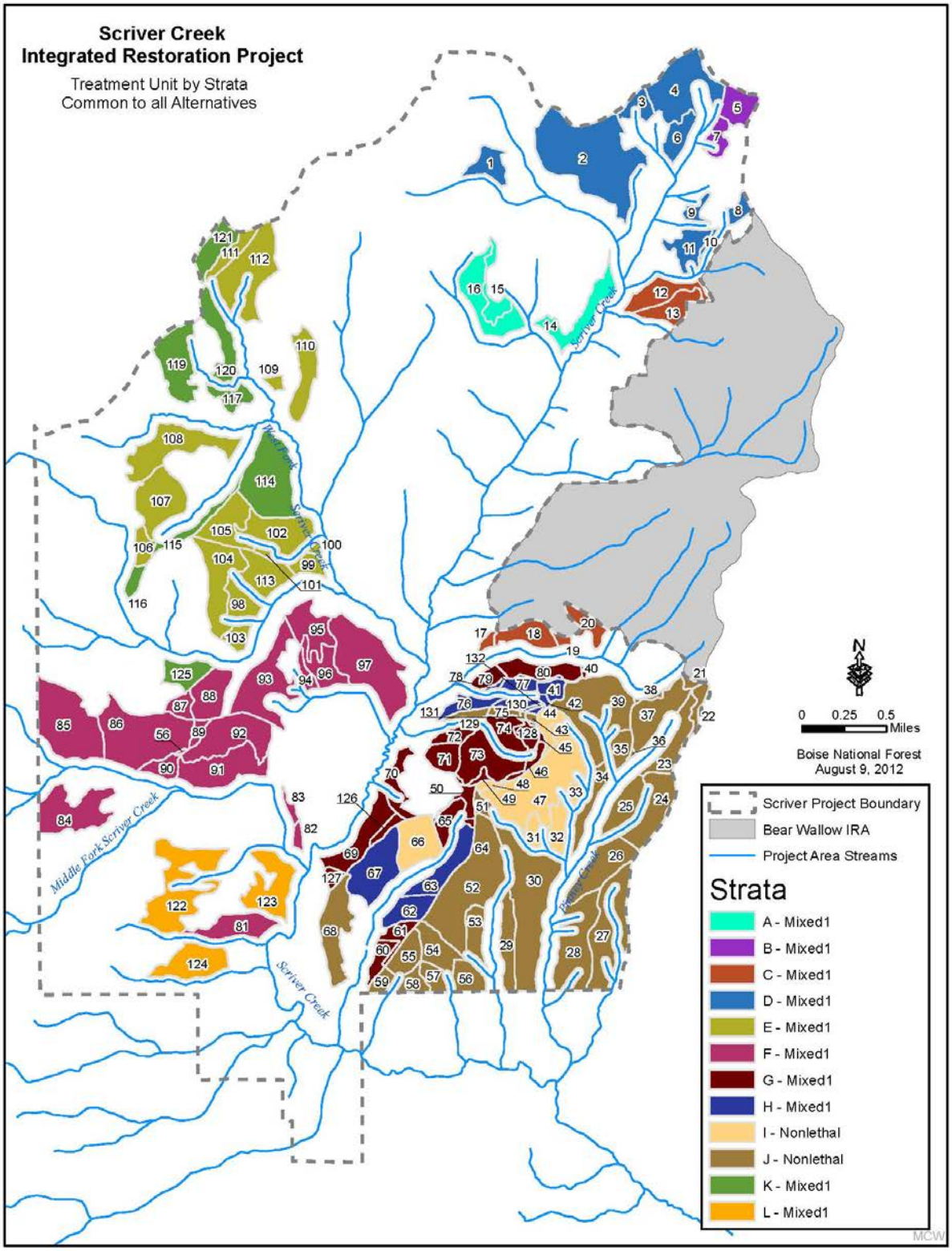
Seasonally high water tables control this group, which is a minor component on the Forest, and the extent may be small in some areas depending on the presence of these conditions. This group is found at elevations ranging from 9,000 to as low as 4,500 feet in frost pockets and along cold air drainages. This group most commonly occurs on wet toe slopes, stream terraces, seep areas, and old bogs. The cover type is mostly lodgepole pine, followed by Engelmann spruce and subalpine fir. Early-seral conditions usually support lodgepole pine because this species tolerates intermittent high water tables and cold air that often accumulate in these areas. In severe frost-prone areas, lodgepole pine can persist for long periods. In other areas with better cold air drainage, Engelmann spruce and subalpine fir rapidly establish under lodgepole pine. Understories are primarily dominated by herbs and grasses that require the seasonal influence of a high water table. Shrubs are sparse, though Labrador tea (*Ledum groenlandicum*) can dominate some sites. Historically, fire was lethal in this group. Like PVG 8, ignitions more likely occurred on adjacent, drier slopes, and burning in this group likely depended on weather conditions before and at the time of ignition.

PVG 10—Persistent Lodgepole Pine

This group is common throughout the subalpine fir zone. It represents cold, dry subalpine fir sites that range in elevation from over 9,200 feet down to 5,200 feet in frost pockets. Lodgepole pine is the dominant cover type, though small amounts of other species may occasionally occur. Vegetation under the tree cover can be sparse. Grasses and scattered forbs are generally the most common components. Shrubs are sparse and consist mainly of low-growing huckleberries, including dwarf huckleberry and grouse whortleberry (*Ribes montigenum*). Historically, this group experienced lethal fire, though nonlethal fires may have occurred during stand development. Lodgepole pine is more often nonserotinous in western portions of Idaho and appears to become more serotinous moving easterly in the state. Within the Forest, lodgepole pine may reproduce in areas that experience nonlethal fires, resulting in more vertical stand diversity in some areas than is often found where lodgepole pine is mostly

serotinous. Over time, the combination of these low-intensity events, subsequent reproduction, and mountain pine beetle (*Dendroctonus ponderosae*) mortality would have created fuel conditions that allowed lethal fires to occur under the right weather conditions.

PVG 11—High Elevation Subalpine Fir (with Whitebark Pine)

This group occurs at the highest elevations of the subalpine fir zone and generally represents the upper timberline conditions. It often grades into krummholz or alpine communities. Whitebark pine (*Pinus albicaulis*) is a major seral species in this group and Engelmann spruce and subalpine fir are climax co-dominants. In some areas, whitebark pine serves as a cover for Engelmann spruce–subalpine fir establishment. Understories are primarily forbs and grasses tolerant of freezing temperatures, which can occur any time during the growing season. Shrubs are sparse due to the cold, harsh conditions. Historically, the fire regime in this group is characterized as mixed2, though the fire effects were highly variable. Ignitions are common in this group due to high elevation; however, fire effects were patchy because fuel conditions were historically sparse due to cold growing conditions and shallow soils. Fire regimes are mixed2.

ATTACHMENT B—STRATUM LOCATION WITHIN THE SCRIVER INTEGRATED RESTORATION PROJECT AREA