CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This section summarizes the existing environmental conditions of the affected project area and the potential changes to those conditions due to implementation of the alternatives presented in Chapter 2. It also presents the scientific and analytical basis for comparison of alternatives. The individual discussions are organized by resource.

3.2 FOREST VEGETATION

This section of the document describes the characteristics and patterns of the vegetation as well as the effects of the alternatives on the different components of the vegetation resource. Unless specifically stated otherwise, the analysis area used in the assessment of the vegetation resources consists of the combined area within the perimeters of the Lucky (1,582 acres) and Lightning fires (6,994 acres), for a combined total of 8,576 acres (Figure 3.1 and Figure 3.2).

To provide context, the individual components are discussed in terms of the pre-fire and post-fire (i.e., existing) conditions where the wildfire altered that particular component. Stand data, collected from 1994 through 1998, for pre-fire conditions exists for approximately 4,173 acres (slightly less than half of the vegetation analysis area). For those components of the vegetation that were not altered by the 2007 wildfire, only a discussion of the post-fire (i.e., existing) condition is provided. Post-fire conditions described in this section are based on two information sources. Post-fire tree mortality maps derived from satellite images (remote assessment of vegetation, i.e., RAVG) within the boundaries of the wildfires were developed in the fall of 2007 (Figure 3.1 and Figure 3.2). These maps were used to assess the extent of tree mortality and aid in field reconnaissance. Table 3.1 contains acreage estimates from the RAVG modeling.

Individual components discussed in the following pages include fire-killed trees, forest insects, potential vegetation groups, tree size class, canopy closure, species composition, snags, reforestation, created openings, and vegetation effects of gopher control with strychnine bait.

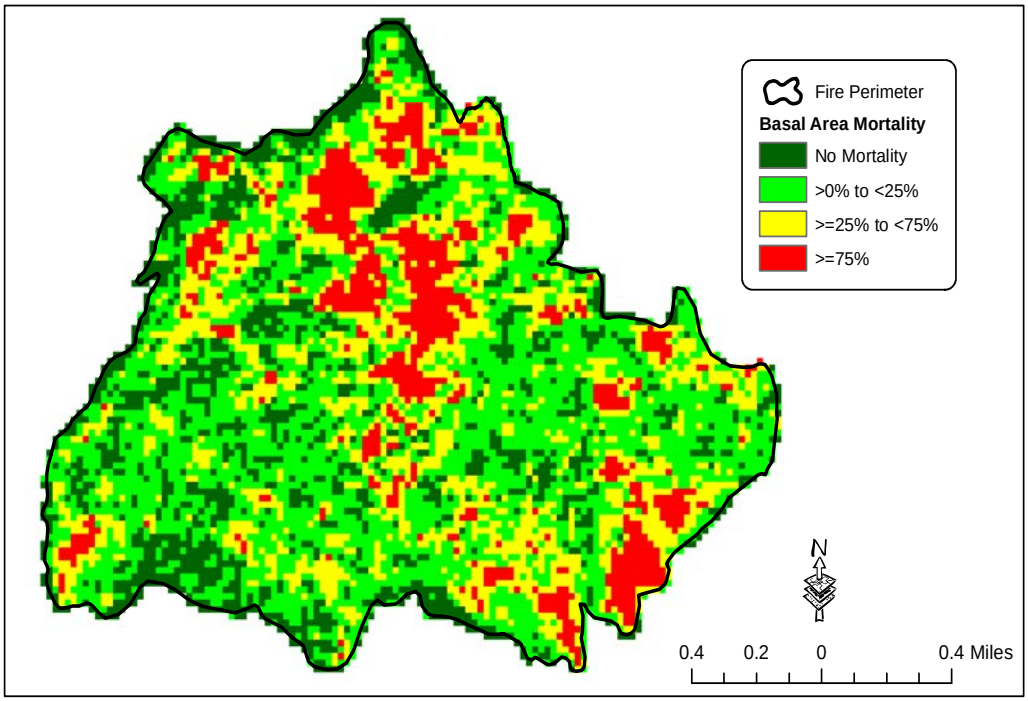


Figure 3.1 – RAVG Modeled Basal Area Mortality in the Lucky Fire Area

Post-fire aerial photography, in conjunction with the RAVG maps, was used to stratify the fire areas into two levels of tree mortality, moderate and high. These polygons were digitized and overlaid with Management Prescription Categories (MPC) and stream buffers. The exclusion of stream buffers and all MPCs except MPC 5.2 resulted in the identification of potential salvage harvest units for the Proposed Action (Alternative B) (Figure 3.3). Stand data was collected in the fall of 2007 within these proposed units to assess live and dead trees, snags, and coarse woody debris.

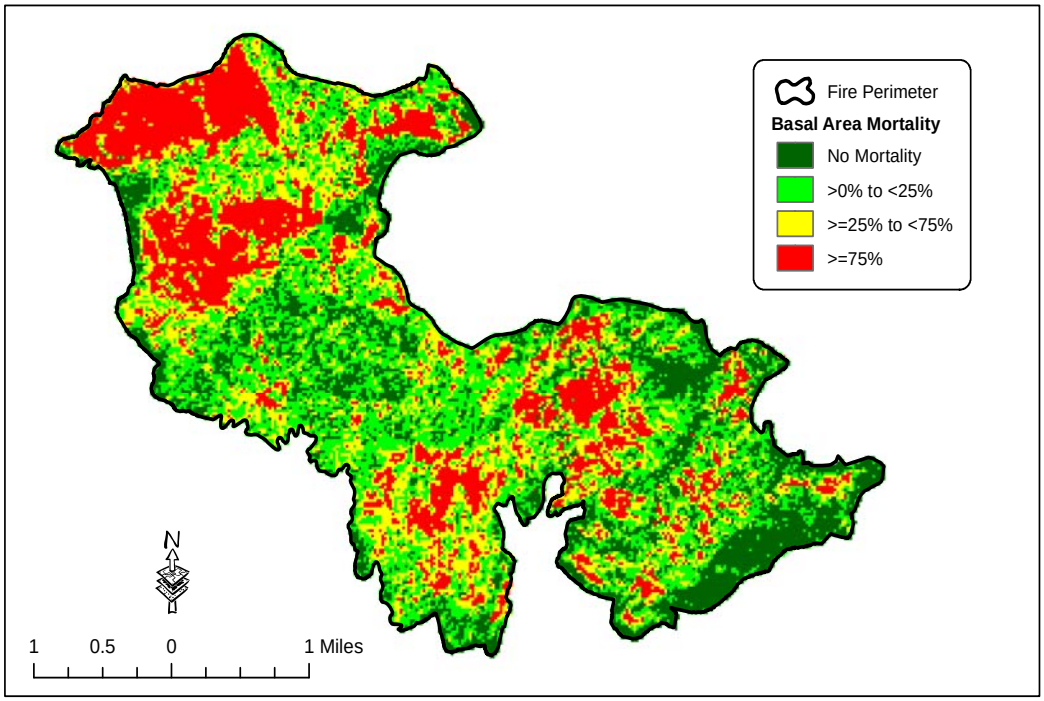


Figure 3.2 – RAVG Modeled Basal Area Mortality in the Lightning Fire Area

3.2.1 Fire-killed Trees

The 2007 wildfires were a major disturbance event that directly altered the composition, structure, and function of the vegetation within the analysis area. The amount of tree mortality associated with any given burn intensity[1] varied depending upon the predominant tree species present. Thin-barked species such as lodgepole pine, subalpine fir, Engelmann spruce, and grand fir are generally intolerant of fire and easily succumb to low and/or moderate intensity burns. Although the fire may not have directly impacted the tree's limbs or foliage, the less obvious damage to the tree's root system and/or basal stem often results in death of the tree. In contrast, species such as Douglas-fir, ponderosa pine, and western larch with their thick bark are much less susceptible to the impacts of low and moderate intensity burns. The fire's effect on the live foliage of these species is generally a good indicator of whether or not these trees will survive the wildfire.

Table 3.1. RAVG Basal Area Mortality Acreage Estimates*

Basal Area Mortality	Lightning Fire		Lucky Fire		Total	
	Acres	Percent	Acres	Percent	Acres	Percent
0%	1,643	23%	333	20%	1,976	22%
>0% to < 25%	2,284	32%	695	43%	2,979	34%
>=25% to < 75%	1,635	23%	402	25%	2,037	23%
>= 75%	1,599	22%	203	12%	1,802	20%
Totals	7,161	100%	1,633	100%	8,794	100%

*RAVG acreage does not conform to fire perimeter polygon acreage because many of the satellite imagery pixels project outside of the fire perimeter.

[1] For the purposes of this analysis, the terms "severity" and "intensity" are used interchangeably.

In 1989, the Lowman fire burned 47,600 acres in the South Fork Payette River drainage roughly 40 air miles south of the project area. Impact plots consisting of over 400 trees, nearly all of which were ponderosa pine or Douglas-fir, were installed to monitor tree survivorship and causes of mortality. Impact plots were established immediately after the Lowman fire in 1989, monitored in 1990, and again in 1993. The results of that monitoring revealed that those trees that died as a result of the fire had a mean crown scorch of 74 percent (Weatherby et al., 1994).

A recent study, *Assessing Post-fire Douglas-fir Mortality and Douglas-fir Beetle Attacks in the Northern Rocky Mountains* (Hood et al., 2007) revealed similar results. That study found that Douglas-fir trees with a diameter at breast height (d.b.h.) of 10 inches and a cambium kill rating (CKR) of two or more had a probability of mortality exceeding 85 percent when 70 percent of the crown was scorched. A Douglas-fir tree with a 20 inch d.b.h. and a CKR of two or more had a probability of mortality exceeding 75 percent when 70 percent of the crown was scorched (Hood et al., 2007).

Perhaps the most dramatic difference in fire resistance between trees of different species is due to differences in bark thickness. Field and laboratory studies indicate that resistance to cambium damage varies with the bark thickness (Reinhardt and Ryan, 1989). Although most tree mortality studies have focused on the thick-barked species, Wagener (1961) suggests that cambium injury to more than one-quarter of the circumference above stump height seriously reduces the chances for tree survival. Forest Health Protection personnel from the Boise Field Office in 1995 suggested that thin-barked species with greater than 40 percent bole and root char would be expected to die, even those with minimal crown scorch (Weatherby IN: USDA, Forest Service, 1995).

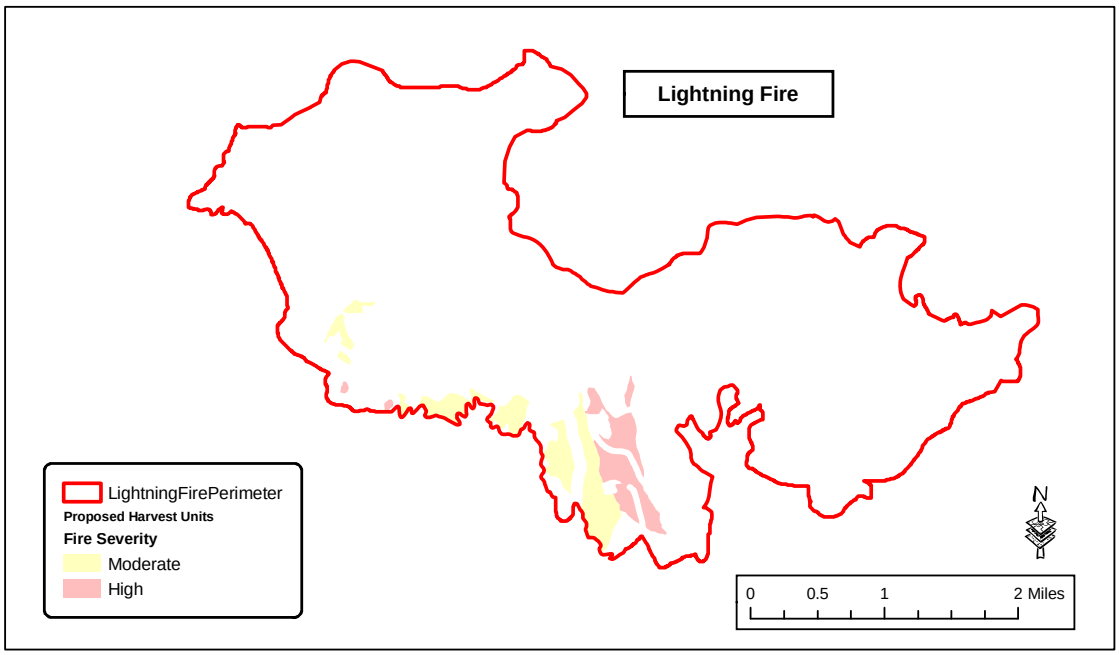
Therefore, based on the above research, for the purposes of this analysis, a fire-killed tree was defined as: (1) a tree of any species that has 70 percent or more of its crown scorched, or; (2) any Engelmann spruce, lodgepole pine, subalpine fir, or grand fir that has 50 percent or more of its basal circumference burned.

3.2.1.1 Environmental Consequences Specific to Alternative A

This alternative does not include harvest of any trees. All trees, regardless of the level of fire damage, would be retained onsite.

3.2.1.2 Environmental Consequences Common to All Action Alternatives

All fire-killed trees greater than 8 inches d.b.h. would be harvested within designated harvest units, with the exception of snags (trees that were dead prior to the fire), and fire-killed trees needed to meet the wildlife habitat snag requirements (Figure 3.3).



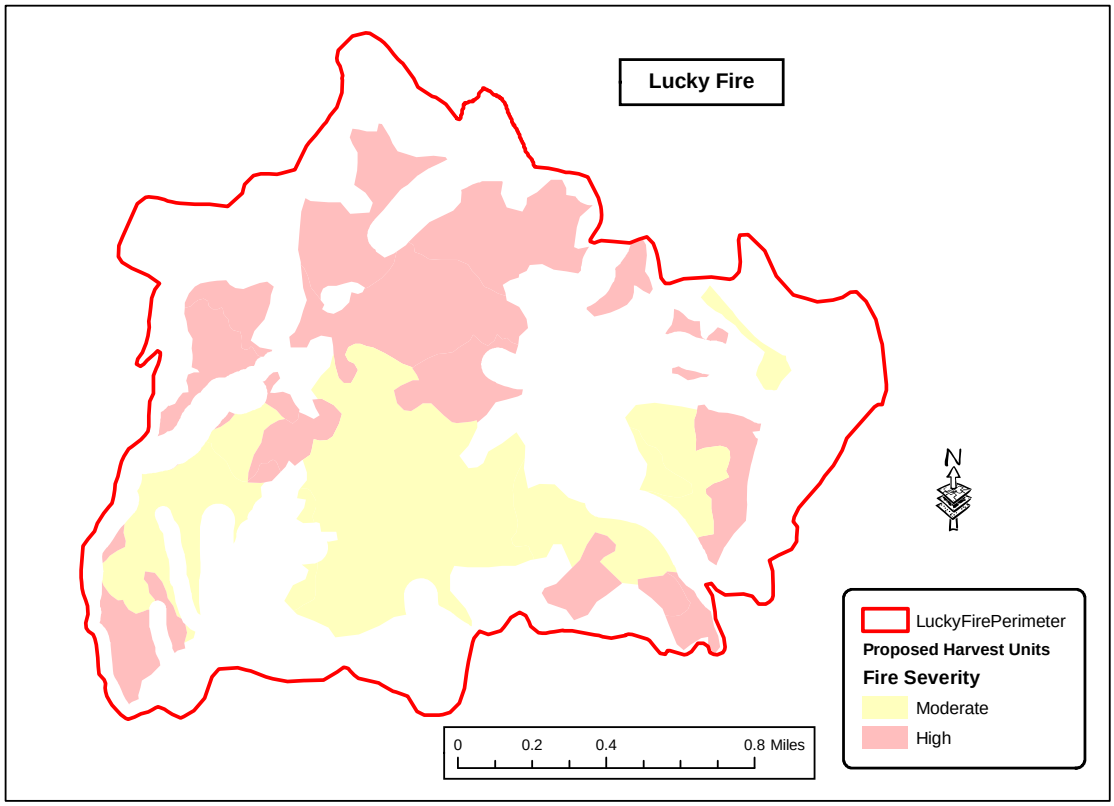


Figure 3.3 – Proposed Salvage Harvest Areas

3.2.1.3 Cumulative Effects

The effects of any alternative on the quantity of fire-damaged trees that could survive the 2007 wildfire would be limited to the Lucky and Lightning fire areas. Therefore, the area used to assess cumulative effects consists of the 8,576 acre analysis area (Figure 3.1 and Figure 3.2). Appendix B includes a list of past, ongoing, and reasonably foreseeable future activities considered for this analysis. The effects of all past activities were considered in disclosing the existing conditions and the direct and indirect effects presented above. Ongoing or foreseeable future activities that could potentially affect the quantity of fire-damaged trees within the cumulative effects area include:

Personal Use Firewood - Personal use firewood cutting is expected to continue into the foreseeable future and would likely reduce the quantity of fire-damaged trees within 100 to 200 feet of open roads.

Frontier Timber Sale - Portions of the planned Frontier Timber Sale (172 acres) occur within the Lucky Fire perimeter and overlap some of the proposed salvage units (108 acres). This is a “green” timber sale, scheduled for sale in 2009 that would include only live timber. However, some fire-damaged trees that survived the fire might be included in the Frontier timber sale.

Alternative A would have no direct effects on fire-damaged trees, therefore, no incremental or cumulative effects would occur.

The cumulative effects of Alternatives B and C would be an unquantifiable reduction of fire damaged trees within the cumulative effects analysis area.

Since none of the alternatives would have any measurable effect on the quantity of fire-killed trees that could survive within the analysis area, no incremental or cumulative effects would occur as a result of implementation of either alternative.

3.2.2 Forest Insects

Aerial detection surveys are conducted annually by the Boise Field Office of Forest Health Protection to monitor forested stands being impacted by insects on or adjacent to the Forest. A variety of forest insects exist within the analysis area. The majority of these insects were present in low levels prior to the 2007 wildfire and were not substantially affecting forest health or vigor at that time. Others, however, particularly bark beetles, constitute an existing or potential threat to forest health and are discussed in detail below.

Bark beetle outbreaks following wildfires are not unprecedented, but neither are they certain. Several conditions must exist for bark beetles to take advantage of fire-damaged hosts. First, there must be a sufficient supply of undamaged inner bark in fire-damaged trees. If the beetle’s food supply (the inner bark) becomes dry and darkened, which is often the case with high severity fires or in thin-barked species, beetles can neither feed nor deposit eggs in the tree (DeNitto et al., 2000). For this reason, trees often infested by bark beetles following a wildfire event are not the trees killed by the fire, but instead are those trees that survived the fire but are in a weakened condition.

Second, fires must occur at a time when beetles are in the adult stage and can quickly infest susceptible trees. Fires in late summer or early fall may occur after beetles have flown. A recently killed tree’s inner bark remains usable to beetles for a relatively short period of time. If not attacked while still “green,” the inner bark of fire-killed trees may become too dry before the beetle’s next flight season (DeNitto et al., 2000). Given that many bark beetles only have one flight each year, bark beetle activity is often not noticeable until 2 or 3 years after the wildfire has occurred.

And third, there must be a population of beetles within a reasonable distance to take advantage of weakened trees. Because all three conditions must be met for an outbreak to develop, beetle epidemics following wildfires are not a foregone conclusion. Still, a few such outbreaks are well documented in the literature (DeNitto et al, 2000).

3.2.2.1 Environmental Consequences Specific to Alternative A

This alternative would have no effect on tree mortality associated with insect infestations. A percentage of the preferred host species, damaged but not killed by the wildfire, would likely succumb to attacks by the Douglas-fir beetle or mountain pine beetle. Preferred host trees stressed by the 2007 wildfire would continue to be abundant across the analysis area, particularly where the fire burned in a mosaic pattern, and/or where the fire burned at a low intensity. It should be noted, however, that the level to which either insect population expands over the next few years and the extent of tree mortality associated with these insects is unpredictable.

3.2.2.2 Environmental Consequences Common to All Action Alternatives

Imminently dead trees, as used in this analysis, are defined as any tree not directly killed by the fire but subsequently considered dead or dying as a result of windthrow or successful bark beetle attack. The definition of a successful bark beetle attack (i.e., more than 50 percent of the tree's circumference has evidence of bark beetle boring dust) was derived from local research (Weatherby et al., 1994).

Preferred host species exhibiting signs of a successful bark beetle attack would be removed under this alternative from an estimated 1,077 acres. However, removal of these trees would have a negligible effect on the overall potential for additional tree mortality associated with insect infestations. Preferred host trees stressed by the 2007 wildfire would continue to be abundant across the analysis area, particularly where the fire burned in a mosaic pattern, and/or where the fire burned at a low intensity. It should be noted, however, that the level to which either insect population expands over the next few years and the extent of tree mortality associated with these insects is unpredictable.

Implementation of the reforestation activities in Alternatives B and C would not increase the potential for insect mortality of the green trees remaining in the project area.

3.2.2.3 Cumulative Effects

The effects of any alternative on insect-related tree mortality would be limited to the analysis area. Therefore, the area used to assess cumulative effects consists of the 8,576 acre analysis area (Figure 3.1 and Figure 3.2). Appendix B includes a list of past, ongoing, and reasonably foreseeable future activities considered for this analysis. The effects of all past activities were considered in disclosing the existing conditions and the direct and indirect effects presented above. Ongoing or foreseeable future activities that could potentially affect insect-related tree mortality within the cumulative effects area include:

Personal Use Firewood - Personal use firewood cutting is expected to continue into the foreseeable future and could slightly reduce the quantity of insect-infested trees within 100 to 200 feet of open roads.

Frontier Timber Sale - Portions of the planned Frontier Timber Sale (172 acres) occur within the Lucky Fire perimeter and overlap some of the proposed salvage units (108 acres). This is a "green" timber sale and would contain live timber. However, there is a chance that some insect-infested trees might be harvested during implementation of the Frontier timber sale.

Alternative A would have no direct effects on insect-related tree mortality, therefore, no incremental or cumulative effects would occur.

Although unquantifiable, the cumulative effects of Alternatives B and C, in combination with past, ongoing, and foreseeable future activities would be a slight reduction of the risk of insect-related tree mortality within the analysis area.

Since none of the alternatives would have any measurable effect on insect-related tree mortality within the analysis area, no incremental or cumulative effects would occur as a result of implementation of either alternative.

3.2.3 Potential Vegetation Groups

Forested habitat types are categorized into potential vegetation groups (PVGs) based on their similar environmental characteristics, site productivities, and disturbance regimes. There are seven PVGs in the analysis area, with PVGs 2, 4 and 10 comprising about 44 percent of the entire analysis area and 90 percent of the portion of the analysis area for which data exists. Table 3.2 displays the acres and percentages of the various PVGs found within the analysis area. Figure 3.4 displays the locations and juxtaposition of those PVGs.

Although the wildfire has impacted the structure and composition of the vegetation present within the analysis area, no PVG for any site has been altered. Therefore, the pre-fire and post-fire amounts and distribution of PVGs are identical.

Table 3.2. Area of Potential Vegetation Groups within the Analysis Area

PVG	Wildfire (acres)		Total Acreage	%
	Lightning	Lucky		
No Data	4,133	270	4,403	51%
2 - Warm, Dry DF / Moist PP	1,158	1,176	2,334	27%
3 - Cool, Moist DF	103	37	140	2%
4 - Dry, Moist DF	519	-	519	6%
6 - Cool, Moist GF	-	83	83	1%
7 - Warm, Dry SF	95	2	97	1%
8 - Warm, Moist SF	-	14	14	0%
10 - Persistent LP	986	-	986	11%
Total	6,994	1,582	8,576	100%

3.2.3.1 Environmental Consequences Common to All Alternatives

None of the alternatives considered in this analysis would have any effect on the existing quantities or distribution of forested habitat types or potential vegetation groups (PVGs) within the analysis area.

3.2.3.2 Cumulative Effects

The effects of any alternative on the quantities or distribution of PVGs would be limited to the analysis area. Therefore, the area used to assess cumulative effects consists of the 8,576 acre analysis area (Figure 3.1 and Figure 3.2). Appendix B includes a list of past, ongoing, and reasonably foreseeable future activities considered for this analysis. The effects of all past activities were considered in disclosing the existing conditions and the direct and indirect effects presented above. There are no ongoing or foreseeable future vegetative management activities within the cumulative effects analysis area that would impact the quantity or distribution of any PVG.

Since none of the alternatives would have any direct or indirect effects on the quantities or distribution of PVGs within the analysis area, no incremental or cumulative effects would occur.

3.2.4 Tree Size Class

Tree size class for a stand, as described in the Forest Plan, is determined by the size of the live overstory trees that have a non-overlapping canopy closure of at least 10 percent. The average diameter of the trees in the overstory or uppermost tree layer determines the stand's size class.

Pre-fire Condition - Stands within the analysis area were categorized into one of five size classes using stand exam data collected from 1994 through 1998. This data was projected to the year 2008 using the Forest Vegetation Simulator (FVS) (Wykoff, et. al., 1982) and used to calculate pre-fire tree size class, canopy closure and species composition.

Prior to the 2007 wildfires, the majority of the analysis area consisted of stands in the large tree size class. Table 3.4 displays the percentages of the pre-fire tree size classes within the analysis area by fire. Figure 3.5 displays the locations of the pre-fire tree size classes.

Post-fire Condition – Given the lack of extensive post-fire stand examinations, RAVG data (Figure 3.1 and Figure 3.2) was used to assess mortality levels, and the following assumptions (Table 3.5) were made to project fire-induced changes to tree size classes in order to estimate the post-fire conditions:

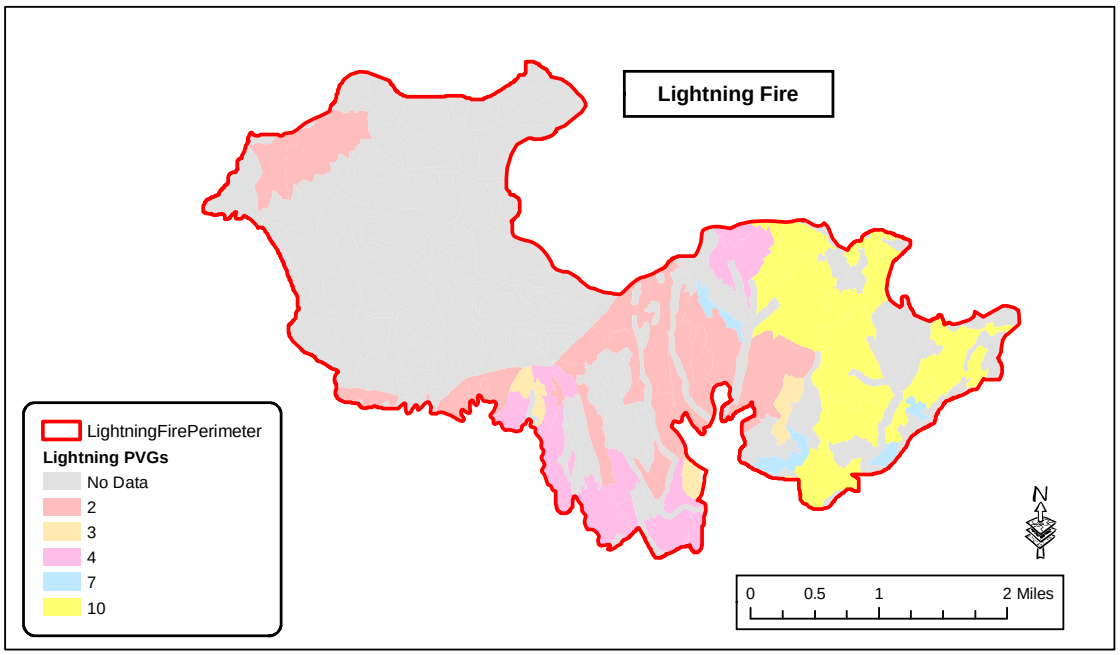
PVG 2, 3, 4 and 6 - Any site that experienced greater than 75 percent tree mortality was assumed to have been converted to a grass/forb/shrub/seedling size class. While a few of the trees in the small tree size class may survive, tree mortality in the 25 to 75 percent range was assumed to convert the grass/forb/shrub/seedling, sapling, and small tree size classes to the grass/forb/shrub/seedling size class. Tree mortality in the 25 to 75 percent range likely eliminated the smaller diameter trees in the medium and large tree size classes, presumed to be mostly thin-barked species, but the large diameter Douglas-fir, ponderosa pine, and western larch would have survived these fire intensities in sufficient numbers to convert the medium tree to a large tree size class and retain the large tree size class where previously existing. Tree mortality less than 25 percent was assumed to have had no effect on the size class of the affected stands.

PVG 7, 8 and 10 – Given that these PVGs are dominated by thin-barked species which are very intolerant of fire, any site that experienced 25 to 75 percent tree mortality was assumed to have been converted to a grass/forb/shrub/seedling size class. While a few of the trees in the small tree size class may survive, tree mortality in the 25 to 75 percent range was assumed to convert the grass/forb/shrub/seedling, sapling, and small tree size classes to the grass/forb/shrub/seedling size class.

Due to the impacts of the 2007 wildfires, the grass/forb/shrub/seedling size class now comprises 17 percent more of analysis area, coming at the expense of the large, medium, and small tree size classes. Table 3.4 displays the estimated post-fire percentages of the various tree size classes within the analysis area. Figure 3.6 displays the locations of the post-fire tree size classes.

Table 3.3. Pre-fire and Post-fire Tree Size Classes within the Analysis Area

	Percent of Analysis Area	
Tree Size Class	**Pre-fire**	**Post-fire**
Grass/Forb/Shrub/Seedling (<4.5’ tall)	3	20
Sapling (0.1-4.9” d.b.h.)	0	0
Small Tree (5.0-11.9” d.b.h.)	4	1
Medium Tree (12.0-19.9” d.b.h.)	12	6
Large Tree (≥20” d.b.h.)	81	73



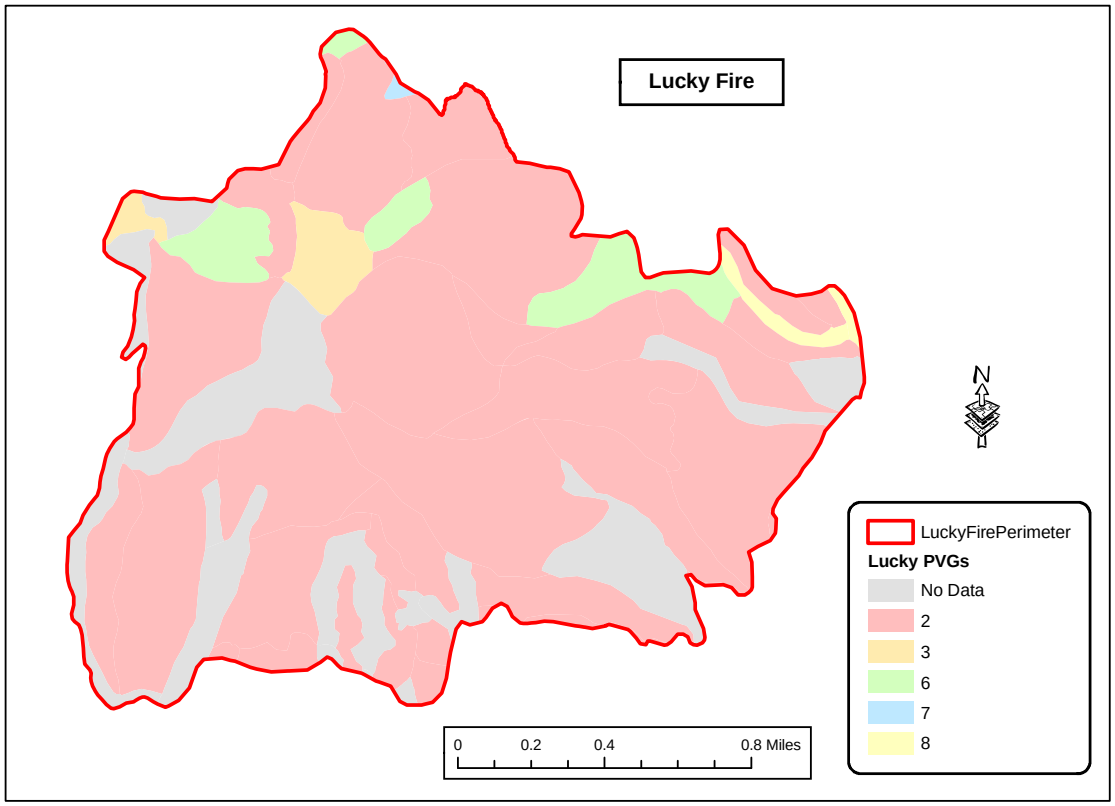
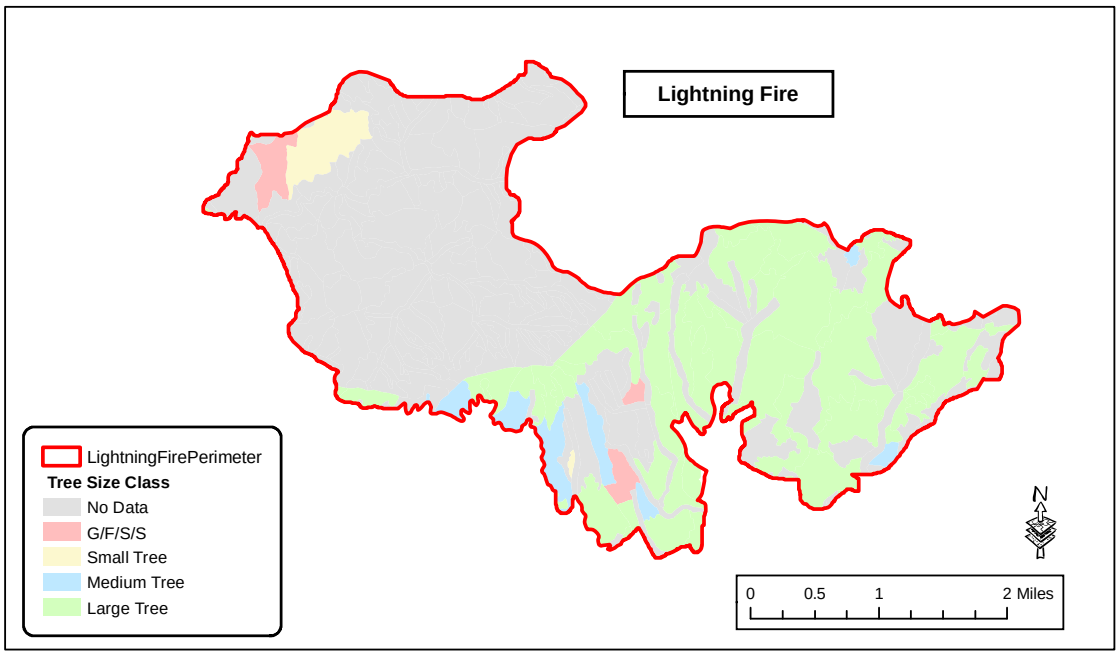


Figure 3.4 – Potential Vegetation Groups



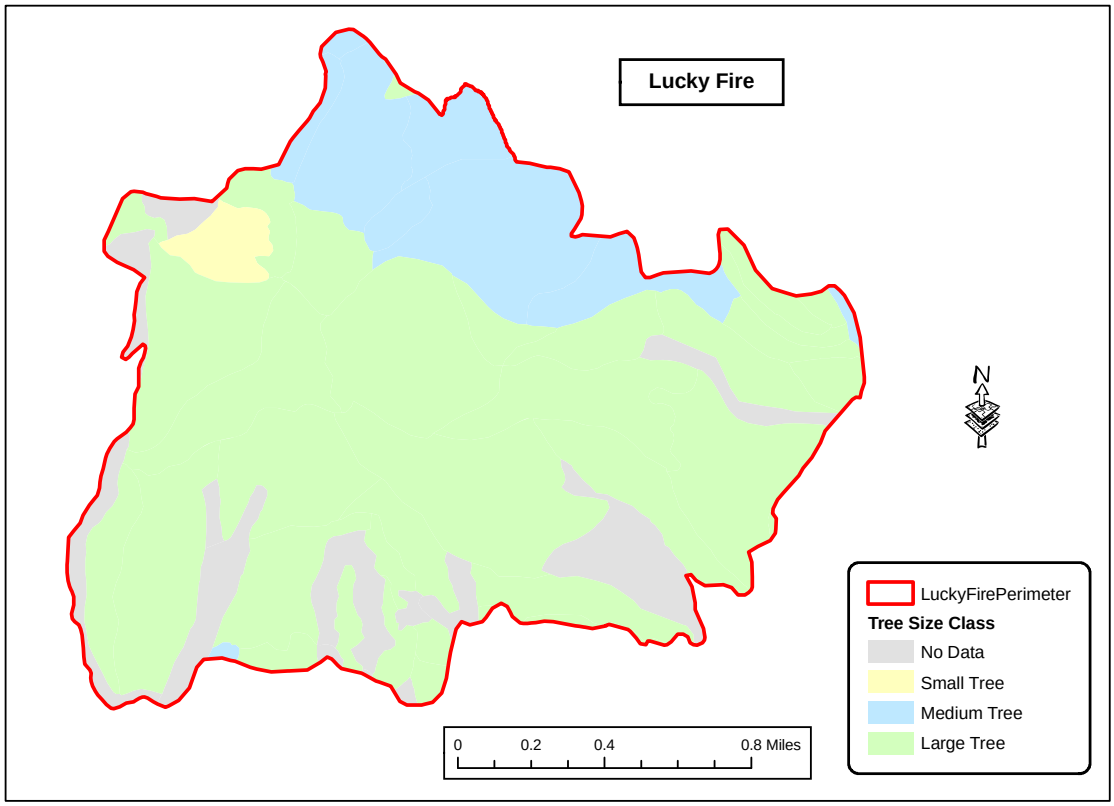


Figure 3.5 – Pre-Fire Tree Size Class

3.2.4.1 Environmental Consequences Specific to Alternative A

Implementation of this alternative would have no effect on the existing quantities or distribution of tree size classes within the analysis area, since no live trees would be treated. Following implementation the large tree size class would continue to dominate the analysis area.

Table 3.4. Tree Size Class Assumptions

PVG	Tree Mortality	Pre-fire	Post-fire
2,3,4,6	>75%	All size classes	GFSS
2,3,4,6	25% to 75%	GFSS, SAP, ST	GFSS
2,3,4,6	25% to 75%	MT, LT	LT
2,3,4,6	<25%	All size classes	No Change
7,8,10	>75%	All size classes	GFSS
7,8,10	25% to 75%	GFSS, SAP, ST	GFSS
7,8,10	25% to 75%	MT, LT	MT, LT
7,8,10	<25%	All size classes	No Change

3.2.4.2 Environmental Consequences Specific to Alternative B

Implementation of this alternative would have a negligible effect on the existing post-fire quantities or distribution of tree size classes within the analysis area. Although some fire-killed or imminently dead trees (as defined in this assessment) may be removed that could actually survive the wildfire, the number of trees likely to fall under this scenario would be minor and certainly not present in quantities sufficient to convert any particular stand from one size class to another (*see Section 3.2.1)*.

Reforestation (784 acres) would occur within areas currently classified as Grass/Forb/Seedling/Shrub, and would likely result in a class change to Sapling within 5-10 years from planting.

3.2.4.3 Environmental Consequences Specific to Alternative C

The effects of Alternative C are identical to Alternative B, except that Alternative C reforests 132 fewer acres. The change from Grass/Forb/Seedling/Shrub to Sapling on these acres would take much longer than with Alternative B.

3.2.4.4 Cumulative Effects

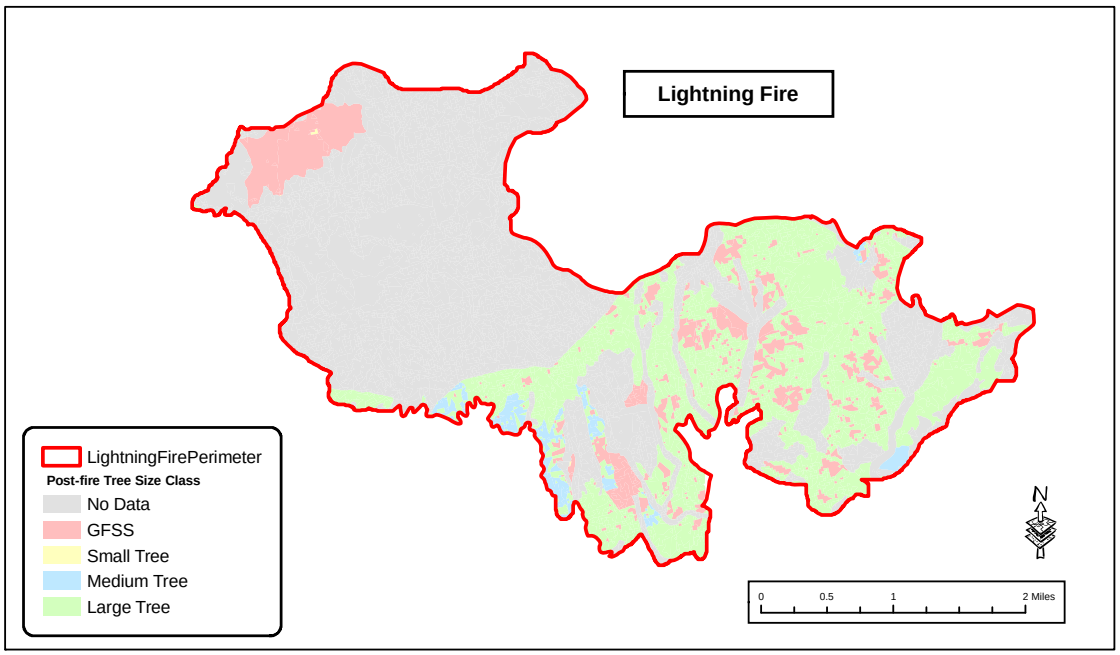
The effects of any alternative on the quantities or distribution of size classes would be limited to the analysis area. Therefore, the area used to assess cumulative effects consists of the 8,576-acre analysis area (Figure 3.1 and Figure 3.2). Appendix B includes a list of past, ongoing, and reasonably foreseeable future activities considered for this analysis. Ongoing or foreseeable future activities that could potentially affect tree size class within the cumulative effects area include:

Frontier Timber Sale - Portions of the planned Frontier Timber Sale (172 acres) occur within the Lucky Fire perimeter and overlap some of the proposed salvage units (108 acres). This is a “green” timber sale and would contain live timber. Therefore, this sale has the potential to change tree size class on 172 acres within the analysis area over a 5-year timeframe.

Given that most of this acreage was affected by the fire, it is unclear at this time what condition these stands are in. Therefore, it is not possible to know what treatment these stands may require to achieve their desired future condition (DFC), nor the precise effect of that treatment on tree size class. However, in no case would a stand classified as Large Tree be reduced to a smaller size class, as per Forest Plan Standard WIST01.

Lightning Creek Reforestation - An additional 745 acres of land within the Lightning Fire perimeter, currently classified as Grass/Forb/Seedling/Shrub, is proposed for planting in the spring of 2009 under a Categorical Exclusion (CE). As in Alternatives B and C, this would result in a change in classification from Grass/Forb/Seedling/Shrub to Sapling over a 5- to 10-year period.

Alternatives B and C would have slight measurable direct effects, related to reforestation, on the quantities and distribution of tree size classes within the analysis area over a 5-10 year horizon. Additionally, the proposed Frontier Timber Sale and the Lightning Creek Reforestation project produce a small cumulative effect. In the analysis area, implementation of Alternative B or C, along with the ongoing or foreseeable future activities, would result in a small cumulative effect in the tree size class by conversion of Grass/Forb/Seedling/Shrub to Sapling over a 5– to 10-year period.



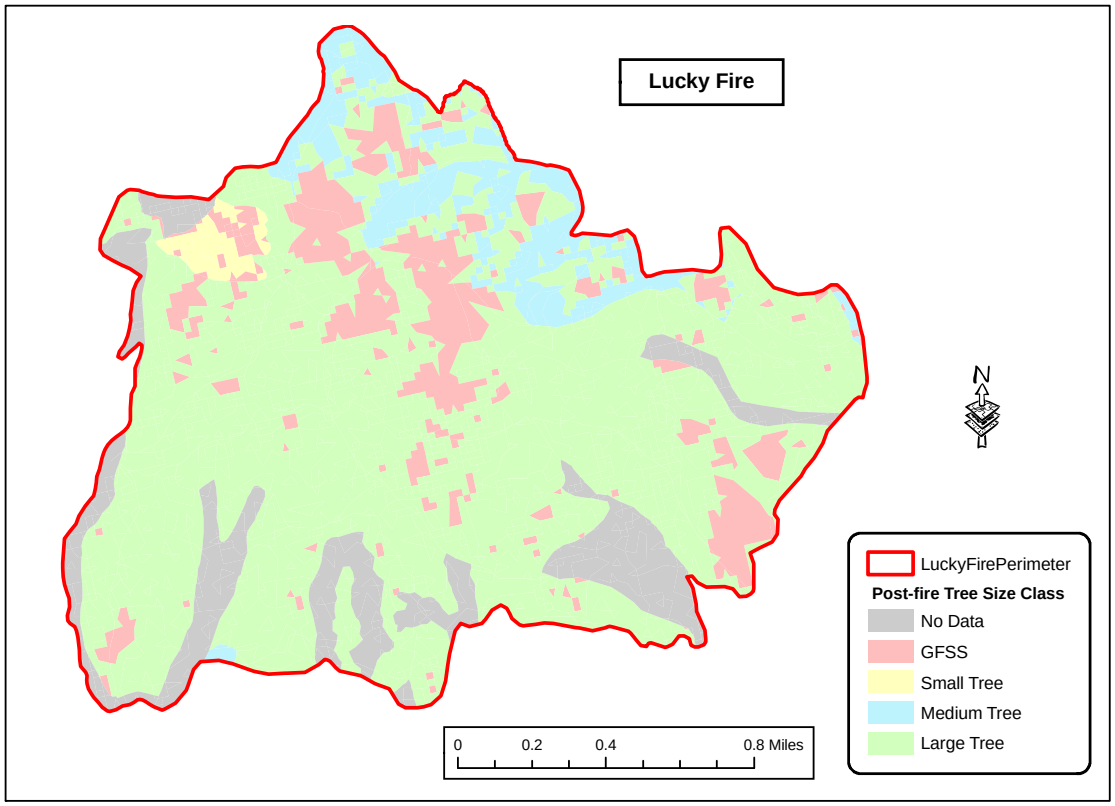


Figure 3.6 – Post-Fire Tree Size Class

3.2.5 Canopy Closure

Canopy closure represents the density of all live trees in individual stands. As used in this analysis, stands were categorized into one of three classifications: low (canopy closure 10 to 39 percent); moderate (canopy closure 40 to 69 percent); or high (canopy closure ≥70 percent).

Pre-fire Condition - Stands within the analysis area were categorized into the individual canopy closure groups using pre-fire stand exam data collected from 1994-1998, and projected to 2008 using the FVS. Prior to the wildfire, canopy closure within the analysis area was mostly a moderate classification (40 to 69 percent canopy closure) which constituted about 58 percent of the area. Table 3.6 displays the percentages of the analysis area in the individual canopy closure classifications prior to the 2007 wildfire. Figure 3.7 displays the pre-fire locations and distribution of the three canopy closure categories within the analysis area.

Table 3.5. Pre-fire and Post-fire Canopy Closures within the Analysis Area

	Percent of Analysis Area	
Canopy Closure	**Pre-fire**	**Post-fire**
Low (≤39%)	17	41
Moderate (40 to 69%)	58	41
High (≥70%)	25	18

Post-fire Condition - Given the lack of extensive post-fire stand examinations, the following assumptions were made to project fire-induced changes to canopy closure in order to estimate the post-fire conditions:

All PVGs - Any stand that experienced greater than 75 percent tree mortality has likely shifted to a low canopy closure. Stands with a high or moderate canopy closure prior to the fire that experienced 25 to 75 percent tree mortality were assumed to have been converted to the next lower classification (i.e., high down to moderate and moderate down to low). The pre-fire canopy closures of the remaining stands were assumed to be unchanged.

3.2.5.1 Environmental Consequences Specific to Alternative A

Implementation of this alternative would have no effect on the existing quantities or distribution of canopy closures within the analysis area. Following implementation, the moderate (40 to 69 percent) and low (≤39 percent) canopy closure classifications would continue to dominate the analysis area.

Table 3.6. Canopy Closure Assumptions

PVG	Tree Mortality	Pre-fire	Post-fire
All	>75%	All canopy closures	L
All	25% to 75%	H	M
All	25% to 75%	M	L
All	25% to 75%	L	unchanged
All	<25%	All canopy closures	unchanged

3.2.5.2 Environmental Consequences Specific to Alternative B

Implementation of this alternative would have little or no effect on the existing quantities or distribution of canopy closures within the analysis area. Following implementation, moderate and low canopy closures would continue to dominate the analysis area, since no activities are proposed that would alter canopy closure in the short-term (<15 years). Longer-term (>=15 years), reforestation activities would eventually result in 784 acres changing from low canopy closure to moderate canopy closure.

Although some fire-killed or imminently dead trees (as defined in this assessment) may be removed that could actually survive the wildfire, the number of trees likely to fall under this scenario would be negligible

and certainly not present in quantities sufficient to convert any particular stand from one canopy closure category to another (see Fire-killed Trees section).

3.2.5.3 Environmental Consequences Specific to Alternative C

Alternative C is identical to Alternative B except that 132 acres of reforestation would not occur in the Peace Rock Roadless Area (MPC 4.1c). Consequently, there is no difference in effects to canopy closure between Alternatives B and C in the short-term. However, in the long-term, reforestation activities would eventually result in 652 acres changing from low canopy closure to moderate canopy closure.

3.2.5.4 Cumulative Effects

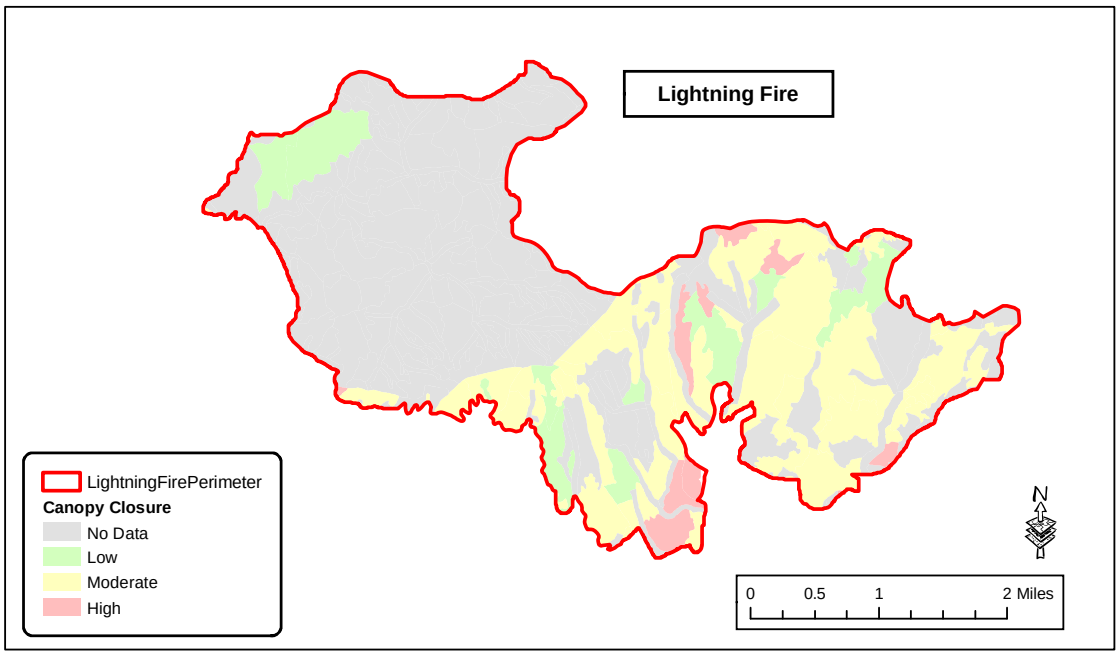
The effects of any alternative on the quantities or distribution of canopy closures would be limited to the analysis area. Therefore, the area used to assess cumulative effects consists of the 8,576-acre analysis area (Figure 3.1 and Figure 3.2). Appendix B includes a list of past, ongoing, and reasonably foreseeable future activities considered for this analysis. The effects of all past activities were considered in disclosing the existing conditions and the direct and indirect effects presented above. Ongoing or foreseeable future activities that could potentially affect canopy closure within the cumulative effects area include:

Frontier Timber Sale - Portions of the planned Frontier Timber Sale (172 acres) occur within the Lucky Fire perimeter and overlap some of the proposed salvage units (108 acres). This is a “green” timber sale and would contain live timber. Therefore, this sale has the potential to change canopy closure on 172 acres within the analysis area over a 5-year timeframe.

Given that most of this acreage was affected by the fire, it is unclear at this time what condition these stands are in. Therefore, it is not possible to know what treatment these stands may require to achieve their desired future condition (DFC), nor the precise effect of that treatment on canopy closure. However, it is probable that stands with high canopy closure would be treated to reduce canopy closure to low or moderate.

Lightning Creek Reforestation - An additional 745 acres of land within the Lightning Fire perimeter, currently classified as low canopy closure, is proposed for planting in the spring of 2009 under a Categorical Exclusion (CE). As in Alternatives B and C, this would result in a change from low canopy closure to moderate canopy closure on these acres in the long-term.

Alternatives B and C would have slight measurable direct effects, related to reforestation, on canopy closure within the analysis area over the long-term. Additionally, the proposed Frontier Timber Sale and the Lightning Creek Reforestation project produce small cumulative effects. In the Lucky fire area, implementation of Alternative B or C, along with ongoing and foreseeable activities there would be a cumulative reduction of canopy closure from the current level to low or moderate. In the Lightning fire area, implementation of either action alternative would result in a cumulative change in canopy closure from low to moderate in the long-term.



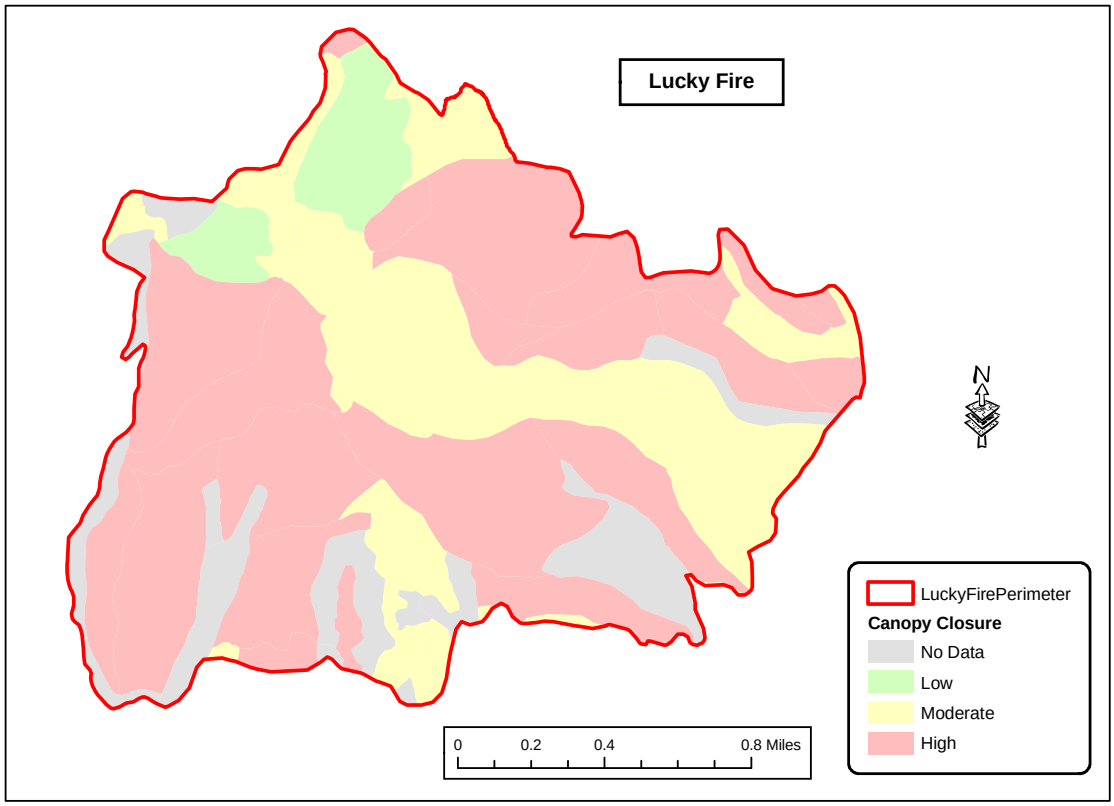
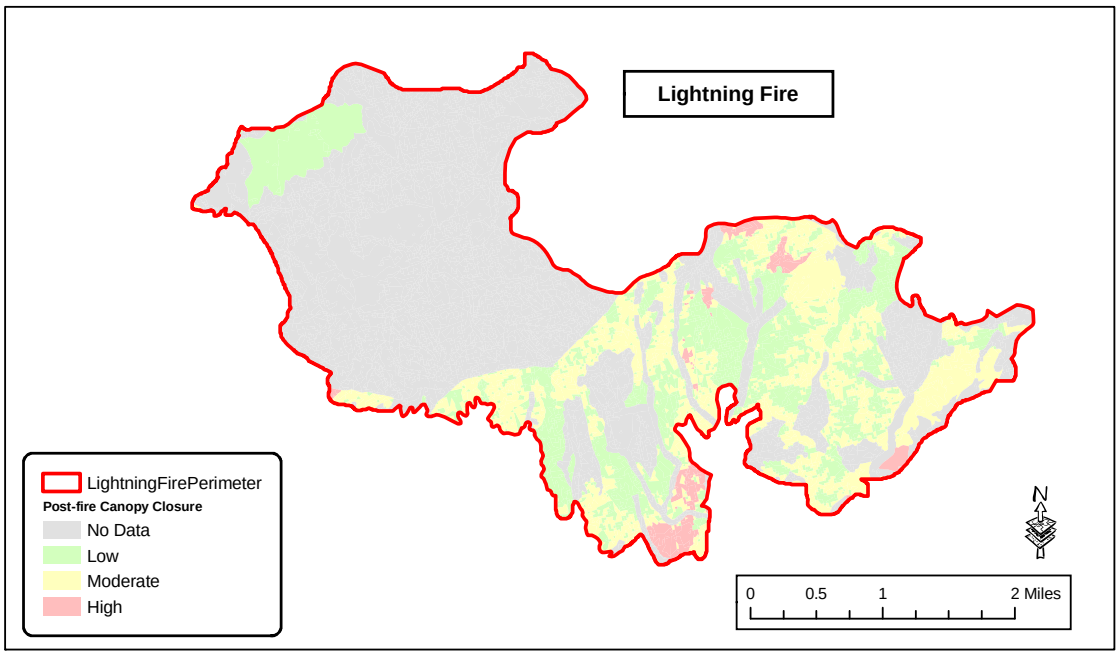


Figure 3.7 – Pre-fire Canopy Closure



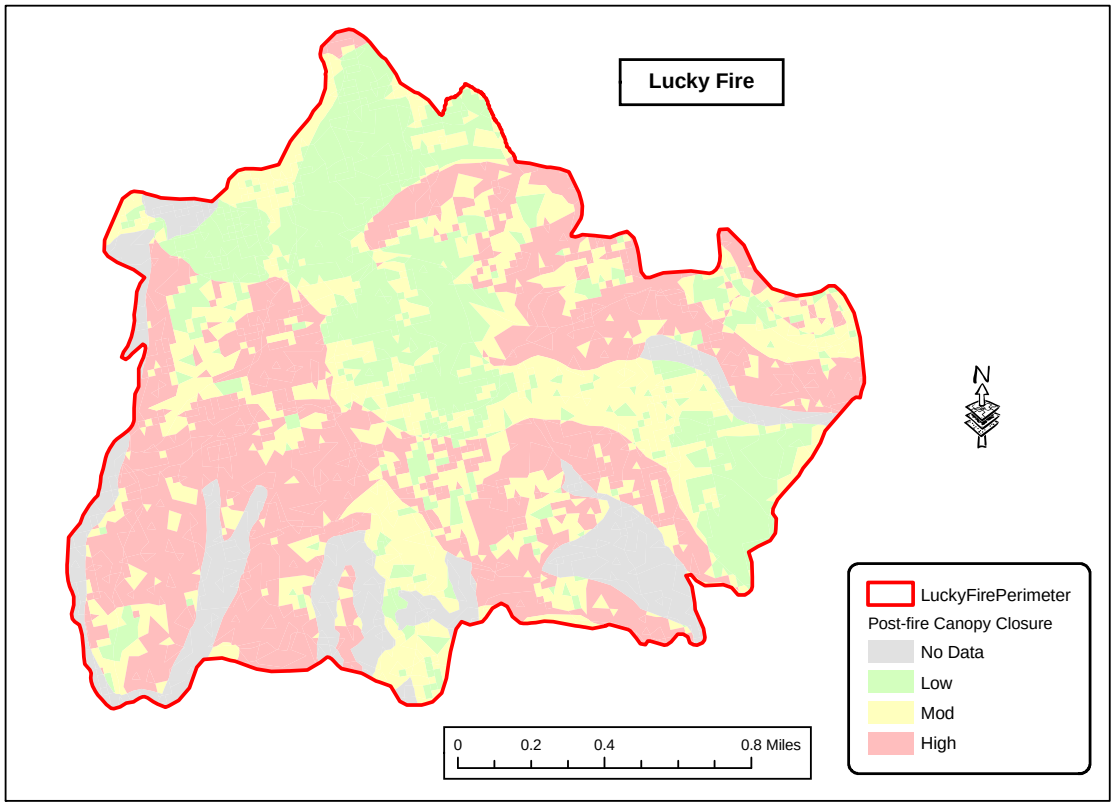


Figure 3.8 – Post-fire Canopy Closure

3.2.6 Species Composition

Appendix A of the Forest Plan refers to species composition to describe the desire conditions of forest vegetation. In the following discussion, "cover type" is used interchangeably with "species composition".

Pre-fire Condition - Stand data, collected from 1994 through 1998, and projected to 2008 classifies the analysis area into five different cover types, based upon the plurality of basal area (i.e., the species with the most basal area determines the cover type). Table 3.7 displays those pre-fire cover types. Figure 3.9 displays the locations of the various pre-fire cover types.

As displayed in Table 3.7, prior to the 2007 wildfire the Douglas-fir cover type (69 percent) comprised the majority of the analysis area for which data was collected. Ponderosa pine was the second most prevalent species (28 percent).

Table 3.7. Pre-fire Cover Types within the Analysis Area

Cover Type	Pre-fire Percent of Analysis Area
Douglas-fir	69
Ponderosa Pine	28
Grand Fir	1
Lodgepole Pine	1
Subalpine Fir	1

Post-fire Condition - Use of the RAVG data to predict tree mortality allows assumptions to be made as to likely post-fire tree size and canopy closure. However, it is difficult to predict fire effects on species composition. Consequently, such predictions are not presented here. In general, it is likely that the more fire tolerant ponderosa pine cover type would increase in acreage at the expense of the other cover types within the analysis area, but the magnitude of this change cannot be quantified.

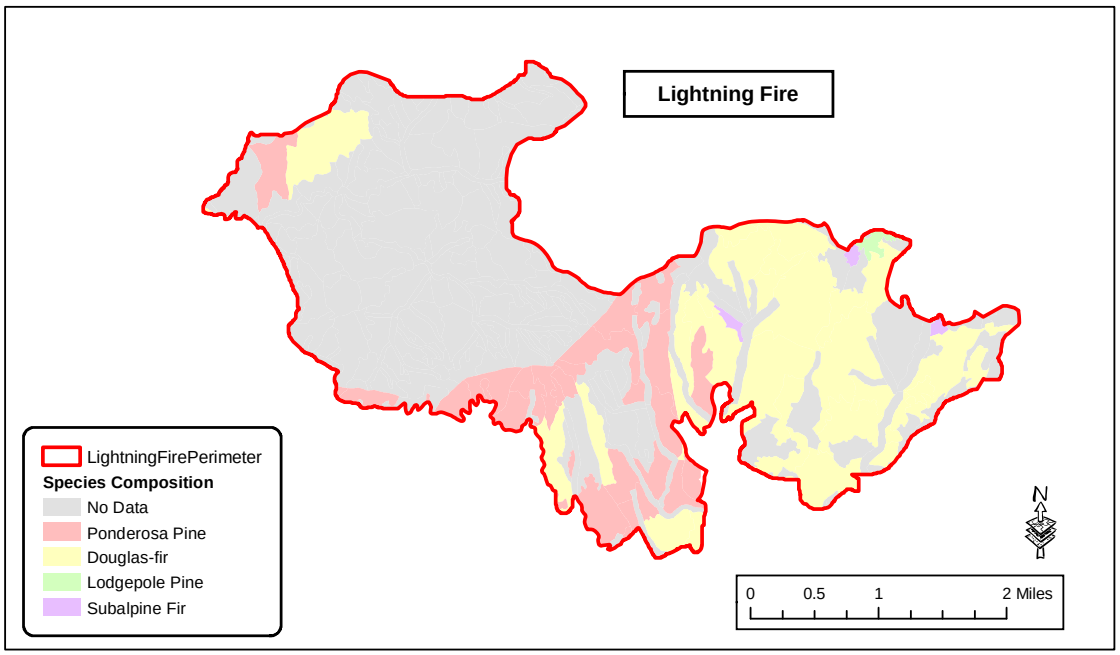
3.2.6.1 Environmental Consequences Specific to Alternative A

Implementation of any Alternative A would have no effect on the existing quantities or distribution of cover types within the analysis area. Following implementation, cover types would remain the same as currently exist.

3.2.6.2 Environmental Consequences Specific to Alternative B

Implementation of this alternative would have a slight effect on the existing quantities and distribution of cover types within the analysis area. Following implementation, Douglas-fir and ponderosa pine cover types would continue to dominate the analysis area. However, 784 acres of reforestation proposed with Alternative B would eventually result in 784 acres of ponderosa pine cover type. Since post-fire cover types are not known, it is impossible to quantify the magnitude of potential change. However, it is likely that some of the severely burned Douglas-fir types would become ponderosa pine cover types in the short-term (<15 years).

Although some fire-killed or imminently dead trees (as defined in this assessment) may be removed that could actually survive the wildfire, the number of trees likely to fall under this scenario would be slight and certainly not present in quantities sufficient to convert any particular stand from one cover type to another (see Fire-killed Trees section).



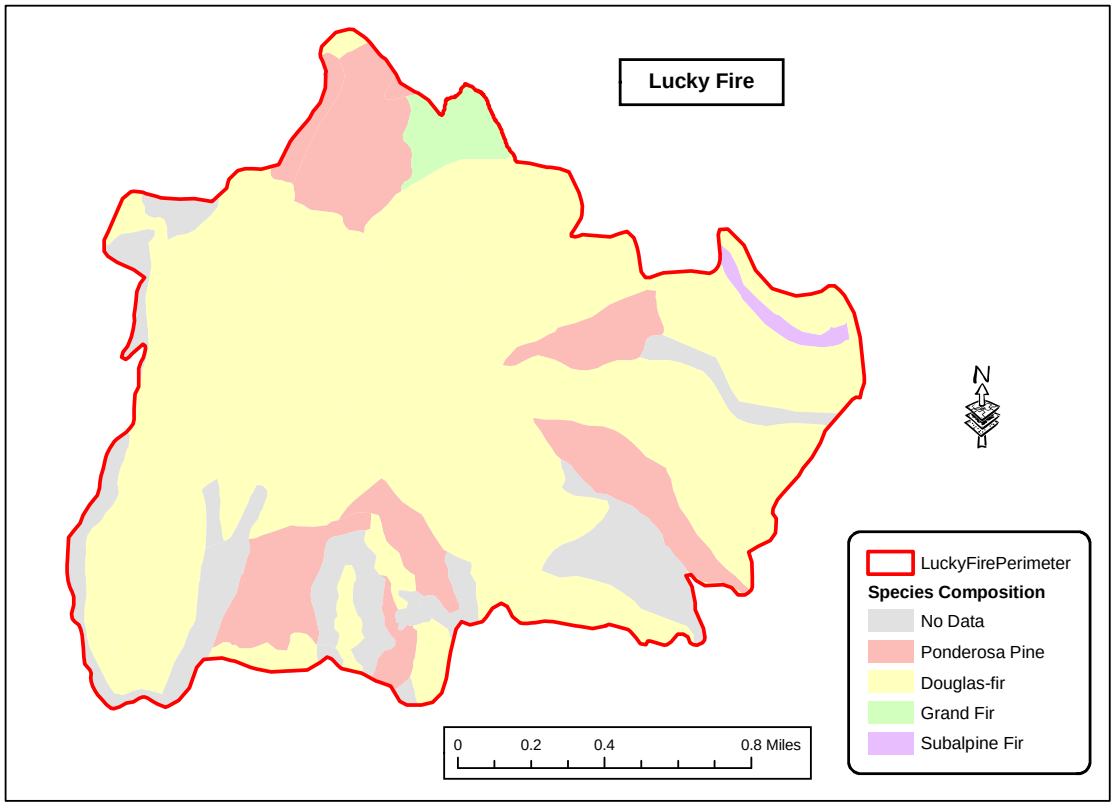


Figure 3.9 – Pre-fire Species Composition

3.2.6.3 Environmental Consequences Specific to Alternative C

Alternative C is identical to Alternative B except that 132 acres of reforestation would not occur in the Peace Rock Roadless Area (MPC 4.1c). Consequently, these acres would retain their current cover type.

3.2.6.4 Cumulative Effects

The effects of any alternative on the quantities or distribution of cover types would be limited to the analysis area. Therefore, the area used to assess cumulative effects consists of the 8,576 acre analysis area (Figure 3.1 and Figure 3.2). Appendix B includes a list of past, ongoing, and reasonably foreseeable future activities considered for this analysis. The effects of all past activities were considered in disclosing the existing conditions and the direct and indirect effects presented above. Ongoing or foreseeable future activities that could potentially affect canopy closure within the cumulative effects area include:

Frontier Timber Sale - Portions of the planned Frontier Timber Sale (172 acres) occur within the Lucky Fire perimeter and overlap some of the proposed salvage units (108 acres). This is a “green” timber sale and would contain live timber. Therefore, this sale has the potential to change cover type on some or all of 172 acres within the analysis area over a 5-year timeframe.

Given that most of this acreage was affected by the fire, it is unclear at this time what condition these stands are in. Therefore, it is not possible to know what treatment these stands may require to achieve their desired future condition (DFC), nor the precise effect of that treatment on cover type. However, it is possible that stands composed primarily of Douglas-fir and/or grand would be treated to favor ponderosa pine, thereby altering the species composition.

Lightning Creek Reforestation - An additional 745 acres of land within the Lightning Fire perimeter, of unknown species composition, is proposed for planting in the spring of 2009 under a Categorical Exclusion (CE). As in Alternatives B and C, this might result in a change of cover type in the short-term.

Alternatives B and C may produce slight direct effects, related to reforestation, on species composition within the analysis area over the short-term. Additionally, the proposed Frontier Timber Sale and the Lightning Creek Reforestation project may also produce small cumulative effects. Therefore, implementation of Alternatives B or C, along with ongoing or foreseeable future activities may result in a small cumulative effect on species composition within the analysis area.

3.2.7 Snags

For this discussion, a distinction will be made between a snag that was a dead tree that pre-existed the wildfires, and a snag that is a dead tree as the result of the fires. Snags are an important component of the environment, providing not only habitat for a variety of birds and terrestrial species, but also serving as a source of coarse woody debris which plays an important role in soil productivity.

Snags are known to fluctuate both spatially and temporally and are often found in clumps for a variety of reasons including insect infestations, root diseases, and/or wildfire. Appendix A of the Forest Plan discloses desired ranges of snags for individual potential vegetation groups (PVGs), and goes on to explain that those desired ranges are not meant to provide an even distribution of snags across every acre of the forested landscape, but to provide numbers that serve as a guide to approximate an average condition for an activity area (Forest Plan, Appendix A, pg. A-8). Appendix A also states that although snags are managed at the activity area, it is useful to have some knowledge of the larger landscape to assist in determining the appropriate number and amount that fall within the desired ranges in order to provide context (Forest Plan, Appendix A, pg. A-10).

Pre-fire Condition – Given the age of the available stand data (10-14 years old), an analysis of pre-fire snag levels using this data is not warranted. Many of the snags inventoried from 1994 through 1998 have likely fallen, and others were undoubtedly consumed during the wildfires. Within the MPC 4.1c portion of the analysis area, given the lack of road access, and therefore, of firewood cutting, and the level of Douglas-fir beetle, western pine beetle, and wildfire activity within the last decade, it is likely that snag

levels prior to the wildfire within this MPC were generally near levels indicative of unmanaged ecosystems, although this cannot be substantiated.

Within MPC 5.2, past commercial timber harvest, which reduced the number of trees available to become future snags, and firewood cutting adjacent to open roads, would likely have resulted in snag levels somewhat less than unmanaged stand conditions. However, the magnitude of this reduction is unknown.

Post-fire Condition – Post-fire snag data was collected during the fall of 2007 on 60, one-fifth acre fixed plots, randomly located within the proposed harvest units (Figure 3.3). For this dataset, a snag is defined as a dead tree that pre-existed the wildfires, not a fire-killed tree. However, data was also collected for fire-killed trees at the same time. Since this was such a small sample, no attempt was made to parse this data by PVG. Therefore, an estimate of snag density for each PVG represented within the harvest units is not available. Since PVGs 2 and 4 represent 95 percent of the proposed harvest units, Table 3.8 discloses the average post-fire snag density from the plot data compared to the desired conditions for PVGs 2 and 4, as portrayed in Appendix A (pg. A-9) of the Forest Plan.

As displayed in Table 3.8, the snag density (snags/acre) of pre-fire snags in the analysis area post-fire fall at the low end of the desired ranges in the 10- to 20-inch diameter group for both PVGs. Pre-fire snags/acres in the greater than 20-inch diameter group for PVG 4 is within the desired range, however at the low end of the range, and snags/acre in PVG 2 fall below the desired range for this diameter group.

Table 3.8. Pre-Fire Snag Densities in the Analysis Area Post-Fire

Diameter Group	PVG 2 DFC	PVG 4 DFC	Plot Data Average
10” – 20”	1.8-2.7	1.8-2.7	1.9
>20”	0.4-3.0	0.2-2.1	0.3
Total	2.2-5.7	2.0-4.8	2.2

3.2.7.1 Environmental Consequences Specific to Alternative A

Implementation of this alternative would have no effect on the existing quantities or distribution of snags within the 8,576 acre project area. As Table 3.8 demonstrates, post-fire snag levels are within or very near DFC, albeit at the low end. However, since no fire-killed trees would be harvested with Alternative A, these trees would become available habitat for snag-dependent species, and their numbers would far exceed the DFC.

3.2.7.2 Environmental Consequences Common to All Action Alternatives

The environmental consequences for Alternatives B and C are identical in terms of effects to snag levels. The discussion will differentiate between proposed harvest units that were severely burned (i.e., high basal area mortality), versus those that were moderately burned (i.e., low to moderate basal area mortality) (Figure 3.3).

Since existing pre-fire snag levels fall within the low end of the DFC range, all fire-killed ponderosa pine greater than 20 inches (>20”), d.b.h. and two 10- to 20-inch fire-killed trees per acre will be left onsite to enhance snag levels (Design Feature WL-1). Cruise data indicates this will result in an average of approximately 2.2 fire-killed snags greater than 20-inch fire-killed ponderosa pine per acre left onsite. The 99 percent confidence limits for this mean range from 0.88 to 3.45, which puts the true mean within the DFC range for PVGs 2 and 4 (Table 3.8).

Severely-burned proposed harvest units total about 489 acres within the two fire areas. Following salvage harvest, snag populations in these units will consist of all existing pre-fire snags and the fire-killed trees intentionally left to achieve the Appendix A DFC. Scattered live trees that survived the fires will also be present in places, and would be available for future snag recruitment, although their numbers would be low. These units will meet the Forest Plan DFC for snag levels post-harvest, however, over time (5-25

years), the majority of snags will have fallen to the ground and there would be few live trees within the desired size classes available for recruitment.

Proposed harvest units that were moderately burned total about 588 acres. These units generally have fewer fire-killed trees, more pre-fire snags, and numerous live trees, compared to the severely-burned units. Post-harvest, these units would be expected to meet the Forest Plan DFC for snag levels with a combination of pre-fire snags and retained fire-killed trees. Numerous live trees would be available for future snag recruitment.

Approximately 18 acres of hazard-tree removal would occur adjacent to 1.1 miles of NFS road 670 within the Middle Fork Payette River Wild and Scenic eligible corridor. Only trees that pose a public safety hazard, evaluated on a case by case basis, would be removed. Although it is not possible to evaluate the effect of this activity on snag levels, it is likely the post-harvest DFC would be met. In any case, there would be no harvest of fire-killed trees that do not pose a safety hazard within the Wild and Scenic eligible corridor.

Within the estimated 146 acres of severely-burned riparian conservation areas (RCAs) that are adjacent to some of the harvest units, no harvest would occur and the effects would be similar to Alternative A.

3.2.7.3 Cumulative Effects

The effects of any alternative on snag densities would be limited to the proposed harvest units. Therefore, the area used to assess cumulative effects consists of the 1,077 acres of cutting units (Figure 3.3), and the estimated 18-acre hazard tree buffer above Road 670. Appendix B includes a list of past, ongoing, and reasonably foreseeable future activities considered for this analysis. The effects of all past activities were considered in disclosing the existing conditions and the direct and indirect effects presented above. Ongoing or foreseeable future activities that could potentially affect snag densities within the cumulative effects area include:

Personal Use Firewood - Personal use firewood cutting is expected to continue into the foreseeable future and could slightly reduce the quantity snags within 100 to 200 feet of open roads.

Frontier Timber Sale - Portions of the planned Frontier Timber Sale (172 acres) occur within the Lucky Fire perimeter and overlap some of the proposed salvage units (108 acres). This is a “green” timber sale and would contain only live timber. Mitigation measures contained in the Sixshooter FEIS (USDA, Forest Service, 2006, A-6), the governing environmental document for the sale, directs that all snags meeting minimum size requirements as specified in Appendix A of the Forest Plan be retained on site, unless the tree presents a safety hazard to the logger or the public. Consequently, the Frontier Timber Sale could slightly reduce the quantity of snags within the 108 acres where cutting units overlay proposed salvage units.

Alternative A would have no direct or indirect effects on snag densities, therefore, no incremental or cumulative effects would occur as a result of this alternative.

The cumulative effect of Alternatives B and C, in combination with ongoing and/or foreseeable future activities would be a decrease in snag densities, but would not likely result in snag levels dropping below desired ranges post-harvest, except within 200 feet of open authorized roads as a result of personal-use firewood cutting.

3.2.8 Reforestation

Approximately 1,200 acres within the analysis area have been reforested, beginning in the 1960s. These efforts have largely been successful, as evidenced by the existence of the resulting plantations. Inventory data does not exist for most of these stands, however, it would appear from field reconnaissance and aerial photo interpretation that most of these plantations are adequately stocked and at least one has been thinned.

The most recent reforestation project within the analysis area took place in 2004 following a prescribed fire in the Granite Creek drainage that burned out of control. Portions of this fire (~300 acres) were planted with ponderosa pine. Survival following the third growing season was 88 percent. Unfortunately, most of these seedlings were killed during the 2007 wildfires.

In the areas proposed for reforestation with this project, the 2007 wildfires burned with such intensity, on roughly 784 acres, that a viable ponderosa pine or Douglas-fir seed source is not present in sufficient numbers to provide for natural regeneration. Past experiences on similar sites suggests that, in the absence of artificial regeneration, brush and grass species such as velvetleaf ceanothus, willow, ninebark, common snowberry, elk sedge, and pine grass would occupy these sites and inhibit the establishment and growth of natural conifer regeneration for decades.

Most of the riparian habitats in the analysis area consisted of mature conifer species prior to 2007. These conifer species, in combination with shrub and brush species provided valuable shade which assisted in regulating stream temperatures. The conifer species also served as potential sources of large woody debris recruitment to adjacent streams. In most locations, the predominant conifer species were ponderosa pine and Douglas-fir, with lesser amounts of Engelmann spruce, lodgepole pine, and subalpine fir. Within the RCAs planned for reforestation, the stream shading previously provided by these mature conifers is now absent.

3.2.8.1 Environmental Consequences Specific to Alternative A

Natural regeneration of conifers would eventually occur across the analysis area. However, the time needed for this regeneration to become established would vary depending upon site characteristics (elevation, aspect, soil type, etc.) and seed availability, and may take decades.

Brush and grass species would be expected to quickly become established in those portions of PVGs 2, 3, 4, 5, and 6 that burned at high or moderate intensities. The presence of these species would inhibit the establishment and growth of natural conifer regeneration. Given the lack of competition with conifers, regrowth of brush and shrub species should be immediate and abundant within the riparian habitats affected by the wildfire.

3.2.8.2 Environmental Consequences Specific to Alternative B

Conifers would be planted on 784 acres of severely-burned stands and RCAs to accelerate forest re-establishment within MPC 5.2, and in stands and RCAs where inadequate seed source exists to provide for natural regeneration within a portion of MPC 4.1c. Artificial regeneration on these sites prior to the establishment of competing brush and grass species would enhance survival of conifer trees and reduce the time necessary for the sites to return to a forested condition.

Within MPC 4.1c, trees would be planted at a low density (200 trees per acre) in a random pattern. This, combined with unplantable spots and normal mortality, will result in a natural forested appearance in much less time than if the stand(s) were naturally regenerated.

Natural regeneration of conifers on unplanted sites would eventually occur across the analysis area. However, the time needed for this regeneration to become established would vary depending upon site characteristics (elevation, aspect, soil type, etc.) and seed availability, and may take decades.

The removal of dead standing trees under this alternative is not expected to negatively influence the survival of regenerating trees. Sections 3.3.7 and 3.15.1 of this chapter disclose the effects of this alternative on snags and coarse woody debris, both of which influence shade and soil moisture, and therefore, influence regeneration. It should be noted, however, that snags, as defined in Section 3.3.7, are greater than or equal to 10 inches d.b.h., and coarse wood is defined as that material greater than or equal to 3 inches in diameter. Dead standing and down material less than these diameter limits, although by definition not considered snags or coarse wood, do nevertheless influence shade and soil moisture.

3.2.8.3 Environmental Consequences Specific to Alternative C

Conifers would be planted on 652 acres of severely-burned stands and RCAs to accelerate forest reestablishment within MPC 5.2. No reforestation would occur within stands or RCAs classified as MPC 4.1c. These stands will regenerate naturally over time, but it could take many decades, given the lack of a suitable seed source in many areas. Otherwise, the effects of Alternative C are identical to Alternative B.

3.2.8.4 Cumulative Effects

The effects of any alternative on regeneration would be limited to the 8,576 acre analysis area (Figure 3.1 and Figure 3.2). Appendix B includes a list of past, ongoing, and reasonably foreseeable future activities considered for this analysis. The effects of all past activities were considered in disclosing the existing conditions and the direct and indirect effects presented above. Ongoing or foreseeable future activities that could potentially affect canopy closure within the cumulative effects area include:

Lightning Creek Reforestation - An additional 745 acres of land within the west end of the Lightning Fire perimeter is proposed for planting in the spring of 2009 under a Categorical Exclusion (CE). This project would result in additional acreage of artificial regeneration within the analysis area.

Alternative A would have no direct or indirect effects on regeneration, and no incremental or cumulative effects would occur as a result of this alternative.

The cumulative effects of Alternatives B and C, in combination with foreseeable future activities would be an increase in the acres of planted conifers within the analysis area.

3.2.9 Created Openings

The Code of Federal Regulations (36 CFR 219.27) states that the maximum size limit for openings created in one harvest operation by even-aged management is 40 acres. Created openings that exceed 40 acres are subject to a 60-day public notice, and review and approval by the Regional Forester, except where catastrophe exists.

3.2.9.1 Environmental Consequences Specific to Alternative A

This alternative does not include any silvicultural prescriptions, and therefore, would not result in any management created openings.

3.2.9.2 Environmental Consequences Common to All Action Alternatives

Silvicultural prescriptions associated with this alternative would be limited to salvage of fire-killed and imminently dead trees and reforestation activities. This prescription would not result in management-created openings.

3.2.9.3 Cumulative Effects

The effects of any alternative on management-created openings would be limited to the analysis area. Therefore, the area used to assess cumulative effects consists of the 8,576-acre analysis area (Figure 3.1 and Figure 3.2). Appendix B includes a list of past, ongoing, and reasonably foreseeable future activities considered for this analysis. Ongoing or foreseeable future activities that could potentially create openings within the cumulative effects area include:

Frontier Timber Sale - Portions of the planned Frontier Timber Sale (172 acres) occur within the Lucky Fire perimeter and overlap some of the proposed salvage units (108 acres). The Sixshooter FEIS (USDA, Forest Service, 2006, B-3), the governing environmental document for the sale, states that: "*No cultural treatments that result in the creation of openings (USDA, Forest Service, 2003b, IV-43) are prescribed for the Sixshooter project." Consequently*, no opening creation is planned for the Frontier Timber Sale.

Since none of the alternatives considered in this analysis, nor any ongoing or foreseeable future activities result in management-created openings, none of the alternatives would have any incremental or cumulative effects on created openings.

3.2.10 Vegetation Effects of Gopher Control with Strychnine Bait

3.2.10.1 Trees

The application of up to three, yearly strychnine bait applications would quickly reduce localized gopher densities, thus reducing gopher depredation on planted seedlings. Individual-tree morality would decrease as young trees increase in diameter, develop more complex root systems, and become less vulnerable to stem girdling, clipping, and root pruning by gophers. As these young trees grow, a more closed overstory structure would develop that impedes growth of herbaceous vegetation cover preferred by gophers. The resulting changes in habitat would render these areas less suitable or unsuitable for high densities of pocket gophers (Engeman and Witmer, 2000). If enough trees survive to near complete canopy closure, pocket gopher would not be a serious threat to regenerating forest stands. Well-stocked forested areas appear to be less attractive to pocket gophers than open areas sparsely stocked with small trees.

3.2.10.2 Nontarget Species

There is limited information available on toxicity to plants. High concentrations (500 ppm) of soluble strychnine salts inhibit, and low concentrations (10 ppm) stimulate, germination and growth of cereal (*Triticum*). In one study, no measurable strychnine residues were found in crops such as alfalfa or apples after underground application of grain bait (USDA, Forest Service, 1995).

Failure to find dangerous residues in crops suggests that there is insufficient translocation of strychnine from underground-treated soil to plants to produce any toxicity under recommended conditions of use (USDA, Forest Service, 1995).

3.3 RANGE

3.3.1 Range Condition

The Lightning Fire project area occurs within a portion of the old Anderson Creek sheep grazing allotment. The grazing permit was waived back to the Government in the late 1980s and remained vacant and unused until 2001 when the allotment was closed.

The Lucky Fire project area includes a small portion of the 43,315-acre Middle Fork South allotment in the Scriver Creek drainage. Nine hundred and fifty ewes with lambs now graze from June 6 to mid-August after which the lambs are shipped. At that time, some ewes are culled, bucks are added, and the band is combined with the band from the Middle Fork North allotment. The dry band spends the remainder of the season until October 6 grazing from Bear Run to East Mountain lookout.

The Middle Fork South allotment grazing system is rotated from year to year. Under this strategy, grazing on some of the area is deferred, or delayed, for several months (i.e., until the plant growth/seed formation cycle is completed).

3.3.2 Rangeland Effects

The rangeland direct and indirect effects analysis area includes the 1,582-acre Lucky Fire project area and the 13,853-acre Lightning Fire project area. The analysis area is the two sheep allotments in the Middle Fork Payette drainage encompassing approximately 15,435 acres.

3.3.2.1 Environmental Consequences Specific to Alternative A

Alternative A has no effect upon the ongoing range program since there would be no change in management activities with implementation of this alternative.