

Understanding Burn Severity




Ground Cover, Amount and Condition

	<p>Low soil burn severity</p> <p>Little or no change from pre-fire status. Less than 50% consumption of litter, some char. Needles and leaves mostly intact.</p>
	<p>Moderate soil burn severity</p> <p>Up to 80% consumption of litter and duff, but generally incomplete. Recognizable leaves and needles remain. If more complete consumption occurred, a mitigating factor may be potential for leaf- or needle-cast from scorched canopy to provide ground cover.</p>
	<p>High soil burn severity</p> <p>Little to no effective ground cover remaining after fire (less than 20%). All or most litter and duff has been consumed, only ash or bare soil (ash blown away) remain. Little to no potential for leaf- or needle-cast.</p>




Ash Color and Depth

	<p>Low soil burn severity</p> <p>Ground surface may be black with recognizable fine fuels (needles, grass, and leaves) remaining on surface.</p>
	<p>Moderate soil burn severity</p> <p>Thin layer of black to gray ash with recognizable litter beneath it. Ash layer may be patchy as it is highly moveable by wind and water. Soil heating may have been significant; residence time usually brief. If thicker ash layer is observed, a mitigating factor may be leaf- or needle-cast potential from scorched canopy.</p>
	<p>High soil burn severity</p> <p>Thick, 1- to 3-inch (3- to 6-cm or more) layer of powdery gray or white ash covers the ground. Greater than 90% surface organics consumed; significant soil heating has occurred; residence time long. No potential for leaf- or needle-cast to provide ground cover.</p> <p>Localized red (oxidized) soil may underlie a thick, powdery layer of gray and white ash—generally found near a burned out stump or log; indicates extreme heating.</p>

Soil Structure

	<p>Low soil burn severity</p> <p>Structure unchanged. Granular aggregates are not weakened by consumption of organic matter.</p>
	<p>Moderate soil burn severity</p> <p>Structure slightly or not altered. Some consumption of organic matter in the top 0.5 inch (1 cm) of the soil profile.</p>
	<p>High soil burn severity</p> <p>Structural aggregate stability reduced or destroyed. Loose- and single-grained soil dominates and is exposed or under ash (up to 4 inches or 10 cm of ash). Consumption of organic matter in the top 2 inches (5 cm) of the soil profile.</p>

Roots

	<p>Low soil burn severity</p> <p>Fine roots (<0.1 inches or 0.25 cm diameter) intact and unchanged.</p>
	<p>Moderate soil burn severity</p> <p>Fine roots near surface may be charred or scorched; large roots intact (<0.25 inches or 0.5 cm diameter).</p>
	<p>High soil burn severity</p> <p>Many or most fine roots near surface consumed or charred. Some charring may occur on very large roots (<3 inches or 8 cm diameter).</p>

Soil Water Repellency

	<p>Low soil burn severity</p> <p>No fire-induced water repellency. Water infiltrates immediately; however, some soils exhibit water repellency even when unburned (see section 4.3).</p>
	<p>Moderate soil burn severity</p> <p>Weak to medium water repellency found at or just below soil surface. Water infiltrates slowly.</p>
	<p>High soil burn severity</p> <p>Strong water repellency found at surface or deeper. Water does not infiltrate. In case of extreme soil heating, soil water repellency may be destroyed or may exist at very deep soil depths (6 inches or 15 cm).</p>

Summary of Soil Burn Severity Class Factors

Factor considered	Soil burn severity class		
	Low	Moderate	High
Aerial view of canopy	Tree canopy largely unaltered. Shrub canopy intact and patches of scorched leaves not dominant. Ash is spotty.	Tree canopy is scorched over 50% of area. Shrubs mostly charred but difficult to assess fuels from air. Black ash is visually dominant. Gray or white ash may be spotty.	Tree canopy is largely consumed over > 50% of area. Shrubs completely charred but difficult to assess fuels from air. Gray and white ash is visually dominant.
Vegetation	Nearly all of crown remains "green." Some scorching in understory trees.	High scorch height. Generally, > 50% of crown is scorched. Mostly "brown" crowns with intact needles.	No needles or leaves remaining. Some or many branches may be consumed. Mostly "black" remaining vegetation.
Shrubs	Scorching in canopy but leaves remain mostly green. Limited fire runs with higher scorch. 5 to 30% charred canopy.	30 to 100% charred canopy. Smaller branches < 0.5 inch (1 cm) remain. Shrub density was moderate or high.	90 to 100% charred canopy. Most branches consumed, including fuels < 1 inch (2.5 cm). Skeletons or root crowns remain. Shrub density was moderate or high. Often old growth in character.
Fine fuels (Grassland)	Scorched or partially consumed.	Mostly consumed. Appears black from the air. Small roots and seed bank remain intact and viable.	Not rated as high unless loss of seed bank is suspected or soil structure strongly altered.
Ground cover	Generally, > 50% litter cover remains under trees—less under shrub community or where pre-fire cover is sparse.	Generally, 20 to 50% cover remains or will be contributed by scorched leaf fall from trees. Shrub litter will be mostly consumed.	0 to 20% cover remains as burned litter and woody debris under trees. Shrub litter is consumed.
Water repellency	Soils may be naturally water repellent under unburned chaparral. Other soils will infiltrate water drops in less than 10 sec; greater than 8 mL min ⁻¹ with the MDI.	The surface of the mineral soil below the ash layer may be moderately water repellent but water will infiltrate within 10 to 40 sec; 3 to 8 mL min ⁻¹ with the MDI.	Strongly water repellent soils (repels water drops for > 40 seconds; less than 3 mL min ⁻¹ with the MDI) may be present at surface or deeper.
Soil	Original soil structure—fine roots and pores are unaltered.	Original soil structure—roots and pores slightly altered or unaltered. Soil color darkened or charred at surface or just below surface only.	Soil structure to 1 inch is degraded to powdery, single-grained, or loose. Fine roots are charred. Pores are destroyed. Black charred soil color common below thick ash layer. Compare with unburned.

Adapted from the BAER Handbook (USDA 1995) by Alex Janicki