Understanding Burn Severity

**Ground Cover, Amount and Condition**

- **Low soil burn severity**
  - Little or no change from pre-fire status.
  - Less than 50% consumption of litter, some char.
  - Needles and leaves mostly intact.

- **Moderate soil burn severity**
  - Up to 80% consumption of litter and duff, but generally acceptable.
  - Recognizable trees and snags remain.
  - Some complete consumption occurred, mitigating factors only partially prevented burn.
  - Canopy from stranded canopy to provide ground cover.

- **High soil burn severity**
  - Little to no effective ground cover remaining after fire (less than 20%).
  - All or most litter and duff has been consumed; only ash or burned soil (fists blown away) remains.
  - Little to no potential for fuel- or shade-cause.

**Ash Color and Depth**

- **Low soil burn severity**
  - Ground surface may be black, with recognizable fine fuels needles, leaves, and leaves remaining on surface.

- **Moderate soil burn severity**
  - Thin layer of black to grey ash with recognizable litter beneath. Ash layer may be patchy as it is highly susceptible to wind and water. Shallowing may have been significant, residence time usually short. If stranded ash layer is observed, a reactivation layer may be visible as a darker ash color, more ash—needle—root present from stratified canopy.

- **High soil burn severity**
  - Thin to 3-inch (0.76 to 6.35 cm) layer of peat or gravel ash covers the ground. Greater than 50% consumption organic carbon, significant soil heating has occurred, plant root zone has thawed. Needles or fine fuels on needle—root to provide ground cover.
  - Localized soil and stranded soil may contribute a thick, partially covered layer of gray and white ash—generally found near a burned out clump of ash, indicates extensive burning.

**Soil Structure**

- **Low soil burn severity**
  - Structure unaltered. Granular aggregates are not rearranged by consumption of organic matter.

- **Moderate soil burn severity**
  - Structure slightly or just altered. Some consumption of organic matter is the top 0.5 inch (1.3 cm) of the soil profile.

- **High soil burn severity**
  - Structural aggregate stability reduced or destroyed. Loss of soil single-grained, soil becomes and is rendered to tufts or gobs (top 4 inches or 10 cm of soil). Consumption of organic matter in the top 2 inches (5 cm) of the soil profile.

**Roots**

- **Low soil burn severity**
  - Fine root scar surfaces may be charred or scorched; large roots intact (>0.35 inches or 0.8 cm diameter).

- **Moderate soil burn severity**
  - Fine root scar surfaces may be charred or charred; large roots intact (>0.35 inches or 0.8 cm diameter).

- **High soil burn severity**
  - Many or most fine roots near surface consumed or charred. Some charred root scar surfaces very large roots (>3.5 inches or 8 cm diameter).

**Soil Water Repellency**

- **Low soil burn severity**
  - Normal unburned water repellency. Water infiltrates immediately. However, some soils exhibit water repellency even when unburned (see section 2.1).

- **Moderate soil burn severity**
  - Weak to severe water repellency found at or just below soil surface. Water infiltrates slowly.

- **High soil burn severity**
  - Strong water repellency found at surface or deeper. Water does not infiltrate.

**Summary of Soil Burn Severity Class Factors**

<table>
<thead>
<tr>
<th>Factor considered</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awkward view of canopy</td>
<td>Tree canopy largely unaffected</td>
<td>Tree canopy is scarred over 30% of area. Standing branches still in place but difficult to discern from soil</td>
<td>Tree canopy is largely consumed over 50% of area. Standing branches totally consumed. Yellow, green vegetation remains. Grey or white ash is visibly dominant.</td>
</tr>
<tr>
<td>Stands</td>
<td>Mostly scarred canopy, some leaves remain mostly green.</td>
<td>Mostly scarred canopy, some leaves remain mostly green.</td>
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</tr>
<tr>
<td>Fire fuels (Groundcover)</td>
<td>Groundcover 10-30% charred. Cover remains under trees—mesic forest. Some scar cover apparent.</td>
<td>Groundcover 40-60% charred or remains will be contributed by mesic forest. Trees.</td>
<td>Groundcover 60-90% charred. Cover remains will be contributed by mesic forest. Trees.</td>
</tr>
<tr>
<td>Groundcover</td>
<td>Mostly consumed. Appears dark from the air. Some bark and seed bank remain intact and visible.</td>
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</tr>
<tr>
<td>Soil</td>
<td>Original soil structure—fine roots and pines are unaltered.</td>
<td>Original soil structure—roots and pines slightly charred. Soil color darkened or charred at surface; fine roots and new soil surface only.</td>
<td>Soil structure altered to depth. Trees and snags (several) are unaltered.</td>
</tr>
</tbody>
</table>

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

From “Field Guide for Mapping Post-Fire Soil Burn Severity,” RMRS-GTR-243, Parsons and others October 2010