FIRE BURN SEVERITY EXPLAINED

The Tunnel Fire is a mixture of low, moderate and high burn severity but what does that mean? Read on to find out more and see examples from the Tunnel Fire and what's next after determining the soil burn severity.

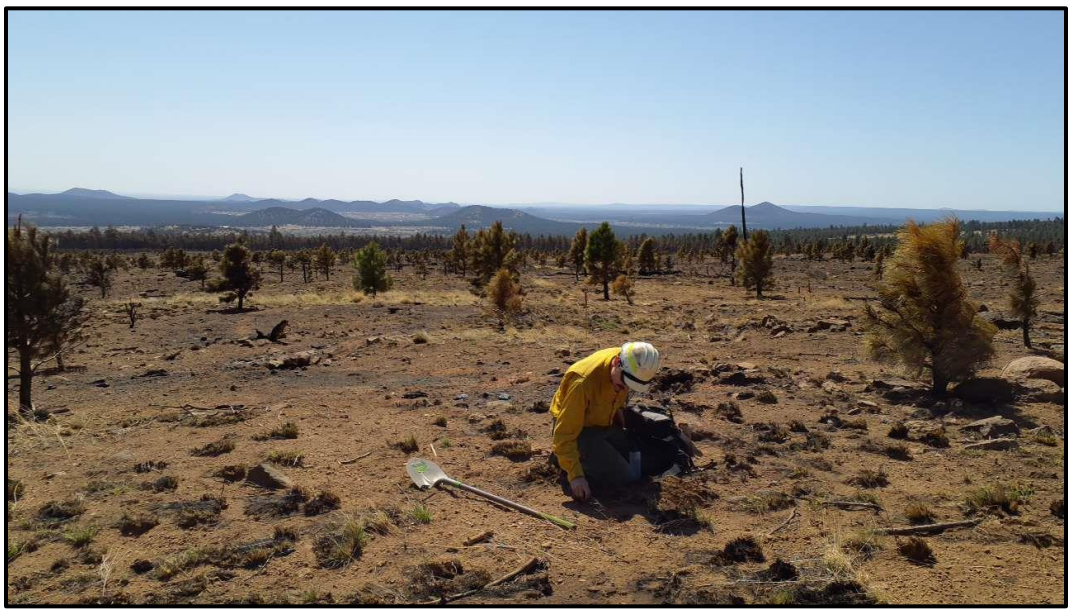
LOW BURN SEVERITY

Low Soil Burn Severity (SBS) occurs across the 67% of the Tunnel Fire. Low SBS occurs from partial consumption of fine fuels (for example, pine needles and grass), where broken limbs, leaves and ground cover are relatively unchanged and intact on the soil surface. Burning at the soil surface was short in time and discontinuous, leaving root systems and soil physical and biological conditions undamaged. Based on the ecological community, burned vegetation will generally recover to pre-fire conditions within 1-to-2 year. Low SBS generally indicates a low to very low risk for accelerated runoff, erosion, flooding, and debris flows within and below these areas compared to moderate and high SBS areas.

The photo below displays low burn severity just west of Timberline Estates. Note that the tree canopy is intact and that the surface has a light scorch. Also note that there are patches of unburned pockets as well. Also note that you can see where new needles from the ponderosa pine trees have already began to fall on top of the burned surface.

The photo below displays an up-close view of grasses sprouting post fire in a low burn severity area west of Timberline Estates.

The picture below displays soil scientist Rob Ballard assessing soil burn characteristics in a low severity burn site in the Schultz Fire burn scar. Again, note that there are patches of unburned soil, small trees are either scorched or unburned and that where the fire burned, that the grasses are already starting to resprout. With approximately 2 months to monsoons, many of the grasses will have abundant growth to slow raindrop impact and provide surface cover to allow for soil to soak into the burned area.



MODERATE BURN SEVERITY

Moderate burn severity occurs on 8% of the Tunnel Fire. Moderate SBS occurs where 50 to 80 percent of pre-fire soil cover (litter and ground fuels) was consumed by fire. Charring of the mineral soil is patchy or sporadic and plant roots within the soil may be scorched but are rarely consumed. Water repellency is often found at the surface, sometimes increasing in strength and depth which reduces the ability of precipitation to infiltrate the soil surface. Unburned leaves from fire-damaged or killed trees will provide ground cover to replace the organic soil cover that was consumed by the fire. Where greater amounts of reduced soil cover and increased water repellency occur, increased overland flow of water from precipitation is expected, most notably in locations where the overstory canopy no longer exists. Moderate burn severity generally recovers in 3-5 years

The photo below displays a moderate burn severity site west of Sunset Crater Volcano National Monument neat Forest Road 414. Note that not all of canopy has been burned. The needles associated with the crown scorch will provide ground cover to begin to restore this site.

The photo below displays another moderate burn severity site west of Sunset Crater Volcano National Monument neat Forest Road 414. Soil scientist Rob Ballard (left) and hydrologist Dan Bone are assessing the site to determine the burn severity. Note that the tree canopy is heavily scorched but intact that will allow for needles to provide for ground cover to help protect the site from raindrop impact. The majority of the surface is burned, but there are unburned patches in a mosaic within the site.

HIGH BURN SEVERITY

High SBS occurs on less than 1% of the fire—11 total acres. High SBS sites within the fire are typically the result of high fire severity that corresponds with longer burning time at the soil surface. As a result of the high, longer duration heat, nearly all of the pre-fire soil cover ground fuels have been consumed. The surface mineral soil structure can be reduced to powder and fine small roots of grass and shrubs tend to be completely consumed. Hydrophobicity, or soil water repellency does not occur at the surface because the organic materials have been vaporized and forced downward into poor spaces and voids between soil particles. For high burn severity areas, soil water repellency tends to be deeper compared to moderate fire SBS. Fire induced soil water repellency is a natural process where waxes are released from vegetation via the burning process. The fire-induced waxy layer can clog soil pore space preventing water infiltration.

The photo below displays a high burn severity site just west of Sunset Crater Volcano National Monument near Forest Road 414. Note the total lack of remaining needles and a continuous grey ash layer across the entire site, as well as a log burned completely to white ash. The site also had hydrophobicity down to 6 inches, depicting a very hot fire with long heat residence time. Recovery on this site will be lengthy because there is a lack of overstory needles to provide organic material and surface organic layer is heavily damaged.

WHAT'S NEXT WITH SOIL BURN SEVERITY?

The Soil Burn Severity layer is the base layer the BAER Team resource specialists use to begin the next phase of the BAER process-risk assessments to critical values on National Forest System lands. Critical values for the Tunnel Fire include Human Life and Safety to National Forest System lands, property on National Forest System Lands, Natural Resources such as soil productivity and hydrologic function, affects to habitat for federally listed threatened and endangered species, effects related to noxious and invasive species and effects caused by the fire to Heritage and Cultural Resources on National Forest System lands.

The SBS helps frame the potential magnitude of effects to critical values. For example, the BAER engineer is assessing effects to road systems that could pose a threat to human life and safety and the BAER recreation specialist is examining similar affects to developed recreation sites and the potential effect to human life safety and property. The BAER team soil scientist will use these data to model potential soil erosion from the fire and the BAER hydrologist is modeling the potential for accelerated runoff in relation to the critical value of soil productivity and hydrologic function. BAER Archaeologist are examining the potential threats to the abundant cultural resources and the San Francisco Peaks Traditional Cultural Property caused by the fire.

The data have also been shared with our cooperators so they can use it to assess potential impacts on non-National Forest System lands.