

## InciWeb News Article

### **Forest Service BAER Soil Scientist Explains How Wildfire Affects Burned Watersheds**

After the fire is contained, the emergency continues. While a forest fire can have a huge impact on trees and shrubs, the fire also affects the soil.

To understand how the Airport Fire influenced soils and how these effects contribute to post-fire watershed response and watershed health over time, BAER team soil scientist Eric Nicita from the Eldorado National Forest collects soil burn severity data across the burned area within the fire perimeter. This data will later be used in erosion, stream flow, and debris flow models that help managers make forest-wide predictions and determine if treatments are necessary and feasible.

Soil burn severity (SBS) is categorized from unburned through low, moderate, and high severity. Unburned soils are areas that were not touched by the fire, and high severity soils sustained more intense effects. The main indicators that soil scientists use to determine SBS impacts to soil structure and soil cover.

Unburned soil sticks together in clumps due to the roots, and mycelium, the fine, root-like fungi that hold the soil together. After a fire, the structure changes. The more soil structure is altered, the more prone the soil is to erosion and depending on the severity of the burn, the roots could be entirely burned slowing recovery.

A fire also alters soil cover. The duff layer, which is composed of organic material like twigs, leaves and decomposing material, burns and becomes ash. Ash is a fine layer that sits on the top of the soil. Because ash is so light, it is easily blown around or moved by water. During a flooding event, the ash then becomes an input to the watershed. Soil cover also protects soil from erosion. The less soil cover, the more erosion and runoff the burned hillslopes experience.

One technique that Nicita uses in the field is a water repellency test to examine potential runoff across the burn zone. Soils are naturally waxy due to the presence of mycelium, meaning water will pool on top before seeping into the soil. A fire exacerbates that characteristic, and moderate to high severity burned soils have increased post-fire water repellency. Explains Nicita, because burned soils have a looser structure, they are likely to erode faster during a flooding event, adding debris and mud to the watershed. This impacts water flow and quality and can cause downstream effects such as impacts to human infrastructure and aquatic organism health.

The data that Nicita collects is used to develop the Soil Burn Severity (SBS) map for the Airport Fire on the Cleveland National Forest. This map is used by other scientists, like geologists and hydrologists, during BAER work. After the fire, this map will continue to be used by scientists, particularly hydrologists, to monitor post-fire impacts to watersheds and determine if treatments are needed.

It is important for the Forest to have these maps and data to best prepare for the future – knowing this enables them to ensure they can prepare for flooding events and help protect critical forest values, like watershed health and human safety.

**NOTE: See related photos to this article under the “Photos” Tab on this Southern CA Post-Fire BAER InciWeb page: [Cabdf Southern California Postfire Baer 2024 Incident Photographs | InciWeb \(wildfire.gov\)](#). Also see “Related Information” PDF article document containing related article photos below.**

**BAER SAFETY MESSAGE:** Everyone near and downstream from the burned areas should remain alert and stay updated on weather conditions that may result in heavy rains and increased water runoff. Flash flooding may occur quickly during heavy rain events--be prepared to act. Current weather and emergency notifications can be found at the **National Weather Service** website: [www.weather.gov/lox/](http://www.weather.gov/lox/).

###



Beading Water is a Result of Water Repellency from the Soil Burned in a Wildfire



Eric Nicita examines burned soil structure within the wildfire burned area



Eric Nicita pours water onto burned soil to test for water repellency



Eric Nicita digs a soil test hole in wildfire burned area