# BAER Specialists Assess SR Lightning Complex fires for flooding threats

After a large wildfire, special actions are often necessary to provide for public safety and protect critical cultural and natural resources. Some fires create situations that require special efforts to prevent additional damage after the fire is contained. Loss of vegetation exposes soil to erosion; water runoff may increase and cause flooding, sediments may move downstream and damage houses or fill reservoirs and put endangered species and community water supplies at-risk.

A Forest Service Burned Area Emergency Response (BAER) team is assessing federal lands burned in the SF Lightning Complex fires, with the goal of keeping visitors and employees safe while recreating and working in the Six Rivers National Forest (NF). BAER team assessments focus on emergency actions that are necessary to protect human life and safety, property, critical cultural resources, and critical natural resources such as soil productivity, hydrologic function, and water quality. Emergency actions are intended to minimize any further damage during rainstorm events.

BAER hydrologists, soil scientists, geologist, road engineers, recreation specialists, biologists, botanists, archeologists, and GIS specialists are currently assessing the condition and response of the watersheds within the burned areas. These BAER scientists and specialists evaluate other critical values that could be at risk during major rainstorm events such as forest roads and trails, campgrounds, and other forest infrastructure.

In this photo below, the Six Rivers NF BAER specialists are preparing to begin field assessments for the Campbell burned area.

The two photos below show BAER specialists assessing road and watershed conditions in the Campbell Fire burned area on September 7, 2022. They are evaluating the condition of existing drainage structures and road conditions for their BAER assessment report.

The photo below shows the mainstem of the Trinity River near Willow Creek which has been designated as a Wild and Scenic River (WSR) which is a critical natural resource value that the BAER team identified for their assessment. The outstandingly remarkable value (ORV) for this reach of the Trinity River is that it provides important habitat for salmon, steelhead, green sturgeon, and many other fish species. Some of these fish species are listed as threatened under the Endangered Species Act such as the coho salmon. The South Fork Trinity River is also a critical natural resource value with a WSR designation and ORV for its suitable habitat for salmon and steelhead.

The next photo shows the condition of one of the intermittent stream channel areas in an area of the Campbell Fire that burned hot. Fortunately areas like this are an anomaly since the majority of the other burned areas burned at a low or very low soil burn severity (SBS).

This photo below captures a low soil burn severity (SBS) in the Groves Prairie area off NFS Road 7N31.

In this next photo below, Forest Service Civil Engineer Justin Nettleton evaluates a road culvert for risk of plugging  during fall/winter storms on NFS Road 7N31.

BAER scientists evaluate the burned watersheds to determine post-fire effects to soil and watershed conditions. This includes testing whether the soil is hydrophobic – aka repels water, the amount of soil cover left, soil structure damage, and organic matter left in the soil. Post-fire burned areas of hydrophobic (water repellent) soils along with destruction of soil structure can act as a "tin roof" by reducing the infiltration capacity of soils, enhanced overland flow, and accelerated soil erosion.

This is important because the amount of hydrophobicity and soil structure damage are important components to determining how much increased water runoff we can expect after a fire. The hydrophobic layer is the result of a waxy substance that is derived from plant material burned during a hot fire. The waxy substance penetrates the soil as a gas and solidifies after it cools, forming a waxy coating around soil particles. Hydrophobicity repels water from soil and is considered when mapping watershed response to rainstorms after a wildfire.

Below, is a photo of a low soil burn severity (SBS) area in the Campbell Fire.

Water repellency is only one of the many changes with the topsoil that happens in moderate and high soil burn severity. The biggest driver is lack of soil cover and soil structure. This why soil burn severity is so important and why hydrophobicity is only one of the contributing factors. Soil texture also plays a role, coarse-grained soils allow hot gasses to penetrate deeper and tend to have deeper water repellant layers where fine-textured soils pore space is tight and does not allow gases to penetrate readily thus causing only surface water repellency.

In these two photos below, Forest Service Hydrologist Emily Fudge assesses soil hydrophobicity (water repellency), changes to soil structure, and maps the soil burn severity (SBS) in Hawkins Creek burned drainage located in the Campbell burned area.

This last photo shows "needle cast" covering the soil on a slope in the Campbell Fire where ground cover no longer remains after the fire. Needle cast happens when the heated and dead needles fall to the ground from the burned and heated pine trees. The needles provide protective cover to the bare soil during rainstorms that help dissipate (block water) and spread water droplets to prevent erosion. The needles also provide a source of recycled nutrients for growth and mulch that retains soil moisture.

**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*** *websites: www.weather.gov/sto/ and www.weather.gov/eka/.*