

BAER Specialists Assess Mosquito Burned Area

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 Mosquito Fire, with the goal of keeping visitors and employees safe while recreating and working in the Tahoe and Eldorado National Forests (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.

BAER soil 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.

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 is “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 repellent layers where fine-textured soils pore space is tight and does not allow gases to penetrate readily thus causing only surface water repellency.

In this photo below, Forest Service Soil Scientist Eric Nicita assesses soil hydrophobicity (water repellency), changes to soil structure, and maps the soil burn severity (SBS) in the Mosquito burned area.



BAER Engineers, Hydrologists, Soil Scientists, and Geologists evaluate the conditions of roads and watersheds within the Mosquito burned area for potential threats from flash flooding, sediment flows impacting drainage crossings and the overall infrastructure due to increased erosion, sedimentation, and water flows. They determine whether road culverts and other drainage structures within the burned areas have sufficient capacity to pass post-fire modeled increased water and debris flows—in particular, they look to see if they are clogged, collapsed, or could get clogged and if rock fall could occur after major rainstorm events. Roads are BAER critical values that need to be assessed for these threats. The BAER team recommends emergency stabilization treatments and actions to minimize those threats.

Critical drainage crossings are identified by BAER assessment team specialists. They evaluate the condition of existing drainage structures and road conditions for their BAER assessment report. The specialists also evaluate the burned area road culverts for risk of plugging during fall/winter storms. They inspect these crossings to prescribe the most effective BAER treatment to protect the road prisms from washing away during major storm events.

The next two photos show rocks and other debris in the roadway on Forest Service (FS) Road 14N25 in the Eldorado NF side of the Mosquito Fire on the way down to Oxbow reservoir. Rock fall zones can become more active post-fire and become hazardous when driving through the burned areas.



The next photo is a catch basin adjacent to a road with limited capacity for runoff along Forest Route 33 on the Tahoe NF in the Mosquito burned area on the way to the Grouse Falls area. The culvert will likely not be able to handle increased flow, and the catch basin may overtop and lead to road washout and erosion. Because of the fire, there is no vegetation to slow the flow of water or hold the sediment in place.



BAER hydrologists model post-fire watershed responses under typical storm conditions to determine if there is a risk of flooding or increased water flows that could undermine or damage the roads and/or result in dangerous situations for Forest visitors or employees.

These next two photos show the beginning of a road edge failure along FS Road 13N48 above Pilot Creek. The side of this dirt road drops sharply off into the creek. BAER Engineers will recommend emergency stabilization actions and treatments to ensure that the roads do not wash away or fail. The treatments also need to reduce the amount of sediment entering the waterways, as well as maintain the road width for driver safety.



These two photos below show a smoldering tree stump hole along FS Road 13N48 near the Blodgett Experimental Forest in the burned area. Stump holes can be a big road hazard since they are often much deeper and wider than they look on the surface and are prone to caving in. These stump holes were at least three feet deep.



This next photo was taken by BAER Aquatic Biologist Dan Teater during his assessment of the Mosquito burned area. The photo shows Ralston Afterbay Dam located on the Middle Fork of American River and is showing signs of elevated turbidity from ash and sediment because of the rain the burned area received in September. Rain events occurring during a wildfire can impact water quality and the feeding behavior of fish and frogs occupying rivers and streams. Water quality and TES (Threatened and Endangered Species) are also BAER natural resources critical values that are evaluated for post-fire impacts.



These two photos show Dan Teater, assessing California red legged frog critical habitat that was burned over by the Mosquito Fire.



This next photo shows Forest Service Environmental Geologist Rick Weaver assessing the California red legged frog habitat near Big Gun Diggings Hydraulic Mine located on the American River Ranger District on the Tahoe NF.



BAER assessment teams sometimes need to bring in hazardous materials (hazmat) specialists to assist in evaluating hazardous areas that were burned over during a wildfire.

In this photo below, Forest Service Abandoned Mine Specialist Jeremy Olson is recording information at a hazardous mine opening near the Western States Trail in the Mosquito burned area.



In this next photo, Rick Weaver is assessing an abandoned mine opening near the Gorman Ranch Road. This mine was previously unknown and is now considered a threat to public safety.



These next four photos show a burned over mine shaft that Jeremy Olson and Rick Weaver assessed in the Mosquito burned area. The shaft was previously closed by a polyurethane foam (PUF) plug. The heat from the fire melted the PUF plug. The BAER team will recommend an emergency stabilization treatment to mitigate the hazard to provide for public safety. The BAER specialists temporarily surrounded the mine shaft with colored flagging to warn anyone who comes upon it.





Along with roads, trails are also a BAER critical value that are assessed for potential threats from flash flooding, debris flows impacting drainage crossings and the overall trail prisms and infrastructure due to increased erosion, sedimentation, and water flows. Forest Service Recreation Specialists evaluated trails within the Mosquito burned area. They will include their trail evaluations in the BAER assessment team report along with BAER emergency stabilization treatment recommendations to minimize threats from potential rainstorm threats.

This photo below shows BAER Trails Specialist James Wood assessing the burned Western States Trail in Eldorado Canyon.



Here BAER Archeology Tech Jacob Batsky is assessing the Loop 6 motorcycle trail on Codfish Ridge as shown in this photo below.



The next two photos BAER Hydrologist Tori Stempniewicz (left photo) and Jacob Batsky (right photo) assess the Loop 6 motorcycle trail in the Mosquito burned area.



This next photo below shows Tyler Segura assessing Grouse Falls Overlook, which unfortunately burned in the Mosquito Fire.



And this last photo for all you "BAER" fans, if you look closely, you will see bear paw prints that BAER Civil Engineer Nicole Thompson found close to Michigan Bluff on the Tahoe NF side of the Mosquito Fire area.



NOTE: For bigger view of each of the above photos, please go to the Photos Tab of this InciWeb page: [Mosquito Post-Fire BAER Photographs - InciWeb the Incident Information System \(nwcg.gov\)](https://www.nwcg.gov/incidents/mosquito-post-fire-baer-photos)



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/sto/.*