BAER Scientists and Specialists Assess the McKinney Fire – What They Do

A Forest Service Burned Area Emergency Response (BAER) team is assessing federal lands burned in the McKinney and Yeti fires, with the goal of keeping visitors and employees safe while recreating and working in the Klamath National Forest. After a fire, 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. 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, geologists, road engineers, recreation specialists, biologists, botanists, archeologists, and GIS specialists are currently assessing the condition and response of the watersheds within the McKinney and Yeti burned areas. These specialists evaluate critical natural and cultural resources, and critical infrastructures such as forest roads, trails, and campgrounds that could be at risk during a major storm event.

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

Below, these three photos show Forest Service Soil Scientist Eric Nicita and Hydrologist Jesse Merrifield assessing soil hydrophobicity (water repellency) and changes to soil structure in a high soil burn severity (SBS) area of the McKinney burned area. Jesse digs a trench and drops water on the soil at multiple depths to determine how deep and how strong the layer of water-repellant soil may be.

When burned watersheds and channels are loaded with unsorted, unconsolidated rocky materials, it creates a post-fire risk where that material is available to be transported downstream as a destructive debris flow during a major rainstorm event.

In this photo below, Eric Nicita is assessing and recording data about potential debris flow damage in a McKinney burned watershed.

The two photos below were taken by Forest Service Hydrologists Kyle Wright and Jesse Merrifield during their field assessments of the McKinney burned area. The top photo shows evidence of prior debris flow material in Little Humbug Creek, while bottom photo shows past debris flow deposits near the confluence of Vesa Creek and the Klamath River.

In the next photo below, Kyle Wright and Forest Service Hydrologist Anna Chinchilli inspect damage at the bridge crossing Vesa Creek on the Klamath River Road following the August 2, 2022, debris flow event. Immediately after this event, only a couple inches of space were observed between the entrained material and the base of the bridge. The bridge inlet/outlet was cleared by heavy machinery to allow water to pass unobstructed.

In the next photo below, a high debris flow mud splatter is visible on oak trees resulting from the August 2 Vesa Creek debris flow event at the confluence of Vesa Creek and the Klamath River. Kyle Wright is in the background walking past large, coarse, woody debris piles pushed out during this event.

This next photo shows Kyle Wright standing on the remnant Vesa Creek debris flow fan at the confluence with the Klamath River.

Forest Service Hydrologist Anna Chinchilli is documenting a head-cut created during the Vesa Creek debris flow event where water carried sediment, rocks and other debris during the event and cut into the adjacent less-armored upland soils resulting in vertical erosion.

BAER Engineers evaluate roads and bridges within burned areas for potential threats from flash flooding, sediment flows impacting drainage crossings and the overall infrastructure due to increased erosion, sedimentation, and water flows. They also determine whether road culverts within the burned area 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 after major rainstorm events. Roads are BAER critical values that need to be assessed for these threats. The BAER team will recommend emergency stabilization treatments and actions to minimize those threats.

The photos below are an example of areas within the McKinney Fire perimeter where BAER assessment team soil scientist and geologists inspected areas of the August 2 debris flow event to prescribe the most effective BAER treatment to protect the road prisms, water crossings and bridges from washing away during future major storm events.

In this photo below, Eric Nicita is assessing fire damage to a bridge.

The next three photos show BAER Geologist Dennis Veich while he and Forest Service Geologist Yonni Schwartz were measuring the depth of inundation (impacts) by the August 2 debris flow event at a bridge just above the confluence of Little Humbug Creek and the Klamath River in the McKinney burned area.

Another BAER specialist who conducted field surveys within the McKinney and Yeti burned areas to assess habitat conditions of critical aquatic species was Forest Service Fisheries biologist Maija Meneks. She captured these next photos during her August 19, 2022, burned area assessment.

This photo shows Vesa Creek looking up-canyon from County Road 8J001 where creek temporarily diverted from the original stream channel, crossing the road.

This next photo is a Humbug Creek area that is a typical example of a side drainage area that was overwhelmed by the August 2 storm event. A primary culvert under the county road was also plugged. The culvert in this photo is a high relief culvert (relieves surface water runoff from roadside ditches to prevent excessive water volume and velocity).

Below is an example of a severely soil burn severity riparian area in Humbug Creek between Lawson Gulch and Sucker Creek.

Here is a riparian area of Humbug Creek just downstream of Eliza Gulch that has an unburned to low soil burn severity which also includes most of the creek's tributaries. There is no sign of sediment impact beyond what is considered normal for this drainage despite evidence of elevated flows from the August 2 rainstorm event.

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/.*