NOGAL CANYON POST-FIRE BAER SOIL BURN SEVERITY MAP RELEASED

USDA Forest Service Burned Area Emergency Response (BAER) is a multi-disciplinary team that assesses post-fire impacts on federal lands following significant wildfires. The role of the assessment team is to characterize fire effects within the burned area to identify imminent post-fire threats to human life, safety, property, infrastructure, and critical natural and cultural resources on NFS lands and recommend emergency response actions designed to mitigate identified risks.

The Nogal Canyon BAER assessment team coordinated early with other local and federal agencies such as county and state officials, Natural Resources Conservation Service (NRCS), National Weather Service (NWS), and USDOI Geological Service (USGS) to share information about burned watershed conditions and their predicted response during certain rain events.

After the team’s assessment of the Nogal Canyon burned area, Lincoln National Forest land managers will establish a separate BAER Implementation team to implement the protective and stabilization treatments that have been approved by the Forest Service Regional and National offices.

The team began their assessment immediately after the fire threat passed. Their focus was on direct effects to the burned landscape caused by the fire, rather than from fire suppression activities which are the responsibility of the Incident Management Team assigned to the fire. Post-fire effects such as loss of vegetation and change in soil stability commonly increase the likelihood of threats that include accelerated soil erosion, increased sediment delivery, flooding and debris flows.

BAER specialists recently completed their field data evaluation to produce the Soil Burn Severity (SBS) map for the approximately 419-acre Nogal Canyon Fire (number of acres analyzed by the BAER team on April 23, 2022—total number of acres may have changed since that date). The map and the data delineate Unburned, Low, and Moderate SBS categories. The BAER team assessing the Nogal Canyon Fire determined that no acres were identified as having high SBS conditions. Across the Nogal Canyon burned area, approximately 91% of the fire is either Unburned and/or Low SBS, while 9% sustained a Moderate SBS.
It is important to note the SBS map product is an estimate of fire effects on soils and not direct effects to vegetation. SBS characterizes the soil surface and below-ground impact, whereas effects on vegetation are estimates of mortality based primarily on changes in vegetation canopy. Changes in overhead and understory vegetation canopy are often used as initial indicators of overall burn severity, but do not necessarily coincide with SBS.

Changes in soil cover, water repellency, and soil physical/biological conditions guide the interpretations to determine the severity burn level of the soil. Water repellency can occur naturally in soils and it changes as a function of fire. It is frequently discussed as a post-fire effect. Fire can increase the strength and thickness (or depth) of water repellent layers in soil, considerably affecting post-fire water runoff and possibly extending time for recovery of the burned area.

Low SBS occurs from partial consumption of fine fuels 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 years. Low SBS generally indicates a low to very low risk. Lower risk for accelerated runoff, erosion, flooding, and debris flows within and below these areas compared to moderate and high SBS areas.

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. The extent of scorched leaves on trees and shrubs is limited to riparian areas and some high elevation hillslopes. Shrub canopy removed by fire in moderate and high SBS areas varies and can reflect a range in mortality from high to low, which is why a closer look at the ground is required to determine the SBS level. 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. Canopy only exists in several of the low and moderate SBS mainstem channel riparian areas. Recovery of burned understory vegetation in these areas can take 3-to-5 years thereby increasing the short-term potential for post-fire threats.

For the Nogal Canyon burned area, no acres were identified by the BAER team to be high SBS which is 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 the pre-fire soil cover and ground fuels have been consumed. The surface mineral soil structure can be reduced to powder (single grain) sometimes several inches thick with a continuous cover of white or gray ash. The fine and small roots of shrubs and grasses tend to be completely consumed. Water repellency does not exist at the surface because the organic materials have been vaporized and forced downward into pore spaces and voids between soil particles below the damaged soil surface.

For high SBS areas, soil water repellency (SWR) layers tend to be stronger, thicker and occur deeper compared to moderate SBS. Fire induced SWR is a natural process where waxes are
released from vegetation via the burning process. The wax can coat soil particles thus preventing water infiltration. At shallow depths throughout the Nogal Canyon burned area, the BAER team found weak soil water repellency during its sampling of the burned soil.

Fire-adapted shrubs and vegetation such as bear clover, manzanita, and deer brush can sprout back within 2-to-3 years because of intact roots systems. However, seed sources for some grass species are consumed in High SBS which may take five or more years to re-establish to pre-fire conditions. Generally, there is 100% tree mortality in High SBS, and tree recovery will take many years without planting. In High SBS, the exposed bare soil is very prone to post-fire impacts. The damaged soil is very easily detached with rain events causing excessive soil erosion, resulting in higher volumes of sediment delivery to adjacent creeks and rivers. There is increased likelihood for flooding and debris flows. These threats can individually or cumulatively increase the risk to human life and safety, property, infrastructure, and important critical natural and cultural resources.

The Nogal Canyon BAER assessment team used preliminary remote sensing imagery with field-validated soils data to produce the final SBS map. The BAER team and the US Geological Survey (USGS) both use the SBS map as an analysis tool to estimate post-fire erosion with subsequent sediment delivery, stream flows and debris flow probabilities.

The Nogal Canyon Fire soil burn severity map can be downloaded at the “Nogal Canyon Post-Fire BAER” InciWeb site (https://inciweb.nwcg.gov/incident/8072/) as a JPEG or PDF version under the “Maps” tab.

**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: https://www.weather.gov/abq/.

Nogal Canyon Post-Fire BAER Assessment information is available at: https://inciweb.nwcg.gov/incident/8072/