Lake Fire Burned Area Summary

Burned Area Report

Fire Background

The Lake Fire is located in Santa Barbara County and burned onto two different Forest Service Ranger Districts on the Los Padres National Forest: the Santa Lucia Ranger District and the Santa Barbara Ranger District, as well as on state and private lands. The fire started in the late afternoon on July 5, in the Zaca Lake drainage area. Firefighters from the Los Padres National Forest and Santa Barbara County Fire responded to the vegetation fire near Zaca Lake that grew rapidly through grass and brush during a prolonged heat wave across the west coast. The Lake Fire ignition point was very close to where the Zaca Fire had started 17 years and 1 day earlier on July 4, 2007.

Santa Barbara County proclaimed a local emergency due to the Lake Fire, which threatened several communities including Santa Ynez and Los Olivos, as well as ranches, farms, homes, campgrounds, and State Highway Routes 154 and 176. The fire is located northeast of the city of Los Olivos, California.

As of August 13, the Lake Fire Information InciWeb page reports the fire as 90% contained at 38,664 acres (including small, unburned islands). However, the BAER team analyzed an additional 2,218 acres outside of the current fire perimeter for a total of 40,882 acres. The fire resulted in the loss of multiple structures (of various sizes) at six locations, all of which are on National Forest System (NFS) lands, and a temporary forest closure order. The cause remains under investigation.

While many wildfires cause minimal damage to the land and pose few threats to the land or people downstream, some fires result in damage that requires special efforts to reduce impacts afterwards. The Burned Area Emergency Response (BAER) program is designed to identify and manage potential risks to resources on National Forest System lands and reduce these threats through appropriate emergency measures to protect human life and safety, property, and critical natural or cultural resources. BAER is an emergency program for stabilization work that involves time critical activities to be completed before damaging events to meet program objectives.

The Forest Service (FS) assembled a BAER team on July 31, for the Lake and Apache Fires, while the soils, hydrology, geology team got an earlier start on their burned area surveys on July 28. This team of experts in various resource disciplines began assessing the post-fire effects to critical values on Forest Service lands.

The California State Watershed Emergency Response Team (WERT) began their assessment before the BAER team arrived and completed the soil burn severity (SBS) mapping.

This BAER assessment focuses on NFS lands and FS critical values as defined in FS BAER policy.

Impacts to the soil are the primary indicator of potential post-fire changes in watershed response, as well as watershed recovery. The team developed soil burn severity (SBS) maps to document the degree to which the fires had changed soil properties. Using the SBS map, physical scientists can predict erosion potential, changes to runoff and flood flows, and increased geologic hazards. Field evaluations and modeling results are used to determine relative increases in post-fire risk to different critical values and inform recommendations to address these increased risks.

Soils

Soil burn severity is not an assessment of vegetation consumption, but rather an integration of vegetation loss, changes in soil structure and infiltration capacity, remaining vegetation, duff, or ash, and soil color, all of which may indicate relative degrees of soil heating.

The final soil burn severity maps were developed with ESRI ArcGIS software using satellite-imagery-derived Burned Area Reflectance Classification (BARC) and field survey data. Field work included assessment of ash characteristics, ground cover, root condition, soil structure, soil water-repellency, and vegetation burn severity as described in the Field Guide for Mapping Post-fire Soil Burn Severity (Parsons et al. 2010). High burn severity is characterized by a complete consumption of organic material with the surface layers of the soil resulting in a change to single-grain structure. Fine roots are commonly charred or consumed 3-5 cm deep. The highest-severity areas often have a loose, dusty appearance, and no longer have any cohesion or soil strength. Generally, there will be less destruction of soil organic matter, roots, and structure in an area mapped as moderate compared to high. In areas mapped as moderate SBS, soil structure, roots, and litter layer may remain intact beneath a thin ash layer. Low soil burn severity results in very little alteration of soil organic matter and little or no change in soil structural stability.

Mapped and validated SBS for the burned area is High (1%), Moderate (29%), Low (59%), and Very Low/Unburned (11%) (see map on the last page of this document). The more severe a fire's effects are on the soil, the more likely those soils will erode in subsequent rainstorms – especially in locations with steep slopes. Erosion after fires can cause tremendous damage to homes and other structures in the years after a fire.

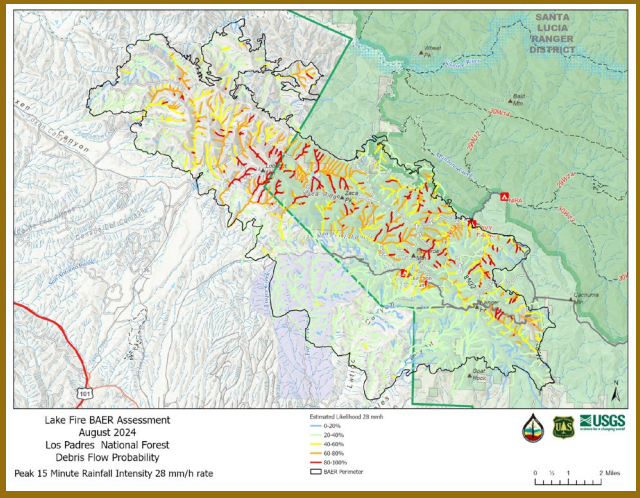
Developed areas (both urban and rural) were not mapped for soil burn severity. This method has been developed for wildland vegetation and landscapes and therefore is not appropriate for describing effects of fire on developed lands and burned structures. As such, these areas were not visited or evaluated by the BAER team.

Geology

The team identified the geologic conditions and processes that have shaped and altered the watersheds and landscapes and assessed the impacts from the fire on those conditions and processes that could affect downstream critical values. Using the understanding of rock types and characteristics, geomorphic processes, and distribution of geologic hazards helps predict how the watersheds will respond to and be impacted by upcoming storms.

Geological hazards in the Lake Fire burn area include rock-fall, debris, debris flows, hyper-concentrated flows. These hazards are most likely to occur in watersheds that have steep slopes, experienced moderate-high soil burn severity, significant amounts of stored sediment, and loose rocks on slopes and in channels.

The team provided soil burn severity field data to the US Geological Survey (USGS) Landslide Hazard Program to assist in forecasting the probability, potential volumes, and hazards of debris flows through their developed empirical models.



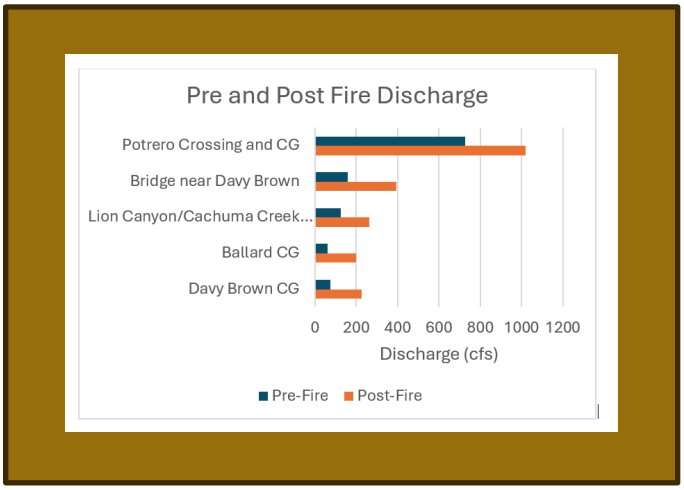
USGS Debris-Flow Probability Map

The USGS Post-fire Debris-Flow Hazards Model did not consider the parent material for the geological unit where the Lake Fire is located. Thus, for this fire, in many places, the USGS model tends to over-estimate the potential for debris-flow hazards. Much of the burn area overlies the Monterey Shale geologic unit which naturally degrades into "chip" sized clasts versus producing

large boulders typical in a classic debris flow. Even though post-fire destructive debris flows are not expected in most areas impacted by the fire, because of potential short duration/high intensity rainstorms and the geology type, hyper-concentrated flows are predicted. High flows, including hyper-concentrated flows present a threat to human-life and safety in and below the Lake Fire burn scar.

Hydrology

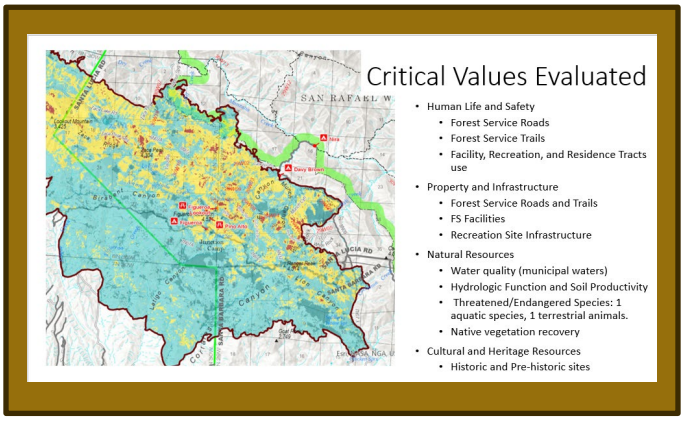
Primary watershed response is expected to include an initial flush of ash and burned materials, erosion in drainages and on steep slopes in the burned area, increased peak flows and sediment transport and deposition, flooding, sediment-laden flows, and debris flows. Watershed response is dependent on the occurrence of rainstorms and rain-on-snow events and will likely be greatest with initial storm events. Increased watershed response is most likely in areas with high to moderate soil burn severity. Disturbances will become less evident as vegetation is reestablished, providing ground cover that reduces erosion and increases surface roughness which slows flow accumulation and increases infiltration.



A rapid hydrologic assessment suggests that due to fire-induced hydrophobic soils and loss of stabilizing vegetation, BAER hydrologists anticipate increases in overland flow and flooding potential. Roads will likely be impacted due to burn and steep slopes. Water crossings may also be impacted from increased flooding, sediment-laden flows, and debris flows. Campgrounds (Ballard, Davy Brown, Potrero, Horseshoe Bend, Coldwater) may experience flooding, especially camp sites close to creeks, streams, and rivers.

The BAER assessment also suggests that potential values at risk from increased flooding and erosion are human life and safety in campgrounds, roads and trails (including crossings), infrastructure (roads, bridges, other structures) within and below the Lake Fire burned area, water quality, hydrologic function, and threatened and endangered species (TES—3 aquatic species, 1 terrestrial animal species).

Critical Values



The first critical value BAER teams assess is always human life and safety on National Forest System lands. During and after heavy rainstorms, Forest Service employees and visitors to National Forest System Lands could be threatened by floodwaters and debris flows. In addition, users of roads within and downstream of the burned areas may be affected by road washouts during and after heavy rainstorms. The National Weather Service can establish an early warning alert plan for areas that are potentially at risk from these events. The BAER team recommends general warning signs and communications to travelers on any National Forest System roads and trails within or directly adjacent to the Lake Fire.

Special attention and caution is recommended in areas where people are traveling through, working or recreating below or in the Lake Fire burned areas during or after storm events. In addition to other specific BAER treatments, the BAER team recommended closures of potentially affected Forest Service roads, trails, and some campsites during rainstorm events. Specifically, the team recommended multiple closure types such as anywhere hazard trees are located along trails or near campsites (closed until mitigated), hazmat areas (closed until mitigated), campgrounds, and trails at risk from increased watershed response (seasonal closure), and general burn area (conditional closure).

Other threats of concern within the Lake Fire burned area are due to burned hazardous materials (hazmat) because of potential exposure to the hazardous materials that can cause illness in humans. The areas of concern are the Pino Alto picnic site, Red Rock Mine, Figueroa Mountain Campground, Figueroa Fire Station (burned pump house and spring box), and Figueroa Recreation Residences (burned structures).

The team also recommended signs and patrols to enforce closure, and a new gate on Figueroa Mountain Road to enforce the closure for human life and safety threats.

Roads and Bridges

Roads in and downstream of burned areas are at risk of damage due to post-fire conditions. The most likely threat due to the fires is clogging of culverts, bridges, and other in-channel infrastructure from the higher levels of floatable debris (especially burned trees) in burned watersheds. Once blocked by debris, road drainage structures no longer function and the stream flows over the road, often causing considerable damage and limiting access. Various measures can reduce this risk, including protecting culvert inlets with debris racks, removing large floatable debris from channels upstream of structures before floods, and making heavy equipment available and readily mobilized during storm events to keep structures clear of debris.

Debris flows are less likely than debris-laden flood flows, but they pose a greater threat to roads when they do occur and are difficult to mitigate.

Critical values addressed in the BAER report include Forest Service System Roads and related drainage features. Treatments for the protection of these human life and safety along these roads include road closures, inspection and response to maintain drainage control and protect egress, installation of drains/storm-proofing for 35 specific locations, a gate, and warning signs.

Recreation

National Forest System recreation infrastructure includes campgrounds, trails, and day use areas. Most of the recreation assets within the Lake Fire burned area relate to 3 picnic areas, 3 developed campgrounds, 4 dispersed camping areas, 12 motorized and non-motorized trails, and FS special use permitted recreation residences cabins. Similar to roads, recreation infrastructure could be damaged in post-fire storm events.

The team proposes trail drainage stabilization treatments, which include armoring and/or cleaning existing water control features and adding additional drainage features to provide additional capacity for elevated sediment laden post-fire runoff, closures, and warning signs because of potential threats from flooding, sediment-laden flows, rockfall, and hazard trees.

Botany

Invasive plants adversely affect native plant

communities through allelopathy (suppression of growth of a native plant by release of a toxin from a nearby invasive plant) and direct competition for water and resources. Over time, native plant diversity decreases as invasive plants expand, reducing habitat for native plant species and wildlife. Shifts from diverse native plant communities to non-native invasive plant dominance could alter future fire behavior, intensity, extent, and season of burning.

Current infestations are primarily located along roads, old dozer lines, campgrounds, and trails throughout the burned area, with interior areas being largely un-infested. However, the burned area creates conditions for invasive species to outcompete native plants. The team recommends a treatment of Early Detection, Rapid Response (EDRR) to monitor for noxious weed infestation and expansion in areas disturbed due to mechanical suppression activity and burned areas prone to new noxious weed infestations.

Cultural Resources

The most typical post-fire threats to cultural sites are physical threats such as erosion or damage from (now dead) falling trees. In some cases, newly exposed artifacts are threatened by human damaging activities such as looting or vandalism. Cultural resources were evaluated by the team and treatments proposed as necessary to protect these values from post-fire threats.

Anticipated Vegetation Recovery

Post-fire recovery varies greatly based on climate, vegetation types and burn severity. It is typical for recovery to take between 3-5 years for reestablishment of ground cover. The persistence of drought in the years following wildfires also delays the recovery time frame. Even with only a short period of time since fire containment, resprouting of trees and shrubs as well as emergence of forbs have been noted within the burned area.

Non-Forest Service Values

Since fire effects know no administrative boundaries, additional threats exist for assets not owned or managed by the Forest Service. Post-fire emergency response is a shared responsibility. There are several Federal, State, and local agencies that have emergency response responsibilities or authorities in the post-fire environment. The BAER team and local unit BAER Coordinator engaged with interagency partners to facilitate consideration of off-Forest values. BAER reports are shared with interagency cooperators such as California Office of Emergency Services (CalOES), NRCS, **California State Watershed Emergency Response Team (WERT)**, and counties who work with downstream private home and landowners to prepare for potential post-fire flooding and debris flow impacts. The WERT (CalFire is the lead agency and WERT works with communities) and Forest Service BAER teams coordinate the assessment of the burned area to ensure post-fire threats are identified.

Conclusion

There are multiple phases of post-fire actions after a wildfire covering suppression repair through long-term recovery. BAER is the rapid assessment of burned watersheds by a BAER team to identify imminent post-wildfire threats to human life and safety, property, and critical natural or cultural resources on National Forest System (NFS) lands and take immediate actions to implement emergency stabilization measures before the first major storms. The BAER team identified imminent threats to critical values based on a rapid assessment of the area burned by the Lake Fire. The assessment was conducted using the best available methods to analyze the potential for damage from post-fire threats, including flooding and debris flows. The findings provide the information needed to prepare and protect NFS critical values against post-fire threats. The recommended BAER treatments in this report are not yet approved or funded. Because of the emergency nature of BAER, initial requests for funding of proposed BAER treatments are supposed to be submitted by the Forest Supervisor to the Regional Office within 7 days of total containment of the fire. The Regional Forester's approval authority for individual BAER projects is limited.

Approval for BAER projects exceeding this limit is forwarded onto the Washington Office.

BAER treatments cannot prevent all the potential flooding or soil erosion impacts, especially after a wildfire-changed landscape. It is important for the public to stay informed and prepared for potentially dramatic increased run-off events. Many burned-area watersheds were already hydrologically responsive to rainfall and prone to erosion and sediment transport prior to the fire and will likely be even more responsive due to post-fire conditions. However, vegetation recovery is anticipated to be rapid with ground cover approaching pre-fire conditions within 1-3 years, which will attenuate any post-fire effects on watershed processes. The Forest Service will continue to provide information and participate in interagency efforts to address threats to public and private values resulting from the Lake Fire. Information can be found on-line at Calpf Lake And Apache Postfire Baer Information | InciWeb (wildfire.gov).

The Forest Service will continue to work towards long-term recovery and restoration of the burned area in coordination with efforts to rebuild and restore the communities affected. A vegetation burn severity map, or mortality map, may be produced as a part of the recovery efforts to help other scientists, such as wildlife biologists, botanists, and silviculturists understand what to expect from this changed landscape for wildlife habitat, invasive weeds, timber salvage, and reforestation needs.

Local Forest Service Leadership

Benjamin Gray, Los Padres National Forest, Santa Lucia District Ranger – benjamin.gray2@usda.gov

Daryl Hodges, Los Padres National Forest, Santa Barbara District Ranger-- daryl.hodges@usda.gov

Local Forest Service BAER Coordinator

Jonathan/Yonni Schwartz, Los Padres National Forest -- jonathan.schwartz@usda.gov

References: Parson, Annette; Robichaud, Peter R.; Lewis, Sarah A.; Napper, Carolyn; Clark, Jess T. 2010. Field guide for mapping post-fire soil burn severity. Gen. Tech. Rep. RMRS-GTR-243. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p. (https://www.fs.usda.gov/rm/pubs/rmrs_gtr243.pdf)

SEE LARGER PDF MAP AT:
[2024 Lake BAER Soil Burn Severity 11x17 Public.pdf (inciweb-prod-media-bucket.s3.us-gov-west-1.amazonaws.com)]