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USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Sierra National Forest | July 2024

Basin Fire Burned Area Summary (DRAFT)

Burned Area Report

Fire Background

On June 24, 2024, the High Sierra Ranger District of the Sierra National Forest, was in the path of a lightning storm that created 18 fires. An additional fire, and by far the largest, is the Basin Fire, which was detected on June 26, 2024. The fire traveled in a northeast direction toward Black Rock at a rapid rate.

Air resources from the surrounding 18 fires on the High Sierra Ranger District were reassigned to the Basin Fire. Aircraft was utilized to slow the rate of spread. The cause of the Basin Fire is currently under investigation.

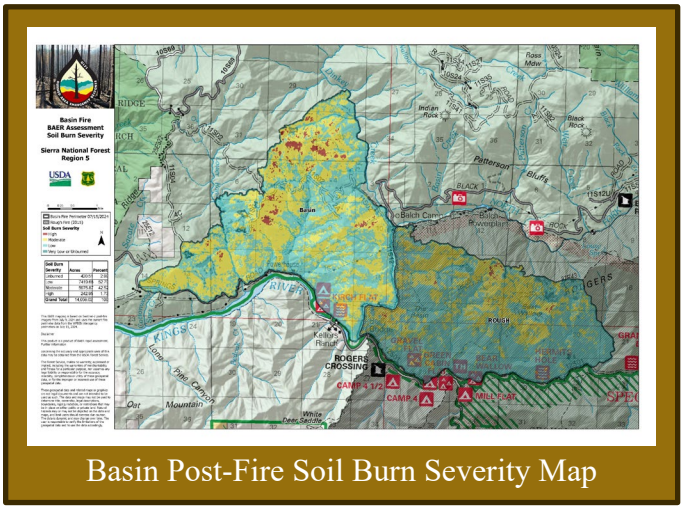
Over a hundred firefighters initially responded to the Basin Fire. Hot Shots, hand crews, dozers, and engines focused on point protection for structures in the Balch Camp area. Resource orders were placed to mobilize more forces, to not only focus on the initial attack of the Basin Fire, but to also continue suppressing the 18 other fires that are on the ranger district.

The fire is located at 2,000-4,500 feet elevation, northeast of Pine Flat Lake, west of the Spanish Mountain, south of Forest Service Black Rock Road (11S012) and north of the South Fork of the Kings River, east of Pine Flat Reservoir, and 46 miles east of Sanger.

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 assembled a BAER team on July 14, 2024, for the Basin Fire. This team of experts in various resource disciplines began assessing the post-fire effects to critical values on Forest Service lands. Impacts to the soil are the primary indicator of potential post-fire changes in watershed response, as well as watershed recovery. The team developed a soil burn severity (SBS) map to document the degree to which the fire 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.



Basin Post-Fire Soil Burn Severity Map

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 (2%), Moderate (42%), Low (53%), and Very Low/Unburned (3%) (see map on [insert page number]). 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.

The BAER team SBS findings include: The 2015 Rough Fire burned the east of Balch Camp resulting in the fire dominated by Low SBS; the headwaters of Sycamore Springs Canyon burned at High and Moderate SBS significantly increasing the risk of watershed processes; drainages above the residences in the west Balch area were completely burned, thereby, increasing flood risks; and all drainages above Trimmer Springs Road were significantly burned.

Summary of SBS include: SBS was tempered by reduced fuel loading from the Rough Fire and the Oak Savannah plant communities with lower fuel loads; soil erosion rates are relatively high due to steep slopes in the burned area; soil erosion will lead to localized sediment delivery to Kings River and Dinkey Creek; sediment delivery to channels will contribute to flow bulking and debris flows; high soil erosion rates and areas with moderate and high SBS will slow vegetation recovery but recovery will begin after the first wetting rain; and water repellency was moderate and discontinuous on this 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.

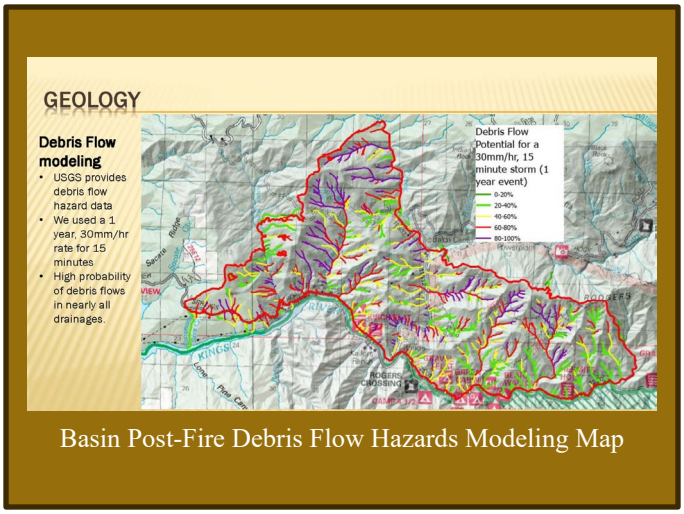
Geology

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.

Debris Flows are fast-moving landslides that carry rock and woody material. They are a significant risk to health and property. Rock fall occurs on steep slopes. The BAER team found that debris flows and rock fall to be pervasive risks where infrastructure is built, and people congregate or travel.

The team provided soil burn severity field data to the US Geological Survey Landslide Hazard Program to assist in forecasting the probability, potential volumes, and hazards of debris flows

through their developed empirical models. The USGS Post-Fire Debris Flow Hazard Model map is shown below.



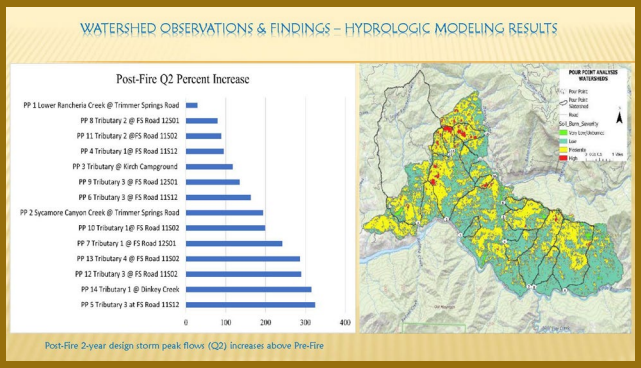
Basin Post-Fire Debris Flow Hazards Modeling Map

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, 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.

Analysis watersheds were selected to determine flooding/sedimentation threats to identified critical values. Fourteen (14) watersheds were selected for hydrologic modeling. Pour Points are located where water exits the selected watersheds. Levels of soil burn severity (acres) are used to model increased post-fire runoff and bulking.

The BAER team's rapid hydrologic assessment findings include: an estimate of moderate to high hydrologic response post-fire with up to 325 percent increase over pre-fire discharge for a two-year modeled storm; steep to very steep burned drainages have existing sediment/ash/loose rock that can be rapidly mobilized downstream; localized water quality will be affected. This will likely lead to increased water quality concerns for municipal and domestic drinking water providers within and downstream of the fire; forest roads, trails and developed sites could be damaged by flooding, soil erosion and sedimentation post-fire; a life and safety threat exists to the public if in the fire area during storm events; and sediment and debris accumulations from slopes and channels could block access on roads.



Watershed Post-Fire Hydrologic Modeling Results for a 2-year storm

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 and temporary area closure signs, gates, and

communications to travelers on any National Forest System roads and trails within or directly adjacent to the Basin Fire.

In addition to specific treatments, the BAER team recommends mitigation actions to protect the Kings River water quality and prevent the movement and release of "hazardous waste" from vault toilets located at Bear Wallow and Kirch Flat campgrounds, road and trail stabilization, and storm inspections and response actions, and early detection-rapid response (EDRR) activities to survey and control invasive non-native plant populations.

Campground Vault Toilet in Basin Burned Area

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 roads include restore drainage by road grading, cleaning culverts, and ditch cleaning to allow water to drain off the road during storm events; and armor drainage at existing crossings to reduce road failure and reduce impacts downslope of road to protect fish habitat and water quality.

Recreation

National Forest System recreation infrastructure includes campgrounds, trails, and day use areas. Most of the recreation assets within the Basin Fire burned area relate to potential risks to campgrounds and trails. 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. The team also recommends a temporary seasonal closure for Kirch Flat campground, the placement of K-Rails (large concrete barriers), and the pumping of campground vault toilets to protect water quality and prevent the movement and release of "hazardous waste" from vault toilets

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, dozer and hand lines, campgrounds, and trails throughout the burned area, with interior areas being largely un-infested.

Vegetation recovery in fire suppression activity areas has the probability of damage or loss due to establishment of destructive invasive weeds as likely. The magnitude of consequences is moderate. Therefore, the risk is high.

While vegetation recovery for the burned slopes within the Basin Fire is considered to have a likely probability of damage or loss. The magnitude of consequences is moderate, because spread and establishment of invasive weeds could have long term negative effects on re-establishment of native vegetation that protects the steep slopes within the Basin Fire. The resulting risk is considered high.

The highest risk is from equipment and vehicles moving weed seeds from roadsides to fire lines based on Basin Fire resource advisors (READs) BAER specialists consulted. 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.

Federally Listed Species - Wildlife and Fisheries

There are no endangered species within the Basin Fire area. However, the Western Pond Turtle in Sycamore Springs Creek has been proposed for Threatened and Endangered (T&E) listing.

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

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 Sierra National Forest BAER Coordinator has engaged with interagency partners to facilitate consideration of off-Forest values covered through other programs with the relevant responsible entities.

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 lands and take immediate actions to implement emergency stabilization measures before the first major storms. The BAER team has identified imminent threats to

critical values based on a rapid assessment of the area burned by the Basin 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 National Forest System critical values against post-fire threats. The recommended BAER treatments in the team's assessment 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 Basin Fire. Post-Fire information can be found on-line at Casnf Basin 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

Dean Gould, Sierra National Forest Supervisor

Local Forest Service BAER Coordinator

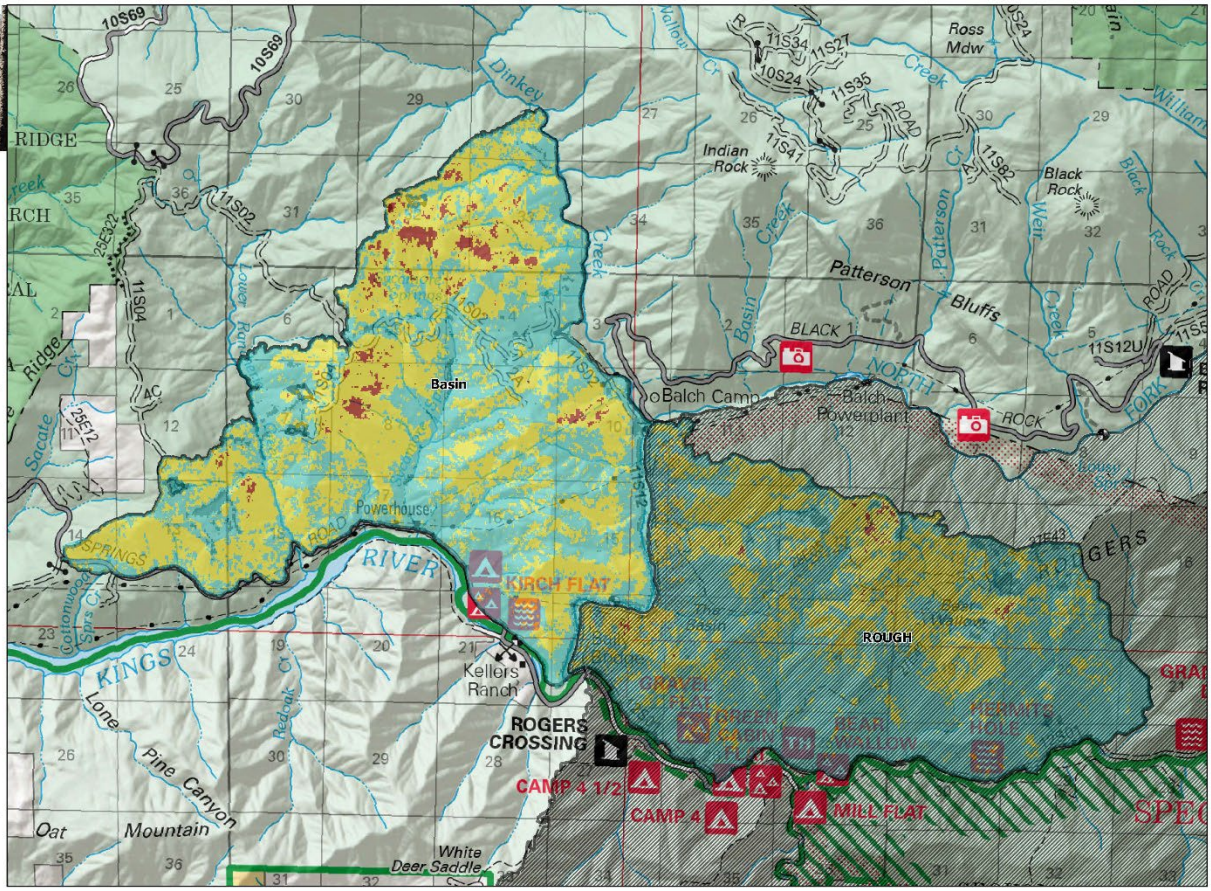
Pablo Gonzalez, Sierra National Forest BAER Coordinator

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)

Basin Fire
BAER Assessment
Soil Burn Severity

Sierra National Forest
Region 5



Soil Burn Severity	Acres	Percent
Unburned	420.51	2.99
Low	7419.68	52.78
Moderate	5975.87	42.52
High	242.95	1.73
Grand Total	14,059.02	100

This BAER mapping is based on Sentinel-2 post-fire imagery from July 9, 2024 and uses the current fire perimeter data from the WFDSS interagency perimeters on July 11, 2024.

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