

# South Fork Fire Burned Area Summary

## Burned Area Report

### Fire Background

The South Fork and Salt fires started on Mescalero Apache lands on June 17, 2024, and spread onto the Smokey Bear Ranger District of the Lincoln National Forest, burning a total of 17,066 and 7,688 acres respectively, including 5,843 acres of National Forest System (NFS) lands (5,822 on South Fork and 18 on Salt). Because the amount of NFS lands burned by Salt is minimal, this report is focused solely on the South Fork fire.

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 Forest Service Burned Area Emergency Response (BAER) program is designed to identify and manage potential risks to resources on NFS 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 and Bureau of Indian Affairs (BIA) assembled an interagency BAER team between June 22-26, 2024. Team members immediately began field assessments, including verification of soil burn severity and inventory of critical values on NFS and BIA lands. Importantly, working in an interagency environment, the soil burn severity (SBS) maps and hydrologic modeling were shared products. The two teams then split into separate BAER “dens” (workspaces) to conduct their own risk assessments to critical values, finalization of specialist reports, crafting of recommended treatments, and preparation and submittal of funding requests.

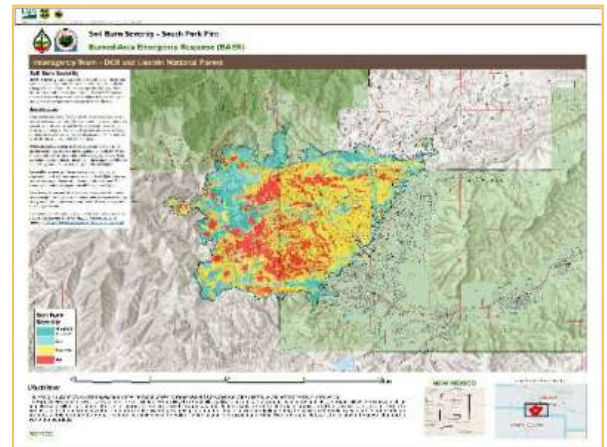


Figure 1: South Fork Fire Soil Burn Severity Map

The Forest Service’s team of experts from various resource disciplines assessed 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 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. 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.

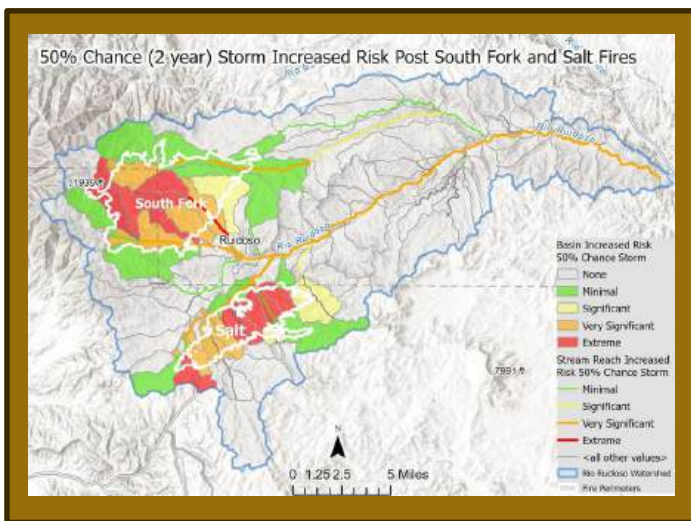
### Soils

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 SBS 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 SBS 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 20%, Moderate 46%, Low 23%), and Very Low/Unburned 11% (Figure 1). 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.

## 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, sediment transport and deposition, and increased probability of debris flows. With the storms in late June, in many areas of the South Fork fire this initial flush has already occurred.

Watershed response is dependent on the occurrence and intensity of rainstorms and will likely be greatest with initial storm events. Areas below the burn scar will experience increased flash flooding risk for at least 2 years or more, depending on watershed recovery post-fire. Increased watershed response is most likely in areas with high to moderate SBS. Watershed recovery time will depend on precipitation and land management practices. As the watershed recovers, increases in peak flows in response to a given precipitation event will decline as vegetation reestablishes, providing ground cover that reduces erosion and increases surface roughness that slows flow accumulation and increases infiltration. Post-fire conditions will likely lead to increased water quality concerns for municipal and domestic drinking water providers within and downstream of the fire.

A rapid hydrologic assessment suggests that most (59%) of areas modeled within the burn scar have very significant or extreme changes in peak flows pre- to post-fire. For most basins, a 50% chance (2-year) storm over the burn scar will now produce flows like the 20% chance (5-year) storm pre-fire. In two areas, Cedar and Perk Canyons, the 50% chance storm now produces flows like the 4% (25-year) storm pre-fire. In other words, in these two areas, the 25-year event now has a 50% chance of occurring in any given year instead of a 4% chance.

## Critical Values

The first critical value of BAER team's assessment is always human life and safety on NFS lands. During and after heavy rainstorms, Forest Service

employees and visitors to NFS 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 NFS roads and trails within or directly adjacent to the fire.

In addition to specific treatments, the BAER team recommends the removal of “danger trees” (fire-killed trees) in areas where crews will be working to implement identified treatments.



*NFSR 127A Roadway Embankment Erosion*

## 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 NFS roads and related drainage features. Treatments for the protection of these roads include stabilization and armoring of roadway embankments located at drainage crossings, three in total, to prevent roadway failure. Removal of accumulated debris in affected drainages will also be considered so they can continue to function as intended and direct stormwater flows away from Forest Service Road 127A.

## Recreation

NFS recreation infrastructure includes campgrounds, trails, and day use areas. Most of the recreation assets in the South Fork fire area provide recreation opportunities to the local Ruidoso communities and visitors for camping, picnicking, hiking, or biking. Like roads, recreation infrastructure could be damaged in post-fire storm events.

The team proposes trail drainage stabilization





treatments on system trails in the Cedar Creek area, 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.

Sam Tobias Group Campground, Oak Grove Campground, and Cedar Creek Picnic Area all experienced damages and losses from the fire. Additional damages occurred at Sam Tobias Group Campground and Cedar Creek Picnic Area in post-fire flooding due to increased runoff. Emergency treatment recommendations for these sites include facility safety work to clean and remove recreation facilities that were damaged or destroyed in the fire.



*Figure 2: Recreation facility damaged during the fire at Sam Tobias Group Campground*

### **Non-Native Invasive Plant Species**

Invasive plants may 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.

*Musk thistle bloom*

Current infestations are primarily located along roads, and trails throughout the burned area, specifically in Spring Canyon and along Ski Run Road. The interior areas of the burned area are largely un-infested. The primary documented non-native invasive plant species is musk thistle, also known as nodding plumeless thistle, followed by bull thistle and teasel. 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. This will consist of monitoring and treatment of suppression lines put in as well as monitoring of known infestation sites.



### **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. The heritage resources within the South Fork fire scar were assessed by a qualified archeologist. Based on this analysis the team recommends hand seeding affected sites with a high elevation seed mix. This treatment will help to stabilize the soils in and around the heritage resource effectively reducing post-fire erosional effects. Simultaneously this treatment provides vegetation to conceal the site. In addition, biodegradable erosional fabric is recommended for heritage resources experiencing post-fire wash in

areas with steeper slopes. This treatment will reduce erosion and wash of artifacts and features important to the site's integrity. Lastly the team recommends that these cultural resources be monitored for treatment success. This will allow us to assess the effectiveness of the treatment on the cultural resource over a three-year period, providing critical data for future treatment implementation.

#### **Federally Listed Species - Wildlife and Fisheries**

The South Fork fire is within the current range of the Mexican spotted owl (MSO) and its designated critical habitat, as well as recovery habitat as identified in the 2012 MSO Recovery Plan. Threats include additional loss of habitat in the fire area due to blowdown, mass soil movement, flooding, invasive species and insects and disease. Aerial seeding and mulching is proposed in conjunction with the hydrological and soils proposals for protection of the designated critical habitat and related BAER critical values at risk.

*Mexican spotted owl pair in a low-to-unburned severity site within the South Fork perimeter.*

#### **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, emergence of forbs has been noted within low severity burn.

#### **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 assessment team and local unit BAER Coordinator engaged with interagency partners to facilitate consideration of off-Forest values covered through other programs with the relevant responsible entities.

#### **Partner Agencies:**

Mescalero Apache Tribe

New Mexico Energy and Natural Resources Department, Forestry Division, Capitan District

Lincoln County Office of Emergency Services (OES)

Village of Ruidoso

Natural Resource Conservation Service (NRCS)

#### **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 identified imminent threats to critical values based on a rapid assessment of the area burned by the South Fork and Salt Fires. 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 critical values against post-fire threats. Each agency is only permitted to treat for critical values within their jurisdictional lands. However, through the interagency approach employed, all agencies and partners are prepared to treat for critical values on their respective lands. 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 Forest Service 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. The Forest Service will continue to provide information and participate in interagency efforts to address threats to public and private values resulting from the South Fork fire. Information can be found on-line at [Nmmea South Fork And Salt Fires Burned Area Emergency Response Information | InciWeb \(wildfire.gov\)](https://www.nmfs.gov/nmmea-south-fork-and-salt-fires-burned-area-emergency-response-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**

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### **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](https://www.fs.usda.gov/rm/pubs/rmrs_gtr243.pdf))

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