

Northern Region
Burned Area Emergency Response (BAER)
 Post-Fire BAER Assessment



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GOAT CREEK & SLIDEROCK POST-FIRE BAER ASSESSMENT REPORT SUMMARY



FS-2500-8 Burned-Area Report: Watershed Analysis, Condition, and Response

The Goat Creek and Sliderock Fires, ignited by lightning on July 19, and July 13, 2017, respectively, are located on the [Lolo](#) National Forest (NF), in the John Long Mountains, approximately 25 miles southeast of Missoula, Montana. The two fires along with the Little Hogback Fire were managed as the [Sapphire Complex](#). The fires were managed for full suppression since its start, but steep rocky terrain, high temperatures, dry conditions, low relative humidity, high pre-existing tree mortality, and gusty winds promoted fire spread. As of September 21, 2017, the Goat Creek Fire burned approximately 8,330 acres and the Sliderock Fire burned approximately 917 acres. Together, the fires burned 9,082 acres on Forest Service System (NFS) land, and 163 acres on private land.

The fire areas include a variety of vegetation types that are aspect, elevation, and slope dependent. The dominant vegetation types within the burned area are open grasslands, mixed conifer stands dominated by lodgepole pine, Douglas-fir and subalpine fir with a moderate dead/down component from beetle kill. Rock outcrops are common throughout the Rock Creek drainage in both timbered and open, grassland areas.

The burned area was surveyed and assessed by a BAER team comprised of Forest Service scientists and specialists. The BAER team evaluated the burned watersheds to determine post-fire conditions, and identify values-at-risk such as threats to human life and safety, property, and critical natural and cultural resources. In addition to these critical values, other threats were also assessed, such as the risk for increased post-fire flooding, sediment flows, rock slides, hazard trees and noxious weed spread.

The BAER assessment team's analysis of the burned area and recommended emergency treatments are documented in a Forest Service (FS) Burned-Area 2500-8 Report. This report was submitted to the Northern Region (Region 1) Regional Forester by the Forest Supervisor for the Lolo NF for review and funding.

The following is a summary of the BAER team's burned area assessment report for both fires:

- 3 sub-watersheds were analyzed and modeled to compare pre-fire conditions to post-fire predicted response: Brewster Creek, Kitchen Gulch-Rock Creek, and Harvey Creek.
- There are 13 miles of perennial stream, and 15 miles of intermittent/ephemeral streams.
- There are 18.7 miles of NF system roads, 22.2 miles of NF non-system roads, and 4.5 miles of NF trails.
- There are 7,027 acres with very severe hazard ratings for soil erosion, 355 acres with severe hazard ratings for soil erosion, 1,526 acres with moderate ratings for soil erosion, and 114 acres with slight hazard ratings for soil erosion. Elevated soil erosion hazard is only applicable for the first few years following a wildfire - until revegetation occurs to stabilize the slopes.
- The fire burned in a mosaic fashion with 13% of the burned area experiencing high and moderate soil burn severity. The rest of the burned areas within the fire perimeter were either low soil burn severity or unburned. There are about 3,304 (36%) unburned acres, 4,694 (51%) acres of low soil burn severity, 1,131 (12%) acres of moderate soil burn severity and 116 (1%) acres of high soil burn severity.
- There are 1,247 acres of water repellent (hydrophobic) soils scattered around the fire area. Hydrophobic soil conditions are common within moderate and high burn severity areas and rare in the low burn severity areas.

Hydrophobic soil conditions may be the result of two processes; the first is a natural accumulation of waxy resins at the soil surface as plant litter and organic material decomposes. The second is a result of hot temperatures volatilizing organic compounds, destroying soil structure and redepositing water-resistant compounds deeper in the soil profile, and is common of areas of high and moderate severity burn. Increased run-off due to hydrophobic conditions is reflected in the peak flow analysis of the watersheds. Hydrophobic layers usually take 6 months to 2 years to break down. Plant root development, soil microbial activity, and freeze-thaw cycling all contribute to the degradation of hydrophobic conditions. Rains in September and October have started the breakdown of the hydrophobic layer. Recovery of pre-fire slope stability and watershed hydrologic response is dependent on many factors and typically occurs within 3-5 years following the fire. Recovery of high burn severity areas is slower because little or no vegetative ground cover remains and soils may be susceptible to erosion.

The different soil burn severity categories reflect changes in soil properties and are a key element BAER specialists use to determine if post-fire threats exist. The distribution of unburned, low, moderate, and high soil burn severity levels become a baseline for resource specialists to monitor changes in soil hydrologic function and vegetative productivity as the burned watersheds recover.

High and moderate soil burn severity categories often have evidence of severe soil heating and the consumption of organic material. Soil seedbank and water infiltration characteristics are reduced in areas that have burned at high or moderate severity. Natural recovery is slower where little or no

vegetative ground cover remains, and increased surface water runoff will result in increased soil erosion at these sites. Areas of moderate soil burn severity may have viable roots and some soil cover, but may still be vulnerable to erosion on steep slopes. The low to very low soil burn severity areas still have good surface soil structure, intact fine roots and organic matter, and will recover more quickly as revegetation begins very soon after the fire and the soil cover is re-established.

Field observations and modeling of the burned area support a general trend of increased flows, sedimentation, and erosion due to post-fire effects especially in sub-watersheds with the most burned acres, specifically moderate and high soil burn severity, high erosion hazard ratings, and the steepest slopes. Areas most at-risk from post-fire flooding, erosion, and sedimentation are within the burn area or within close proximity to the burn area, although some sites outside of the burn perimeter that are down slope or downstream of the burn area are still at-risk from increased post-fire effects. Ash transport into area streams is virtually guaranteed to occur several times before plant re-growth stabilizes the soil.

Identified Values-at-Risk, Threats, and Emergency Conditions

Long duration (6+ hours), high intensity storms are the precipitation events of primary concern. Based on historic precipitation patterns, these types of events are likely to occur in the spring months following the fire. The risk of flooding and erosional events has increased as a result of the fire, creating hazardous conditions within and downstream of the burned area. Additional threats originating from the destabilized hillslopes throughout the burned area include falling trees and rolling rocks.

Emergency post-fire conditions for the Goat Creek and Sliderock Fires were identified by the BAER team for the following on-forest values-at-risk:

- **Human Life and Safety**: There are high risks to the safety of forest recreating visitors and Forest Service employees within and downslope of the burned area. Generally, increased risk occurs within or directly downslope from high and moderate soil burn severity areas. Potential threats exist along roads, trails, trailheads, parking areas, and other recreation areas. Risks for the general public include flooding, debris flows, rolling rocks, falling debris, falling trees, and loss of ingress/egress access.
- **Property**: There is a high risk to the road infrastructure along the Brewster Creek Road (NFS Road 308) and an intermediate risk to the remaining road infrastructure within and downslope of the burned area due to the increased watershed response to precipitation events on areas of moderate and high soil burn severity and the resulting increased run-off. This increased run-off is expected to result in the loss of water control, overwhelming of road drainage structures, and damage to the road prisms.

There is an intermediate risk to the Spring Creek spring development due to the potential for damage to the diversion structure following storm events. The permittee is advised to monitor the point of diversion following high run-off events.

There is an intermediate risk to the mine facilities associated with unpatented claims within the Sliderock burned areas due to the threat of falling trees and sedimentation damage to the development following high run-off events.

There are low risks to the Babcock and John Long trails within and downslope of the burned areas due to the potential for localized trail prism erosion from increased watershed response to precipitation events and increased run-off. These are low standard trails that generally lack constructed drainage features.

- **Natural Resources:** A very high risk is anticipated to native plant communities due to the threat from the spread of noxious weeds. The wildfires created conditions conducive to noxious weed spread and establishment by reducing competition, and exposing bare mineral soil.

There is an intermediate risk to suitable occupied Bull trout habitat in Brewster Creek due to the increased runoff and threat of sediment delivery from hillslopes in the burned areas during precipitation events. The Brewster Creek road also poses a risk to this habitat due to the threat from erosion of the road prism during storm events. The road treatments prescribed by the BAER team are expected to mitigate the road prism erosion risk.

There is a low risk to critical Bull trout habitat in Rock Creek due to the increased run-off and threat of sediment delivery from hillslopes in the burned areas during precipitation events.

There is a low risk to soil productivity and hydrologic function due to the threat of increased erosion and watershed response to precipitation events on areas that experienced moderate and high soil burn severity. The loss of ground cover and the presence of hydrophobic soils has increased the threat of soil erosion.

There is a very low risk to agricultural supply water in Rock Creek due to increased sedimentation following storm events and potential loss of diversion and conveyance systems.

- **Cultural/Heritage Resources:** A very low risk is anticipated to known cultural and heritage resources within the Little Hogback burn perimeter, due to the increased threat of falling trees, rolling debris, sedimentation from upslope burned areas.

Emergency Stabilization Treatments

Treatment Objectives

The BAER assessment team's emergency stabilization objectives for the burned areas are to protect, mitigate and reduce the potential for identified post-fire threats, including increased water run-off flows and soil erosion/sediment yield, for:

1. Human life, safety, and property within and downstream of the burned area;
2. Forest Service infrastructure and investments such as roads and trails;
3. Critical natural and cultural resources; and
4. Native and naturalized plant communities from new noxious weed infestations.

In addition to on-Forest efforts to reduce the threats to National Forest values and resources, the BAER team and the Forest warn users of Forest Service roads and trails of hazards present in the burned area, and communicate and coordinate with other agencies such as the Bureau of Land Management (BLM), National Resource Conservation Service (NRCS), National Weather Service (NWS), State of Montana, local counties, and cities to assist private entities and communities including private residents and businesses to achieve post-fire recovery objectives.

The following post-fire emergency stabilization measures and treatments have been approved:

- Install burned area warning signs to caution forest visitors traveling and recreating within the burned area.

- Storm-proof and stabilize Forest Service (FS) System transportation roads and stream crossings with improved water drainage structures and features to prevent damage resulting from post-fire watershed conditions such as soil erosion, storm water run-off, and public safety hazards to improve the safety of forest visitors and employees. Conduct storm patrol monitoring to ensure road treatments are functioning as intended.
- Continue to communicate risks to the public, community groups, and cooperating agencies.
- Continue to work and coordinate with interagency cooperators, partners, and affected parties and stakeholders.
- Assist cooperators, including local, county, state, and federal agencies with the interpretation of BAER assessment findings to identify potential post-fire impacts to communities and private land owners, domestic and agricultural water supplies, and public utilities (such as power lines, state roads, county roads, and other infrastructure).
- Conduct early detection surveys and rapid response eradication with herbicide aerial application on noxious weeds along areas disturbed by fire suppression activities, equipment concentration points, high and moderate soil burn severity areas near these fire suppression disturbed areas, and other high priority areas, to reduce the potential for impaired native vegetative recovery and the introduction and spread of invasive weeds. The total treatment areas comprises approximately 385 acres.

SPECIAL NOTE: *Everyone near and downstream from the burned areas should remain alert and stay updated on weather conditions that may result in heavy rains over the burn scars. Flash flooding may occur quickly during heavy rain events. BAER actions are intended to reduce, but cannot eliminate risks. Current weather and emergency notifications can be found at the **National Weather Service** (www.weather.gov/mso/) website.*

Northern Region-2017 Post-Fire BAER Assessment information is available at
<https://inciweb.nwcg.gov/incident/5627/>.

