Northern Region

Burned Area Emergency Response (BAER)

Post-Fire BAER Assessment

October 26, 2017 **BAER Information: (415) 881-1871**

LOLO PEAK POST-FIRE BAER ASSESSMENT REPORT SUMMARY

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

The Lolo Peak Fire, which was ignited by a lightning strike on July 15, 2017, is located on the Bitterroot, Lolo and Nez Perce-Clearwater National Forests (NFs), southwest of Lolo, Montana. The fire was managed for full suppression since its start, but steep terrain, high temperatures, low relative humidity, high pre-existing tree mortality, and gusty winds promoted fire spread. For about six weeks, the fire spread steadily to the east toward Lolo. As of September 28, 2017, the fire burned 43,096 acres on Forest Service System (NFS) land, 845 acres on state land, and 9,522 acres on private land.

The Lolo Peak Fire includes a variety of vegetation types that are aspect, elevation, and slope dependent. The dominant vegetation types within the burned area are dry, mixed coniferous forests (lodgepole pine, western larch, Douglas fir, and ponderosa pine) and cool moist coniferous forests (subalpine fir). At lower elevations and on south facing slopes, open grown ponderosa pine forests are common.

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 Bitterroot and Lolo NFs for review and funding.

The following is a summary of the BAER team's burned area assessment report for the Lolo Peak Fire:

- 10 sub-watersheds were analyzed and modeled to compare pre-fire conditions to post-fire predicted response: East Fork Lolo Creek, West Fork Butte Creek, South Fork Lolo Creek, Lower Lolo Creek, Bass Creek, Sweeney Creek, Upper Brushy Fork, Larry Creek-Bitterroot River, One Horse Creek-Sin-tin-tin-em-ska Creek, and North Woodchuck Creek-Bitterroot River.

- There are 38 miles of perennial stream, and 123 miles of intermittent streams.

- There are 74.4 miles of NF system roads, 23.9 miles of NF non-system roads, and 39.5 miles of NF trails.

- Post-fire, there are 6,047 acres with high hazard ratings for soil erosion, 24,731 acres with moderate ratings for soil erosion, and 5,123 acres with low hazard ratings for soil erosion. Elevated soil erosion hazard is only applicable for the first few years following the Lolo Peak Fire - until revegetation occurs to stabilize the slopes.

- There are about 13,914 (32%) unburned acres, 10,137 (23%) acres of low soil burn severity, 13,487 (31%) acres of moderate soil burn severity and 6,507 (14%) acres of high soil burn severity.

- There are 6,507 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

Summer thunderstorms have the greatest likelihood of generating large run-off and soil erosion events. If large summer thunderstorms occur, the primary values-at-risk within the burned area are human life and safety, transportation infrastructure (roads and trails), soil productivity, water quality, bull trout habitat, and native vegetation communities. The primary threats caused by the fire include 1) increased run-off, which is expected to intensify the first 2-3 years following the fire until the burned watersheds recover, and 2) accelerated hillslope erosion - as a result of increased run-off and decreased infiltration rates. High intensity, short duration rainfall may result in valley bottom flooding and localized debris flows, primarily in Mormon and John creeks. Additional threats originating from the destabilized hillslopes throughout the burned area include falling trees and rolling rocks.

Emergency post-fire conditions for the Lolo Peak Fire were identified by the BAER team for the following on-forest values-at-risk:

- Human Life and Safety: There are potential impacts to the safety of forest recreating visitors and Forest Service employees entering the burned area, and residents of private lands within and adjacent to the burned area. Generally, increased risk occurs within or directly down-slope from high and moderate soil burn severity areas. Potential threats exist along roads, trails, trailheads, and other recreation areas. Risks for the general public include rolling rocks, flash flooding, flooding, debris flows, slope failure, falling trees, and loss of ingress/egress access. Locations with increased risk include road systems within the upper Mormon Creek drainage, Mill Creek Trail, and long the South Fork of the Lolo Creek drainage.

- Property: There are potential impacts and threats to Forest Service System roads, trails, and associated infrastructure during and following high-intensity precipitation events. During these events, there is high potential for failure to road drainage due to increased post-fire flows and thus potential for erosion of trail surface tread and sediment delivery to streams. Soil deposition on road and trail surfaces from adjacent hillslopes may also occur. The potential threats are from increased water, sediment flows, soil erosion, loss of capacity, and overtopping and breaching during flood events. Roads at-risk include the Mormon Peak road, Mormon Creek road and associated spurs, John Creek road, Tevis Creek road, Elk Meadows road and surrounding roads, McClain Creek roads within the McClain Creek area, and Johnny Creek road.

- Natural Resources: There are threats and increased risks to water quality, fish (bull trout) communities and habitat, native plant vegetation recovery, increased spread of noxious weeds, reduced soil productivity and hydrologic function from increased sediment flows and accelerated erosion. Mormon Creek and South Fork Lolo Creek are the primary streams of interest for potential risk to bull trout populations and its critical habitat, due to the fire coverage within those watersheds. Over 1,500 acres of known noxious weed infestations occur within the Lolo Peak Fire. There are no known aquatic invasive species with the fire perimeter.

- Cultural/Heritage Resources: A low to moderate risk is anticipated to cultural and heritage resources within the Lolo Peak burn perimeter, due to the increased threat of flooding, deposition, and erosion from upslope burned areas due to loss of pre-fire ground cover.

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 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:

- 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).

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

- Storm-proof and stabilize approximately 34 miles of 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.

- Provide for worker safety during implementation of road and trail drainage improvements by removing hazard trees along the roads and trails where treatment crews are operating for extended periods of time.

- Storm-proof and stabilize approximately 12 miles of burned area FS trails with improved water drainage structures and features to prevent damage resulting from post-fire watershed conditions. Conduct post-storm inspection of problem areas and implement emergency repairs if needed.

- Conduct early detection surveys and rapid response eradication with herbicide 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 area comprises approximately 940 acres. Educational signage would be installed at trailheads to reduce noxious weed spread and encourage users to stay on trails. Early detection would also be conducted by surveying backcountry lakes for aquatic invasive species (AIS). An eradication plan would be developed if any AIS are detected.

- Cultural resource concerns will be evaluated at a later time within the burned area to determine if future management actions are required.

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/.

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