Forest Service and Bureau of Land Management

Burned Area Emergency Response (BAER)

Post-Fire BAER Assessment

BAER Information: (415) 881-1871

HAYDEN PASS POST-FIRE BAER ASSESSMENT REPORT SUMMARY

Photo by Steve Sunday

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

The Hayden Pass Fire was started by lightning on July 8, and as of July 20, 2016, burned approximately 16,520 acres. Full containment is not expected until October. The fire burned 15,065 acres on the Pike and San Isabell National Forests (PSICC) land, 912 acres on Bureau of Land Management (BLM) land, 358 acres of Colorado State land, and the remaining acres burned on private lands.

The majority of the burned area was forested. The vegetation includes a mix of shrub species such as Pinon pine, Juniper, and Gambel Oak, and mixed conifer at the highest elevations. The mixed conifer type is composed mainly of Douglas-fir, White-fir and Ponderosa pine with scattered Spruce-fir, aspen and Lodgepole pine.

Across the landscape of the Hayden Pass Fire many thousands of acres of trees and shrubs have been burned severely enough to kill most of the overstory. Over time, the different forest types will recover at different rates. There are no endangered tree or shrub species within the fire area and in some ways the fire has rejuvenated the forested landscape. Post-fire, the forest will be a more age class diverse landscape with a wider variety of understory grass and shrub species. The resulting forest will be less susceptible to insects and disease problems for many decades to come. The forested areas may provide improved and additional wildlife habitat and increased forage. Grasses, forbs and shrubs will regenerate in the next 2-3 years and dominate these sites for many decades.

This burned area was surveyed and assessed by an interagency BAER team comprised of Forest Service, BLM, and Natural Resources Conservation Service (NRCS) scientists and specialists. The BAER team evaluated the burned watersheds to determine post-fire conditions, values-at-risk such as human life and safety, property, and critical natural and cultural resources, emergency determination on those values and the potential for increased post-fire flooding, sediment flows, rock slides, and hazard trees. The team also recommended emergency stabilization treatments and actions to reduce the risks to those values.

The BAER assessment team's analysis of the burned areas within the Hayden Pass Fire area and recommended emergency treatments are documented in a separate Forest Service (FS) Burned-Area Report. This report was submitted to the Rocky Mountain Region (Region 2) Regional Forester by the

Forest Supervisor for the PSICC. The following is a summary of the BAER team's burned area analysis and report for the Hayden Pass Fire:

- 6 watersheds were analyzed and modeled to compare pre-fire conditions to post-fire predicted response: Hayden Creek, Hamilton Creek-Arkansas River, Big Cottonwood Creek, Falls Gulch, Middle Texas Creek and Sand Gulch. All of these are a part of the larger Arkansas River watershed. Only watersheds with more than 5% burned area were included in the BAER team analysis.
- 11 drainages were modeled for peak-flow analysis: South Prong Hayden Creek, Italian Gulch, Pole Gulch, Wolf Creek, Big Cottonwood Creek, Butter Creek, Little Cottonwood Creek, Deep Gulch, Mosher Creek, Oak Creek and Sullivan Creek.
- The highest change was found in the Wolf Creek drainage which had a 14 times increase in peak flows for a 10-year, 1-hour design storm.
- There are 27 miles of intermittent streams and 24 miles of perennial streams.
- On National Forest System lands, there are 17 miles of roads and 12 miles of trails.
- There are 11,768 (71%) acres with high and very high hazard ratings for soil erosion, 2,758 (17%) acres with moderate ratings for soil erosion, and 1,994 (12%) acres with low hazard ratings for soil erosion.
- There are about 4,306 (26%) acres of unburned/low soil burn severity, 9,240 (56%) acres of moderate soil burn severity and 2,974 (18%) acres of high soil burn severity.
- There are 3,054 acres of water repellent (hydrophobic) soils. Hydrophobic soil conditions were common within moderate and high burn severity areas and rare in the low burn severity areas.

Hydrophobic conditions are expected to exist in approximately 25% of the burned area. 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.

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 identified 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 have evidence of severe soil heating and the consumption of organic material. Soil seedbank and water infiltration characteristics are also impacted 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. The low to very low soil burn severity areas still have good surface soil structure, intact fine roots and organic matter, and should recover more quickly once revegetation begins and the soil cover is re-established.

The Hayden Pass Fire consumed a wide variety of vegetation that included a mix of shrubs, grass, and mixed forest at the highest elevations. The majority of the burned area was forested. Burned forest areas ranged from low to high soil burn severity. Extensive removal of forest floor ground cover occurred in moderate and high soil burn severity areas. Some needle cast is likely to occur in the low and moderate soil burn severity areas and recovery of slope stability and watershed hydrologic response will be accelerated where this occurs. High intensity, short duration summer thundershowers are storm events of

concern for accelerated watershed hydrologic response. 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.

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

Threats to the values-at-risk identified below result from the potential for increased water flows, loss of water control, increased sediment delivery, debris flow occurrence, rock fall, and incursion of invasive weeds. Emergency post-fire conditions for the Hayden Pass Fire were identified by the BAER team for the following on-forest values-at-risk:

- Human Life and Safety: Threats and risk for the general public to be impacted by rolling rocks, flooding, debris flows, landslides, hazard trees, and loss of ingress/egress access.

  There are potential impacts to life and safety of Forest visitors and employees entering the burned area. Generally, increased risk occurs within or directly down-slope from high and moderate soil burn severity areas.

- Property: Threats to Forest Service system roads and trails, trailheads, developed campgrounds, dispersed campsites, land survey monuments, bridges, water diversion, conveyance, and storage infrastructure, and a fish barrier from the risk of increased water, sediment and debris flows, erosion, rock fall, hazard trees, and/or tread destabilization.

  Threats to private residences and structures down-slope from high and moderate soil burn severity areas from an increased risk from potential increased water run-off, debris flows and other post-fire processes.

- Natural Resources: Threats to water quality for domestic and agriculture uses, soil productivity, ecosystem stability and vegetation recovery from invasion of noxious weeds, and soil productivity from accelerated erosion, and critical or suitable occupied habitat for the federally listed threatened and endangered (TES) Colorado Greenback Cutthroat Trout.

- Cultural/Heritage Resources: Threats to sites susceptible to flooding, debris flows, and erosion.

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 soil erosion/sediment yield and water run-off on steep slopes, to:

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 will 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, National Resource Conservation Service (NRCS), National Weather Service, State of Colorado, and local counties to assist private entities and communities including private residents, domestic water suppliers, water infrastructure managers, and public utilities to achieve post-fire recovery objectives.

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

- Reduce the potential for impaired vegetative recovery, and the introduction and spread of invasive weeds by conducting early detection surveys and rapid response eradication of 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.

- Decommission approximately 4 miles of unauthorized trails and 2-track roads that access the Rainbow Trail that are expected to greatly impact the Big Cottonwood Drainage.

- Protect land survey monuments from flooding and debris flow caused by the residual effects of the fire.

- Protect the TES Colorado Greenback Cutthroat Trout by stabilizing the fish barrier structure in Hayden Creek.

- Storm-proof and stabilize approximately 17 miles of Forest Service System transportation roads with improved water drainage structures and features to prevent damage resulting from post-fire watershed conditions such as soil erosion and storm water run-off, public safety hazards to improve the safety of forest visitors and employees. Conduct storm patrols to monitor roads and drainage structures within the burned areas. Implement temporary road closures by means of gates and signage.

- Stabilize and reinforce Mosher and Little Cottonwood ditch and reservoir, and Oak Creek ditch to improve their functioning condition before damaging storms and to lower the risk for dam breaching and failure. Conduct storm patrols and response.

- Storm-proof and stabilize approximately 11 miles of burned area hiking trails with improved water drainage structures and features to prevent damage resulting from post-fire watershed conditions. Close trails, and/or install hazard warning signage along trails affected by the fire as part of an area closure. Conduct post-storm inspection of problem areas with emergency repairs if needed.

- Temporarily remove two trail bridges for the Rainbow Trail that span streams which are predicted to have greatly increased flows.

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

- Implement continuing temporary forest, road and trail closures with signage to protect public users of Forest Service System lands and recreation sites such as the dispersed camping area along Hayden Creek and at the Coaldale Campground.

- 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, state, and federal agencies with the interpretation of BAER assessment findings to identify potential post-fire impacts to communities and residences, domestic water supplies, and public utilities (including hydropower facilities, power lines, county roads, and other infrastructure).

- Implement treatment effectiveness monitoring of closures, and road and trail treatments to determine if treatments are working and if/when maintenance or repairs are required.

SPECIAL NOTE: *Everyone near and downstream from the **Hayden Pass Fire** burned area should remain alert and stay updated on weather conditions that may result in heavy rains over the fire area. Flash flooding may occur quickly during heavy rain events. Current weather and emergency notifications can be found at the **National Weather Service, Pueblo** (http://www.weather.gov/pub/) website.*

Hayden Pass Post-Fire BAER Assessment information is available at http://inciweb.nwcg.gov/incident/4879/.