

Willamette National Forest  
**Burned Area Emergency Response Summary – Holiday Farm Fire**  
October 30, 2020

The Holiday Farm Fire began on September 7, 2020 at approximately 7:45 p.m. during a strong east wind event that passed through the area. The fire started approximately 3 miles west of McKenzie Bridge, OR. Pushed westward by strong winds, the fire moved through the communities of Blue River, Finn Rock, Nimrod, Vida and Leaburg, damaging and destroying homes, businesses and facilities in its path. The fire (as of 10/12/2020) encompassed 173,439 acres primarily in a mixed conifer forest. The fire burned a mosaic pattern through most of the area, and the majority burned with low and moderate severity.

The Forest Service assembled a Burned Area Emergency Response (BAER) team on September 30, 2020. This team of experts in soils, geology, hydrology, engineering, botany, recreation, archaeology, fisheries, and GIS, began assessing the post-fire effects to critical values on Forest Service lands. The team developed a Soil Burn Severity (SBS) map to document the degree to which soil properties had changed within the burned area. Fire damaged soils have low strength, high root mortality, and increased rates of water runoff and erosion. Using the SBS map, BAER team members ran models to estimate changes in stream flows (hydrology) and debris flow (geology) potential. The models compared pre-fire conditions to predicted post-fire conditions to determine relative changes, which are then used to determine the relative risk to different critical values and recommendations to address those things determined to be an emergency. Below is a summary of the findings of each resource area.

## SOILS

Soil burn severity (SBS) is the primary characteristic driving post-fire soil erosion response and sediment delivery. When combined with other factors like slope gradient and shape, remaining surface cover, potential for surface cover recruitment, vegetative recovery, natural and fire-induced water repellency, and local climatic factors, we can make predictions about landscape response and soil loss. Within the Holiday Farm Fire burned area, 63% of mapped areas on FS managed lands experienced high and moderate SBS.

The most concentrated areas of high SBS are found in the Gate Creek, East Fork Deer Creek-McKenzie River,



*Figure 1. Mosaic of low, moderate and high SBS – South Fork McKenzie River/Blue River area.*



Lower Blue River, and Elk Creek-McKenzie River subwatersheds. Much of the high SBS overlaps with areas mapped with severe soil erosion hazard ratings. Modeled post-fire erosion potential for a ten-year storm event (10% probability of occurring in any year) ranges from 1 ton/acre to 90 tons/acre, averaging 26 tons/acre, in the most severely affected subwatersheds.

Long-term soil productivity was identified as a critical value with a high risk of damage or loss. However, no treatments are prescribed to mitigate impacts. Based on modeling across similar burned areas in western Oregon during the 2020 fire season, the reduction in soil loss achievable by techniques such as aerial mulching would be nominal, and treatments would not be cost-effective. Post-fire precipitation events early in the wet season have already accelerated soil loss on erosion-prone hillslopes, further reducing the prospective effectiveness of land treatments to reduce erodibility. Allowing for natural recovery is the recommended course of action.

## GEOLOGY

We identified 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 and downslope critical values. The fire removed vegetation that helps maintain hillslope and watershed integrity, changed the structure and erodibility of the soil, and altered the stability of the landscape. Knowledge of rock types and characteristics, geomorphic processes, and the types and distributions of geologic hazards helps predict how the watersheds will respond to and be impacted by upcoming storms.

Geologic assessment included identification of critical values within, downslope and downstream of potentially unstable portions of the burned area, identification of pre-fire slope failures and pre-fire slope and channel failure deposits, measurements of slopes, identification of geological units, field verification of soil burn severity, notes of observations, and photography. In addition to ground and air reconnaissance, we also conducted a review of published geologic maps and articles, and a study of aerial photography and LiDAR imagery. We provided soil burn severity data to the US Geological Survey Landslide Hazard Program to assist in forecasting the probability, potential volumes, and hazards of debris flows, using their developed empirical models.



*Figure 2. Debris-flow prone slopes in Quartz Creek drainage.*

Our observations and analysis conclude that there is an elevated risk of instability in the form of rockfall and debris flows across much of the burned area. Specific areas with rockfall hazard were identified that in the Highway 126 corridor, on roads accessing Cougar and Blue River dams and reservoirs, and on a forest road accessing a communications site. Elevated debris flow hazard was identified on a number of steep canyon hillslopes where SBS is high and moderate, including in the Highway 126/McKenzie River corridor, in Gate Creek, Elk Creek, Cone Creek, Quartz Creek, and above Blue River Reservoir. The cumulative risk of various types of slope instability, sediment bulking, and channel flushing is high along many slopes and drainages in and below the burned area following the Holiday Farm Fire. Based on this, special attention and caution is recommended in areas where people are living, traveling through, working, or recreating in or below burned areas during and after storm events.

In order to reduce risk to life and safety, we recommend to coordinate warning notifications with the National Weather Service, post warning signs, and enforce administrative closures, especially if rainfall intensities would reach a threshold of 0.75-inch/hour in short duration storms. Cooperation and coordination with partner agencies such as Lane County and the Oregon Department of Transportation is recommended to help mitigate risk along the important transportation corridors in the burned area.

## HYDROLOGY

The Holiday Farm Fire largely burned within the McKenzie River, Blue River, Quartz Creek and South Fork McKenzie River watersheds, with stand-replacing fire prevalent across the burned area, and the highest severities on south and southwest aspects, where slopes were aligned with the wind-driven fire. Primary



*Figure 3. McKenzie River woody debris*

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. These responses will likely lead to increased water quality concerns for municipal and domestic drinking water providers within and downstream of the fire. Modeled post-fire peak streamflow responses range from 1.2 - 3.2x pre-fire levels, depending on the proportion of moderate and high severity burn in the analyzed drainages. Greater effective peak flow increases are modeled if erosion and debris flow bulking are considered.

Watershed responses are dependent on the occurrence of rainstorms and rain-on-snow events, and will likely be greatest with initial storm events. Disturbances will become less evident as vegetation is reestablished, providing ground cover that reduces erosion and increases surface roughness to slow flow



accumulation and increase infiltration. Treatment recommendations to mitigate potential risks to life and safety, property, and water quality include maintaining closures of areas of high risk, posting signage to inform forest visitors about flood risks at campgrounds and gathering places, improving road drainage on high-risk roads, and working with partners to set up an early warning system and continue engagement with water quality stakeholders.

## ENGINEERING

The Holiday Farm Fire includes 141 miles of Forest Service roads. Post-fire conditions, in combination with the expected watershed response, indicate there will be an increased risk of road damage or failure due to rock fall, debris flow and drainage structure failure. Due to fire damage, several of the roads in this fire were inaccessible, and will require future assessment. Treatment recommendations include road closures on FS Roads 2611-000, 2611-060, 1900-408, and 2618-307. On the roads that are remaining open, we recommend road drainage improvements (storm proofing) and storm inspection and response for 57 miles, 7,154 feet of guardrail repair or replacement, 9 road hazard signs, stabilization of one fillslope, and two bridge approach and safety feature repairs.

## RECREATION

The Holiday Farm burned area and immediate vicinity include 3 campgrounds, 2 boat launches, 1 trail, 1 Wild and Scenic river, and 2 reservoirs, most of which experience year-round use. Of these, one campground, one trail and one boat launch were heavily damaged, with nearly total tree mortality and infrastructure loss. We recommend closure and decommissioning of the damaged campground and trail, hazard warning signage at the boat launch and other river access sites, and monitoring of conditions at one campground (storm inspection and response).



*Figure 4. Delta Campground Vault Toilet*

## BOTANY

Native plant communities that were burned at moderate to high severity are threatened by the introduction and spread of noxious weeds. This threat is due to the likelihood that some noxious weed seeds were brought into the area by fire equipment and suppression activity, as well as to known noxious weed locations within the area. Areas of special botanical concern include recently restored riparian habitat along the South Fork McKenzie River. The primary threats to native plant communities are non-native invasive plants that readily colonize burned areas. Most documented weed populations occur along roadsides, and are expected to aggressively compete with native species for space and nutrients in adjacent burned areas and/or sites disturbed by fire suppression. Early detection and rapid response inspections are recommended for approximately 383 acres, including roadside, suppression disturbance, and riparian areas.



## WILDLIFE

The Holiday Farm Fire is within the current range of Northern Spotted Owl (NSO), a species that is listed as threatened under the Endangered Species Act. In critical habitat (CH) for the NSO, 1,684 acres burned with high severity (12% of the CH in the fire area) and 10,740 acres burned with moderate severity (77% of the CH in the fire area).

Threats include additional loss of habitat in the fire area due to blowdown, mass soil movement, flooding, and insects and disease. Each of these threats could result in additional mortality to remaining live trees and further reduce NSO suitable habitat and usable critical habitat and threaten the viability of nesting territories. A secondary issue includes determination if the proposed BAER stabilization treatments could affect spotted owl nest sites or result in disruption of nesting if conducted during the critical breeding season from March 1-July 15. There are no landscape scale treatments that would reduce the risk of the potential loss of additional habitat. During treatment implementation, timing restrictions for NSO and Bald Eagles will be overlaid with proposed treatments to determine any potential conflicts.

## FISHERIES

Streams and rivers affected by the Holiday Farm Fire support runs of federally listed Upper Willamette spring Chinook salmon (threatened), Upper Willamette steelhead trout (threatened), and bull trout (threatened). Critical habitat for Federally listed fish occurs in select river drainages. Potential post-fire effects in select tributaries of the McKenzie River River, Middle Fork Willamette River, and Upper Willamette River include:

- increase in peak flows laden with debris potentially leading to increase in accelerated channel scour and hillslope erosional processes;
- increase in fine sediment leading to direct mortality of eggs and fry and decrease of habitat elements such as pools;
- and increase in the likelihood of other negative effects to habitat from increased flow interaction with infrastructure.

Catchments or drainages of note which may see higher peak and debris flows 1-2 years post-fire include the mainstem McKenzie River, Elk Creek, Quartz Creek, Cone Creek, Simmonds Creek, and Gate Creek. The magnitude of consequence to federally listed fish and critical habitat resulting from this fire is assessed as moderate. These river systems provide habitat for migration, foraging, spawning, and rearing.



*Figure 5. South Fork McKenzie River floodplain restoration project, with spawning spring Chinook salmon.*



Large woody debris available for recruitment into stream channels and valley bottom fish-bearing streams has increased greatly because of the Holiday Farm Fire. Increases in large channel wood will have a long-term benefit on wood loading, geomorphic complexity, and habitat quality in Critical Habitat. In the short term, increased wood delivery to the mainstem McKenzie River is likely to present challenges to recreational boating, a major driver of the local economy. Limited repositioning of channel wood is proposed as needed to protect boater safety while retaining habitat benefits that large wood provides.

The interaction between post-fire stream flows and debris with road, recreation residences, recreation sites, and water use/intake systems was considered a risk to critical fisheries values. Geologic, soils and hydrologic analysis determined that potential sediment delivery resulting from modeled precipitation events is moderate to high in several catchments. Therefore, the BAER team identified emergency treatments to protect infrastructure, water quality and federally listed fish designated critical habitat values at risk. In addition to what is identified in this report, other road treatments are highlighted in the hydrology and engineering specialists' reports.

## **CULTURAL RESOURCES**

A total of 25 known cultural resource sites are present within the Holiday Farm Fire area. Cultural resource types included traditional use areas, pre-contact lithic scatters, pre-contact and historic trails and travel routes, historic administrative structures, and 19<sup>th</sup>-20<sup>th</sup> century mines and camps. Some sites were burned or damaged by the fire itself, while others face post-fire threats such as looting, vandalism, erosion, and hazard trees. Several sites were assessed on the ground during the BAER assessment; several others were either assessed remotely or were deemed unsafe to enter due to post-fire safety hazards. While damage or loss was considered possible at several historic sites, the risk was determined to be minor to intermediate, and no BAER treatments are indicated at this time. Further assessment of sites in the Gold Hill Mining District is recommended once safety concerns are reduced.

## **CONCLUSION**

The BAER team has identified imminent threats to values at risk based on a rapid scientific and engineering assessment of the area burned by the Holiday Farm Fire. While taking significant precautions to minimize exposure to COVID-19, the assessment was conducted using the best available methods to analyze the potential for flooding, debris flows and other post-fire emergencies. The findings provide the information needed to prepare and protect against post-fire threats. The Forest Service will continue to provide information and participate in inter-agency efforts to address threats to public and private values at risk resulting from the Holiday Farm Fire.

