USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Humboldt-Toiyabe National Forest | October 2024

Davis Fire Burned Area Summary

Burned Area Report

Fire Background

On Sept. 7, 2024, the Davis Fire started in the area of Davis Creek Regional Park west and northwest of Washoe Valley, Nevada, and southwest of Reno, Nevada in the Mount Rose area. This wind-driven fire rapidly burned a total of 5,824 acres of private, state, and federal lands, destroying two commercial buildings, 14 residences, and 22 outbuildings. Truckee Meadows Fire Protection District, Humboldt-Toiyabe National Forest, and Bureau of Land Management managed the fire under a unified command.

Due to the fire's complexity, the Southwest Area Incident Management Team 1 dtook over the management of the fire the evening of Sept. 9, and transferred it back to a local Type 4 organization on Sept. 18. The fire was officially fully contained at 6 p.m. on Sept. 25.

After making an initial run through fine fuels towards Washoe Lake, south of Old Washoe City, the Davis Fire backed up into the foothills west of Interstate 580 into the Humboldt-Toiyabe National Forest

On Sept. 16, the Humboldt-Toiyable National Forest established a USDA Forest Service Burned Area Emergency Response (BAER) team to assess the post-fire effects to critical values on National Forest System lands that burned in the Davis Fire.

The Davis Fire burned approximately 5,824 acres, with 2,641.64 acres occurring on National Forest System lands.

The Davis Fire BAER Team consists of scientists in hydrology, geology, soil science, botany, biology, and archeology, and specialists in geographic information system (GIS), recreation, and road engineering. Each team member brings a unique perspective to the BAER process, which helped the team rapidly determine whether the post-fire effects constitute urgent threats to human life and safety, property, or critical cultural and natural resources. Right away, the team began field reconnisance and conducting field surveys using science-based models to rapidly evaluate and assess the burned area.

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 BAER Program is designed to identify and manage

potential risks to resources on National Forest System lands and reduce these threats through appropriate emergency stabilization measures that involve time-critical activities to be completed before the first damaging storm.

Soils

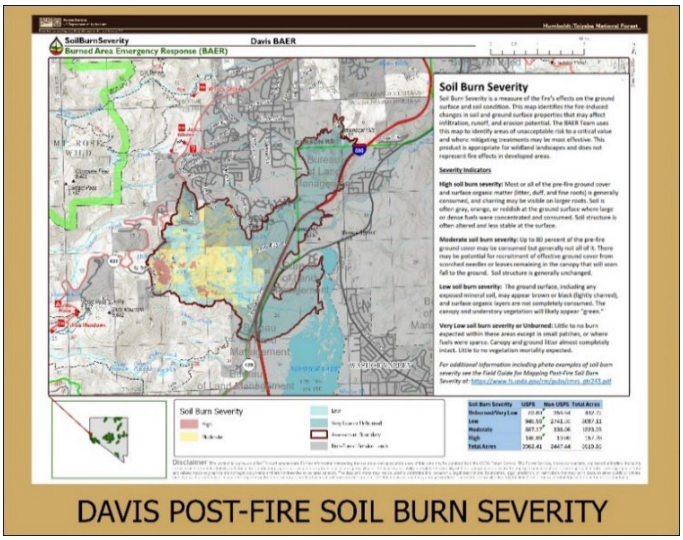
Impacts to the soil are the primary indicator of potential post-fire changes in runoff and erosion responses. The degree of soil impacts also influences the rate of vegetation recovery and slope stabilization during the ensuing years.

Soil burn severity can vary across the fire area depending on topography, weather conditions, fuel types, and rate of fire spread. The degree of soil burn severity is dependent on the peak temperatures and duration of those temperatures within the soil.

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. Post-fire erosion can temporarily reduce soil productivity and contribute to downstream impacts to life, property, and infrastructure via excessive runoff and potential debris flows, which are fast-moving landslides that carry rock and woody material.

Nathan Clark, soil scientist on the Davis Fire BAER Team, dug a small pit to look at the soil burn severity by studying the surface soil structure, root conditions, and water repellency.

One of the products the BAER Team developed was a post-fire soil burn severity map to document the degree to which the fire had changed soil properties. Developing a post-fire soil burn severity map is an important first step in the rapid assessment process. It enables the BAER team to prioritize field reviews and locate burned areas that may pose a risk to critical values within or downstream of the burned area.



Mapped and validated soil burn severity for the David Fire burned area is 8% unburned/very low, 67% low, 22% moderate and 3% high.

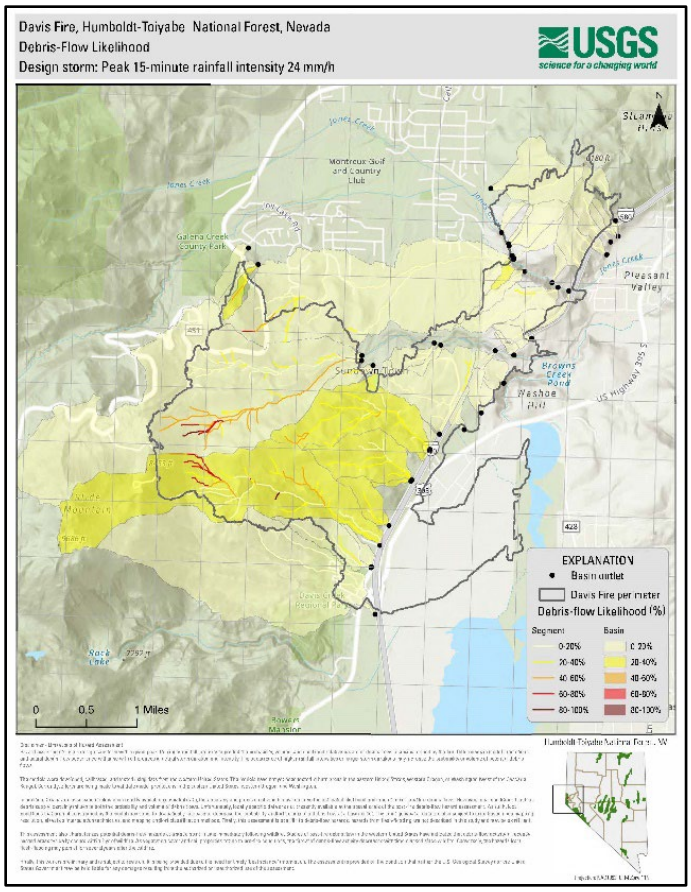
The Davis Fire Post-Fire Soil Burn Severity Map was developed with ESRI ArcGIS software using satellite-imagery-derived Burned Area Reflectance Classification and field survey data. Field work included assessment of ash characteristics, root condition, soil structure, soil water-repellency, effective ground cover, and vegetation type as described in the Field Guide for Mapping Post-fire Soil Burn Severity (Parsons et al. 2010). The map displays the categories of unburned/very low, low, moderate, and high soil burn severity in different colors across the fire perimeter.

Much of the Davis Fire burned in a mosaic pattern with relatively low soil burn severities. This beneficial burn type mimicked a prescribed fire and results in low tree mortality and removal of understory vegetation. 4,130 acres (1,030 Forest Service) within the burned area are expected to recover quickly and yield low erosion rates. In other areas with high and moderate soil burn severity, high levels of erosion and runoff are possible, along with delayed recovery on about 1,380 acres (1,033

Forest Service). During large rain events, sediment-laden runoff could impact areas directly downstream of the burn scar (See Page 8).

The BAER team only evaluates critical values on National Forest System lands, so developed private, county, and state lands were not mapped for soil burn severity.

Geology



The BAER Team provided soil burn severity field data to the U.S. Geological Survey Landslide Hazard Program to assist in forecasting the probability, potential volumes, and hazards of debris flows through the agency's developed field and computer base models.

Within the Davis Fire burn area, several potential debris flow, landslide, and rock-fall hazard areas were identified, based on ground observations and the Debris Flow Model. The magnitude of storm that was chosen for analysis was a peak 15-minute rainfall intensity storm of approximately 1 inch per hour, which is equivalent to the accumulation of 0.25 inches over 15 minutes.

The 15-minute peak intensity has been shown to be the most predictive metric for debris flow initiation as post-fire debris flows are most often triggered by high-intensity, short-duration bursts of rain (See Page 9).

The area on the Humboldt-Toiyabe National Forest that burned is in a mountainous region located in the northern part of the Sierra Nevada Mountain Range and westernmost Basin and Range Province at an elevation between 8,111 feet to 5,257 feet. The area's geology consists of a mixture of granite and volcanic rock overlayed with loose glacial sediments and alluvial-fan deposits. There are historic remnants of debris flows and landslides throughout the area.

The terrain within the burn area consists of steep, confined canyons through which major creeks flow from west to east, such as Winters Creek and Brown's Creek. Tributaries form gradually, then drop steeply from tops of catchments down to year-round creeks, carving seasonally used channels.

The fire burn on top of loose, sandy soil made up of sediments and large boulders. These rocks and loose sediments are located on the steep sides, also known as walls, of the creek drainages. In the area where vegetation has burned on the steep walls, the loose soil has a significant decrease in water infiltration.

It is important to emphasize that past debris flows were observed in many parts of the burned area including tributaries to Winters Creek and Brown's Creek and may occur again regardless of post-fire conditions. In this case, fire effects may exacerbate the issue.

Hydrology

The BAER team conducted a rapid hydrologic assessment of the Davis Fire burned area. The primary watershed response is expected to include an initial flush of ash and burned materials, light to heavy erosion on steep slopes, and increased chance of hyper-concentrated runoff.

A watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel. The Davis Fire burned area includes the Brown's Creek-Steamboat Creek, Franktown Creek-Frontal Washoe Lake, Galena Creek, Thomas Creek, and Washoe Lake watersheds.

Watershed response is dependent on the occurrence and intensity of rainstorms and rain-on-snow events and will likely be greatest with initial storm events in areas with high to moderate soil burn severity. Disturbances will become less evident as vegetation is reestablished, providing ground cover that reduces erosion and increases surface roughness, which slows water accumulation and increases infiltration.

The effects to the burn area and water flows from these storms are expected to be the highest during the first five years after the fire and will become less noticeable as vegetation and soil ground cover and condition recover. This will likely lead to clean water within and downstream of the burn area.

Forest Service Critical Values

The BAER Team actively assessed the burned area to determine whether imminent post-fire threats to human life and safety, property, and critical cultural and natural resources on National Forest System lands exist and take immediate actions, as appropriate, to manage the unacceptable risks to those Forest Service Critical Values.

➢ Human Life and Safety

The biggest risk to human health and safety in the burned area is the possibility of falling hazard trees and rocks especially during high winds, heavy rains, and winter storms. These events can destabilize trees and rocks, making them more likely to fall and cause injuries or damage.

➢ Property

ROADS

Approximately 5.73 miles of Forest Service roads in and downstream of the burned area are at risk of damage due to post-fire conditions. Where roads cross drainages, such as streams and creeks, they are especially vulnerable.

There are 7.3 miles of Forest Service roads, and 21.4 miles of non-Forest Service roads affected by the Davis Fire.

The most likely threat due to the fire is clogging of culverts, bridges, and other in-channel infrastructure from increased runoff, erosion, and debris flows levels of floatable debris. Once blocked by debris, road drainage structures no longer function and water will flow over the road, often causing considerable damage to the road and limiting access as well as increasing the potential for erosion and sedimentation downstream.

RECREATION SITES

The fire did not impact any Forest Service developed recreation sites.

➢ Natural Resources

BOTANY

The Davis Fire burned through meadows, aspen stands, rare plant habitat, riparian areas, and undisturbed native plant habitat that was free from invasives plant species. Two species, Washoe tall rockcress (Forest Service Sensitive Species) and Washoe pine, were also affected through scorching or even death.

There may also be unknown invasive plant infestations present in the Davis Fire burned area, leading to the possibility of further spread of invasives and negative impacts to native plant communities.

In addition, the BAER Team determined that out of 107 non-native invasive species occurring on the Humboldt-Toiyabe National Forest, at least seven of these species were known to grow within the burned area. Many of these species increase in abundance following a wildfire, which means that spread of invasives from existing populations into adjacent newly disturbed sites is likely.

Non-native invasive plants 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 non-native invasive plants expand, reducing habitat for native plant species and wildlife.

Shifts from diverse native plant communities to non-native invasive plant dominance may alter future fire behavior, intensity, extent, and season of burning. Current infestations are primarily located along roads, and previously disturbed areas throughout the burned area, with interior areas being largely weed free. However, the burned area creates conditions for non-native invasive species to outcompete native plants.

THREATENED AND ENDANGERD SPECIES

There were no threatened and endangered species within the burned area.

➢ Cultural Resources

Historical and cultural resources within the burned area were evaluated and it was determined that stabilization measures were not needed.

Anticipated Vegetation Recovery

Post-fire recovery varies greatly based on climate, vegetation types and burn severity. It is typical for recovery to take between three to five years for reestablishment of ground cover. The persistence of drought in the years following wildfires also delays the recovery time frame. In the short period of time since fire containment, resprouting of grasses and shrubs as well as emergence of forbs have been noted within the burned area.

Non-Forest Service Values

Since fires 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 local, county, state, and federal agencies that have emergency response responsibilities or authorities in the post-fire environment. The Davis Fire BAER Coordinators and team members have engaged with interagency partners to facilitate consideration of non-Forest Service values through other programs with the relevant responsible entities.

The Forest Service will continues to work towards long-term recovery and restoration of the Davis Fire burned area on National Forest System lands.

The BAER Team's assessment also benefited from coordination, collaboration, and communication among these partners and cooperators: Truckee Meadows Fire Protection District, Washoe County, Nevada Division of Emergency Management (DEM), Nevada Division of Forestry (NDF), Army Corps of Engineers, Bureau of Land Management (BLM), Farm Service, National Oceanic and Atmospheric Administration (NOAA), and Natural Resources Conservation Service (NRCS).

The BAER team also provided these partners and collaborators with fire-wide landscape scale datasets (soil burn severity, hydrological and erosion modeling, and debris flow potential) to help them assess risks on non-Forest Service lands. The team will continue to collaborate through post-assessment and into implementation.

Conclusion

In the assessment conducted by the Davis Fire BAER team, the following strategies were identified to reduce the threats to critical values:

- **Human Life and Safety:** Place general warning signs on National Forest System lands in designated areas within or directly adjacent to the Davis Fire burned area. The signs will contain language specifying items to be aware of when entering a burn area such as falling trees and limbs, rolling rocks, and flash floods. Signs will be removed once hazards are mitigated.

- **Property:** Implement stabilization measures on Forest Service roads, which includes installing road drainage structures, reshaping the crown of the road, preparing ditches for increased runoff, cleaning culverts, and armoring at-risk drainages with critical dips.

- **Natural Resources:** Mitigate invasive plant infestation on approximately 158 acres of National Forest System lands in the burned area by early detection surveys to document spread, and concurrent rapid response manual and chemical treatments. This strategy also reduces economic and environmental impacts of invasive species infestations by controlling infestations when they are small and unestablished.

The BAER Team assessment of the Davis Fire burned area was conducted using the best available methods to analyze the potential for damage from post-fire threats.

BAER treatments are preventative in nature but cannot prevent all damage, especially debris torrents in areas that are prone to sliding and have lost critical root structure from plants, Also, BAER is not an opportunity to fix historic problems, expand programs or personnel, or conduct new surveys or long-term restoration.

Treatments do not prevent all potential stormwater runoff or soil erosion impacts. It is important for the public to stay informed and prepare for potentially dramatic increased run-off events by paying attention to flood warning alerts from the National Weather Service.

The Forest Service will continue to provide information and participate in interagency efforts to address threats to public and private values resulting from the Davis Fire. Information can be found online at Davis BAER Inciweb Page

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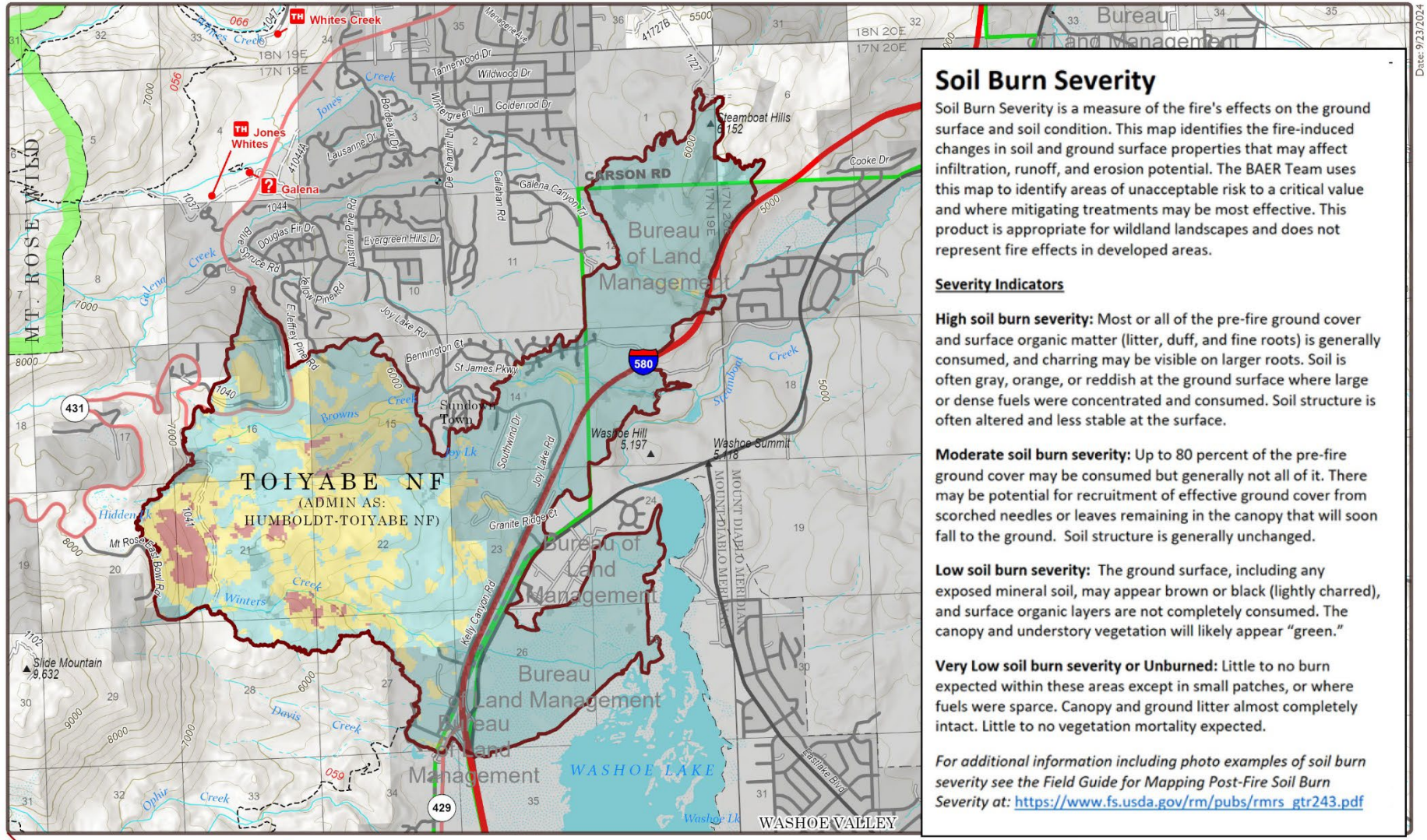
SoilBurnSeverity
Burned Area Emergency Response (BAER)

Davis BAER



Soil Burn Severity

Soil Burn Severity is a measure of the fire's effects on the ground surface and soil condition. This map identifies the fire-induced changes in soil and ground surface properties that may affect infiltration, runoff, and erosion potential. The BAER Team uses this map to identify areas of unacceptable risk to a critical value and where mitigating treatments may be most effective. This product is appropriate for wildland landscapes and does not represent fire effects in developed areas.

Severity Indicators

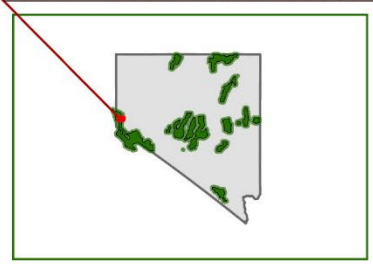
High soil burn severity: Most or all of the pre-fire ground cover and surface organic matter (litter, duff, and fine roots) is generally consumed, and charring may be visible on larger roots. Soil is often gray, orange, or reddish at the ground surface where large or dense fuels were concentrated and consumed. Soil structure is often altered and less stable at the surface.

Moderate soil burn severity: Up to 80 percent of the pre-fire ground cover may be consumed but generally not all of it. There may be potential for recruitment of effective ground cover from scorched needles or leaves remaining in the canopy that will soon fall to the ground. Soil structure is generally unchanged.

Low soil burn severity: The ground surface, including any exposed mineral soil, may appear brown or black (lightly charred), and surface organic layers are not completely consumed. The canopy and understory vegetation will likely appear "green."

Very Low soil burn severity or Unburned: Little to no burn expected within these areas except in small patches, or where fuels were sparce. Canopy and ground litter almost completely intact. Little to no vegetation mortality expected.

For additional information including photo examples of soil burn severity see the Field Guide for Mapping Post-Fire Soil Burn Severity at: https://www.fs.usda.gov/rm/pubs/rmrs_gtr243.pdf



Soil Burn Severity

- High
- Moderate
- Low
- Very Low or Unburned
- Assessment Boundary
- Non-Forest Service Lands

USGS Debris Flow Probability - 15 Minute Intensity 24mm h

Burned Area Emergency Response (BAER)

Davis BAER

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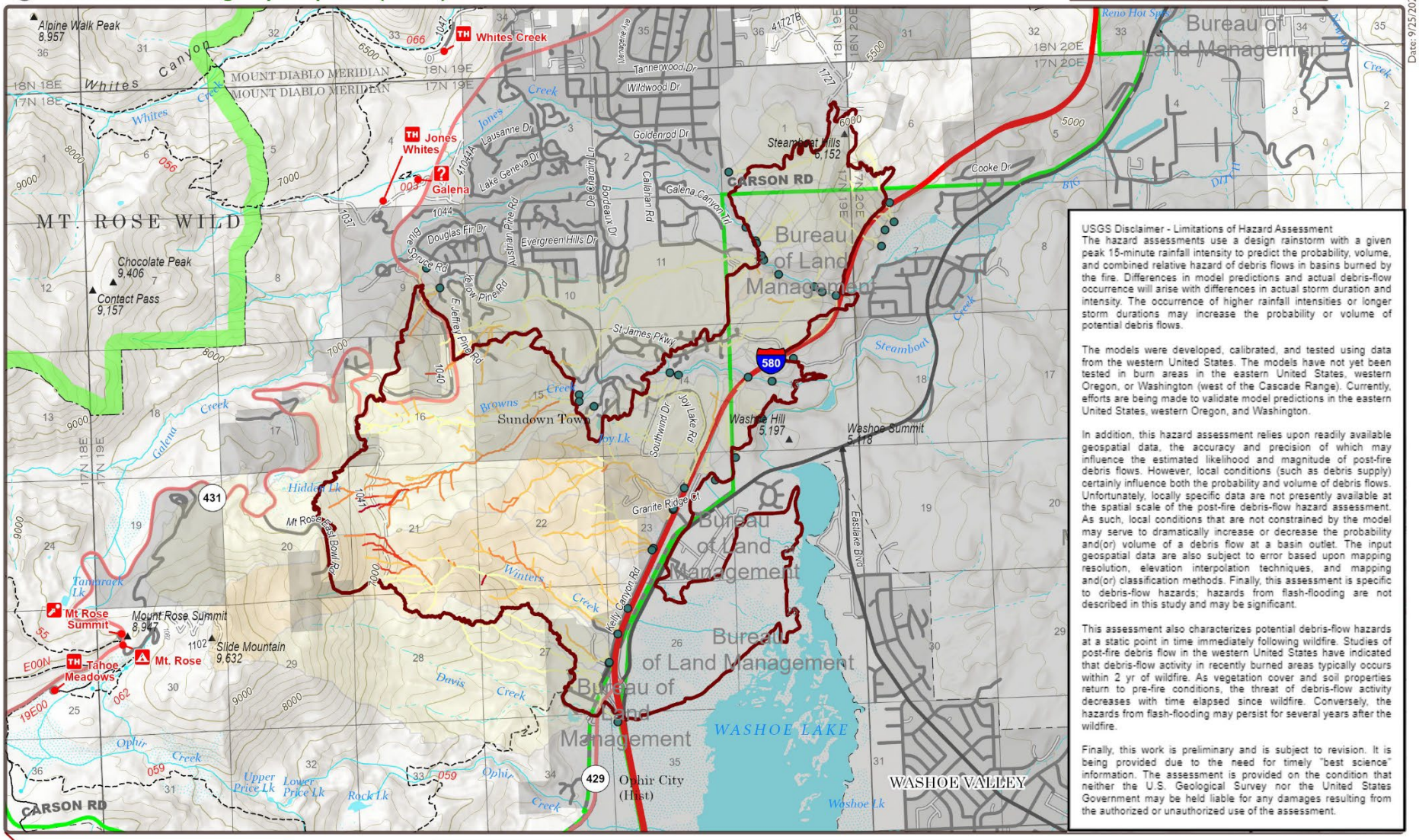
Date: 9/25/2024



USGS Disclaimer - Limitations of Hazard Assessment

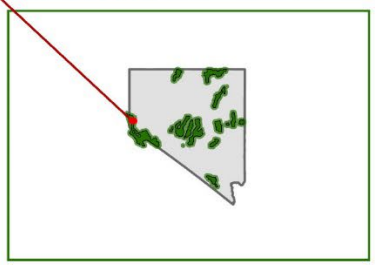
The hazard assessments use a design rainstorm with a given peak 15-minute rainfall intensity to predict the probability, volume, and combined relative hazard of debris flows in basins burned by the fire. Differences in model predictions and actual debris-flow occurrence will arise with differences in actual storm duration and intensity. The occurrence of higher rainfall intensities or longer storm durations may increase the probability or volume of potential debris flows.

The models were developed, calibrated, and tested using data from the western United States. The models have not yet been tested in burn areas in the eastern United States, western Oregon, or Washington (west of the Cascade Range). Currently, efforts are being made to validate model predictions in the eastern United States, western Oregon, and Washington.

In addition, this hazard assessment relies upon readily available geospatial data, the accuracy and precision of which may influence the estimated likelihood and magnitude of post-fire debris flows. However, local conditions (such as debris supply) certainly influence both the probability and volume of debris flows. Unfortunately, locally specific data are not presently available at the spatial scale of the post-fire debris-flow hazard assessment. As such, local conditions that are not constrained by the model may serve to dramatically increase or decrease the probability and(or) volume of a debris flow at a basin outlet. The input geospatial data are also subject to error based upon mapping resolution, elevation interpolation techniques, and mapping and(or) classification methods. Finally, this assessment is specific to debris-flow hazards; hazards from flash-flooding are not described in this study and may be significant.

This assessment also characterizes potential debris-flow hazards at a static point in time immediately following wildfire. Studies of post-fire debris flow in the western United States have indicated that debris-flow activity in recently burned areas typically occurs within 2 yr of wildfire. As vegetation cover and soil properties return to pre-fire conditions, the threat of debris-flow activity decreases with time elapsed since wildfire. Conversely, the hazards from flash-flooding may persist for several years after the wildfire.

Finally, this work is preliminary and is subject to revision. It is being provided due to the need for timely "best science" information. The assessment is provided on the condition that neither the U.S. Geological Survey nor the United States Government may be held liable for any damages resulting from the authorized or unauthorized use of the assessment.



Basins - Probability

- 0-20%
- 20-40%

Segments - Probability

- 0-20%
- 20-40%
- 40-60%
- 60-80%
- 80-100%
- Assessment Boundary
- Non-Forest Service Lands