

# Lower Sugarloaf Fire Burned Area Summary

## Burned Area Report

### Fire Background

The lightning caused Lower Sugarloaf Fire was observed on Monday, September 1, 2025, near Sugarloaf Lookout about 12 miles NE of Leavenworth, Washington. The fire burned from west to east driven by a high wind event over several days. As of October 19, 2025, the fire was approximately 42,980 acres and was 99% contained.

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 Burned Area Emergency Response (BAER) program is designed to identify and manage potential risks to resources on National Forest System lands and reduce these threats through appropriate emergency measures to protect human life and safety, property, and critical natural or cultural resources. BAER is an emergency program for stabilization work that involves time critical activities to be completed before damaging events to meet program objectives.

The Forest Service assembled a BAER team on October 12, 2025, for the Lower Sugarloaf Fire. This team of experts in various resource disciplines began assessing the post-fire effects to critical values on Forest Service lands. Impacts to the soil are the primary indicator of potential post-fire changes in watershed response, as well as watershed recovery. The team developed a soil burn severity (SBS) map to document the degree to which the fire had changed soil properties. Using the SBS map, physical scientists can predict erosion potential, changes to runoff and flood flows, and increased geologic hazards. Field evaluations and modeling results are used to determine relative increases in post-fire risk to different critical values and inform recommendations to address these increased risks.



*Figure 1: Example of Low SBS in ash cap soils within the fire.*

### Soils

Soil burn severity is not an assessment of vegetation consumption, but rather an integration of vegetation loss, changes in soil structure and infiltration capacity, remaining vegetation, duff, or ash, and soil color, all of which may indicate relative degrees of soil heating.

The final soil burn severity maps were developed with ESRI ArcGIS software using satellite-imagery-derived Burned Area Reflectance Classification (BARC) and field survey data. Field work included assessment of ash characteristics, ground cover, root condition, soil structure, soil water-repellency, and vegetation burn severity as described in the Field Guide for Mapping Post-fire Soil Burn Severity (Parsons et al. 2010). High burn severity is characterized by a complete consumption of organic material with the surface layers of the soil resulting in a change to single-grain structure. Fine roots are commonly charred or consumed 3-5

cm deep. The highest-severity areas often have a loose, dusty appearance, and no longer have any cohesion or soil strength. Generally, there will be less destruction of soil organic matter, roots, and structure in an area mapped as moderate compared to high. In areas mapped as moderate SBS, the soil structure, roots, and litter layer may remain intact beneath a thin ash layer. Low soil burn severity results in very little alteration of soil organic matter and little or no change in soil structural stability.

Mapped and validated SBS for the burned area is High (4%), Moderate (20%), Low (60%), and Very Low/Unburned (16%) (see map on Page 6). 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. Erosion after fires can cause tremendous damage to homes and other structures in the years after a fire.

## Geology

The team identified the 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 critical values. Using the understanding of rock types and characteristics, geomorphic processes, and distribution of geologic hazards helps predict how the watersheds will respond to and be impacted by upcoming storms. Major geologic forces that shaped much of the landscape include volcanism, glaciation, landsliding, and fluvial/alluvial processes. Parent materials are composed of volcanic ash and pumice, glacial till, igneous (granitic) and metamorphic (gneiss) rock formations.

The team provided soil burn severity field data to the US Geological Survey Landslide Hazard Program to assist in forecasting the probability, potential volumes, and hazards of debris flows through their developed empirical models. The USGS Post-fire Debris Flow Hazard Model estimates that short-duration, high-intensity rainstorms (a 15-minute rainfall intensity of 24mm/hour for this assessment) tend to trigger debris flows. The drainages at high combined hazard for mass movement are Tillicum Creek, Medicine Creek, and Tamarack Creek. Most

estimated basins within the fire have moderate combined hazard for debris flow (see maps on Pages 7 and 8).

## Hydrology

Primary 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. Watershed response is dependent on the occurrence of rainstorms and rain-on-snow events and will likely be greatest with initial storm events. Increased watershed response is most likely 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 flow accumulation and increases infiltration.



*Figure 2: Burned drainage along NFSR 52 within the Lower Sugarloaf Fire.*

A rapid hydrologic assessment suggests that there will be increased response particularly in small, steep drainages with a high percentage of high and moderate SBS, particularly in the headwaters of Tillicum Creek, Roaring Creek, and Beaver Creek.

## **Critical Values**

The first critical value BAER teams assess is always human life and safety on National Forest System lands. During and after heavy rainstorms, Forest Service employees and visitors to National Forest System Lands could be threatened by floodwaters, fire-weakened trees, and debris flows. In addition, users of roads within and downstream of the burned areas may be affected by road washouts during and after heavy rainstorms. The National Weather Service can establish an early warning alert plan for areas that are potentially at risk from these events. In addition, general warning signs and communications to travelers on any National Forest System roads and snowmobile trails within or directly adjacent to the fire are recommended.

## **Roads and Bridges**

Roads in and downstream of burned areas are at risk of damage due to post-fire conditions. The most likely threat due to the fires is clogging of culverts, bridges, and other in-channel infrastructure from the higher levels of floatable debris (especially burned trees) in burned watersheds. Once blocked by debris, road drainage structures no longer function and the stream flows over the road, often causing considerable damage and limiting access. Various measures can reduce this risk, including protecting culvert inlets with debris racks, removing large floatable debris from channels upstream of structures before floods, and making heavy equipment available and readily mobilized during storm events to keep structures clear of debris.

Debris flows are less likely than debris-laden flood flows, but they pose a greater threat to roads when they do occur and are difficult to mitigate.

Critical values addressed in the BAER report include Forest Service System Roads and related drainage features. Treatments for the protection of these roads include storm proofing, installation of drainage dips along the road and armored dips at stream crossings, drivable water bars, and storm inspection and response.

## **Recreation**

National Forest System recreation infrastructure

includes the French Corral Day Use Area that contains an outhouse, storage shed, and kiosk. The hazard trees at the site have already been removed and the site is unlikely to be impacted by post-fire storm events. No treatments are proposed.

## **Invasive Plants**

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 invasive plants expand, reducing habitat for native plant species and wildlife. Shifts from diverse native plant communities to non-native invasive plant dominance could alter future fire behavior, intensity, extent, and season of burning.

Current infestations are primarily located along roads, old dozer lines, and campgrounds throughout the burned area, with interior areas being largely un-infested. However, the burned area creates conditions for invasive species to outcompete native plants. The team recommends a treatment of Early Detection, Rapid Response (EDRR) to monitor for noxious weed infestation and expansion in areas disturbed due to mechanical suppression activity and burned areas prone to new noxious weed infestations.

## **Cultural Resources**

The most typical post-fire threats to cultural sites are physical threats such as erosion or damage from (now dead) falling trees. In some cases, newly exposed artifacts are threatened by human damaging activities such as looting or vandalism. Cultural resources were evaluated by the team and no unacceptable risk was found so no treatments have been proposed.

## **Federally Listed Species - Fisheries**

Critical habitat for Federally listed bull trout, steelhead, and Chinook occurs in select river drainages within or downstream of the burned area. Impacts to aquatic systems are directly related to the anticipated increases to runoff, erosion, and sedimentation in streams.



## Federally Listed Species - Botany

The Lower Sugarloaf Fire occurred within the occupied range of whitebark pine, where surviving trees face post-fire mortality risk from mountain pine beetles. To address this threat, the BAER team recommends applying verbenone, an anti-aggregation pheromone that deters beetle colonization, to select accessible stands with mature, high-value trees. This short-term treatment will help protect surviving trees, maintain seed sources, and prevent mortality during their most vulnerable post-fire period.

## Anticipated Vegetation Recovery

Post-fire recovery varies greatly based on climate, vegetation types and burn severity. It is typical for recovery to take between 3-5 years for reestablishment of ground cover. The persistence of drought in the years following wildfires also delays the recovery time frame. Even with only a short period of time since fire containment, resprouting of trees and shrubs as well as emergence of forbs have been noted within the burned area.

## Non-Forest Service Values

Since fire effects 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 Federal, State, and local agencies that have emergency response responsibilities or authorities in the post-fire environment. The BAER team and local unit BAER Coordinator has engaged with interagency partners to facilitate consideration of off-Forest values covered through other programs with the relevant responsible entities.

### Partner agency contacts:

Washington Department of Natural Resources –  
Post-Fire Recovery Program – Collin Haffey –  
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<https://dnr.wa.gov/forest-resilience-division/post-fire-recovery-program>



*Figure 3: Looking west from NFSR 1808 at stacked road system.*

## Conclusion

There are multiple phases of post-fire actions after a wildfire covering suppression repair through long-term recovery. BAER is the rapid assessment of burned watersheds by a BAER team to identify imminent post-wildfire threats to human life and safety, property, and critical natural or cultural resources on National Forest System lands and take immediate actions to implement emergency stabilization measures before the first major storms. The BAER team has identified imminent threats to critical values based on a rapid assessment of the area burned by the Lower Sugarloaf Fire. The assessment was conducted using the best available methods to analyze the potential for damage from post-fire threats, including flooding and debris flows. The findings provide the information needed to prepare and protect National Forest System critical values against post-fire threats. The recommended BAER treatments in this report are not yet approved or funded. Because of the emergency nature of BAER, initial requests for funding of proposed BAER treatments are supposed to be submitted by the Forest Supervisor to the Regional Office within 7 days of total containment of the fire. The Regional Forester's approval authority for individual BAER projects is limited. Approval for BAER projects exceeding this limit is forwarded onto the Washington Office.

BAER treatments cannot prevent all the potential flooding or soil erosion impacts, especially after a wildfire-changed landscape. It is important for the public to stay informed and prepared for potentially dramatic increased run-off events. Many

burned-area watersheds were already hydrologically responsive to rainfall and prone to erosion and sediment transport prior to the fire and will likely be even more responsive due to post-fire conditions. However, vegetation recovery is anticipated to be rapid with ground cover approaching pre-fire conditions within 3-5 years, which will attenuate any post-fire effects on watershed processes. The Forest Service will continue to provide information and participate in interagency efforts to address threats to public and private values resulting from the Lower Sugarloaf Fire.

The Forest Service will continue to work towards long-term recovery and restoration of the burned area in coordination with efforts to rebuild and restore the communities affected. A vegetation burn severity map, or mortality map, may be produced as a part of the recovery efforts to help other scientists, such as wildlife biologists, botanists, and silviculturists understand what to expect from this changed landscape for wildlife habitat, invasive weeds, timber salvage, and reforestation needs.

### **Local Forest Service Leadership**

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### **References:**

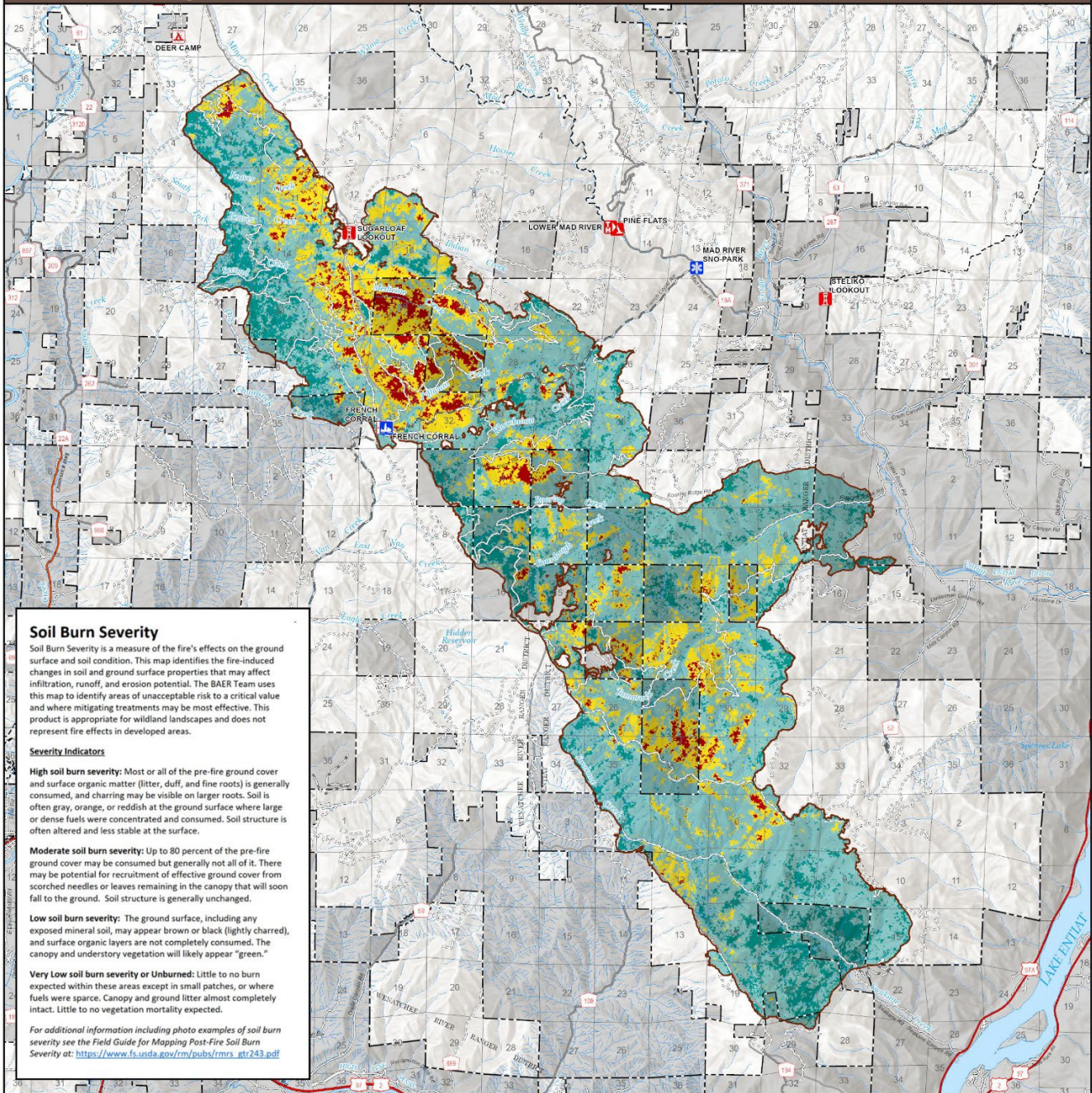
Parson, Annette; Robichaud, Peter R.; Lewis, Sarah A.; Napper, Carolyn; Clark, Jess T. 2010. Field guide for mapping post-fire soil burn severity. Gen. Tech. Rep. RMRS-GTR-243. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p.  
([https://www.fs.usda.gov/rm/pubs/rmrs\\_gtr243.pdf](https://www.fs.usda.gov/rm/pubs/rmrs_gtr243.pdf))





# Soil Burn Severity

## Lower Sugarloaf 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 sparse. 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\\_ptr243.pdf](https://www.fs.usda.gov/rm/pubs/rmrs_ptr243.pdf)

0 1 2 Miles

Assessment Boundary 43,151 acres

Soil Burn Severity	Acres	% Burned
High	1,782	4%
Moderate	8,427	20%
Low	26,096	60%
Very Low or Unburned	6,846	16%



10/14/2025  
NAD 1983 USFS R6 Albers



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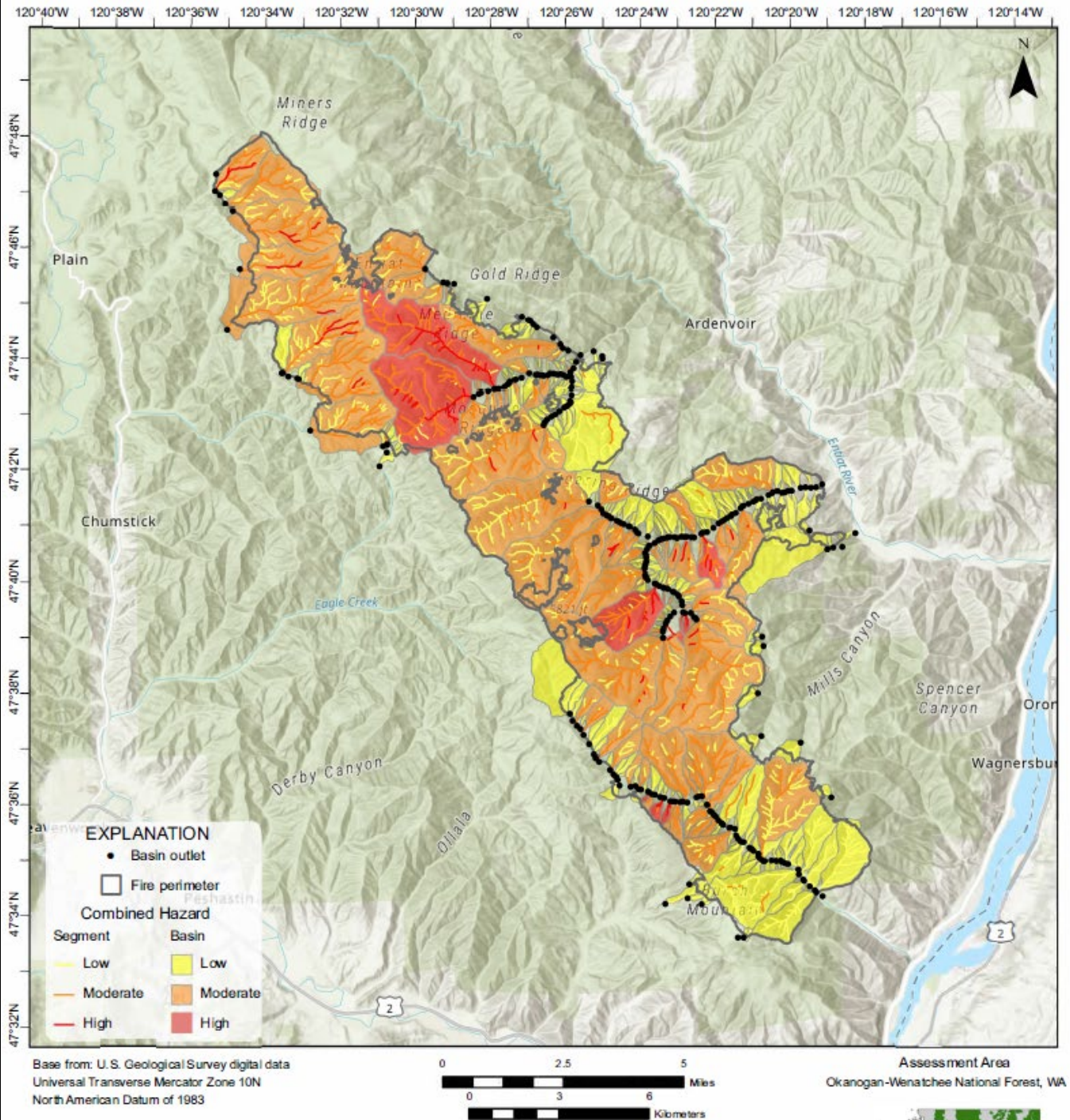
Figure 4: Soil Burn Severity for Lower Sugarloaf Fire



# 2025 Lower Sugarloaf Fire, Okanogan-Wenatchee National Forest, Washington

## Combined Hazard

Design storm: Peak 15-minute rainfall intensity 24 mm/h



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.

Figure 5: USGS combined debris flow hazard map for Lower Sugarloaf Fire.



# 2025 Lower Sugarloaf Fire, Okanogan-Wenatchee National Forest, Washington

Debris-flow Likelihood

Design storm: Peak 15-minute rainfall intensity 24 mm/h

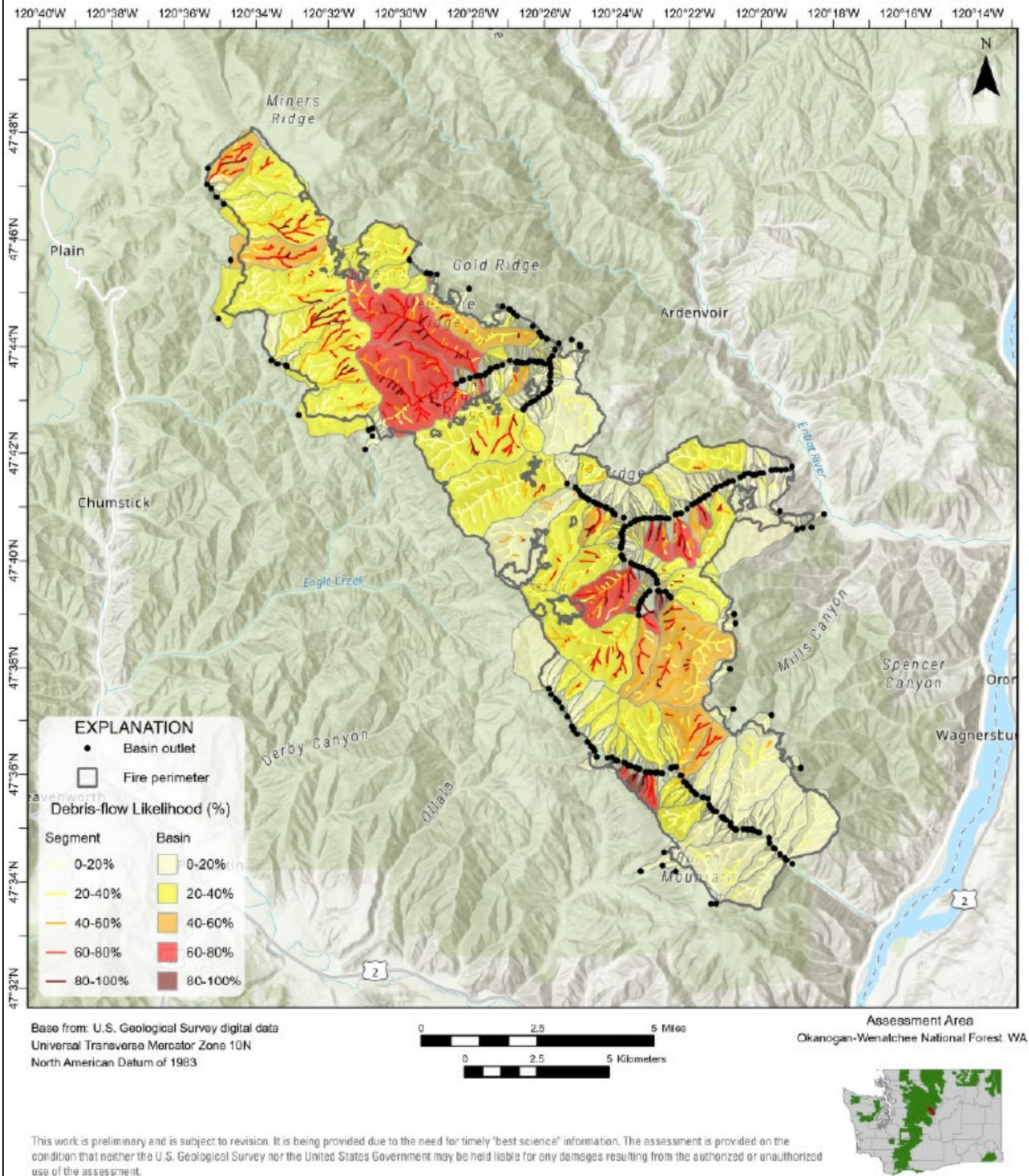


Figure 6: USGS debris flow hazard map. Likelihood of a debris flow occurring by stream segment and basin.