DOGAMI OFR O-25-09: Debris Flow Risk after the Eagle Creek Fire

What are debris flows?

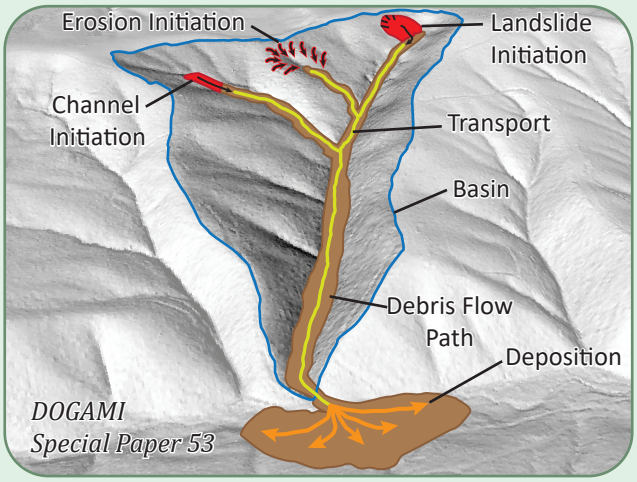
Debris flows are a type of landslide that commonly occur during periods of intense rainfall. They can travel long distances, are fast moving, and dangerous.

How do wildfires contribute?

Wildfires remove vegetation and alter soils, increasing the severity and number of debris flows for many years after the burn.

Anatomy of a debris flow

Fatal debris flow along I-84 after the 2017 Eagle Creek fire (ODOT, 2021)



Initiation
Debris flows can initiate in several different ways, usually in or adjacent to channels.

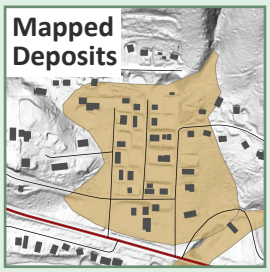
Transport
Once in the channel, the soil, rocks, large woody debris and water become a slurry with the consistency of wet cement. As it moves down the channel it grows in volume and speed, reaching up to 35 mph.

Deposition
When debris flows reach the mouth of the channel or flatter ground, the material spreads out and can severely impact developed areas such as houses and roads.

How do we understand risk from debris flows?

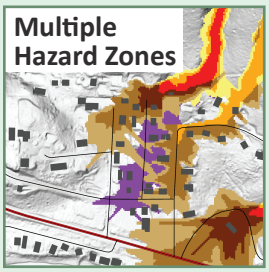
Past Debris Flows

Historic events and deposits are identified using aerial imagery and lidar. Areas that have had debris flows in the past are more likely to experience future events.



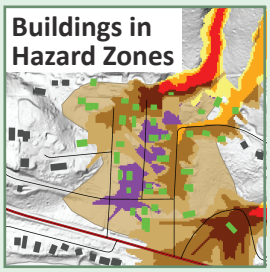
Future Debris Flows

Debris flow hazard zones are developed using a model calibrated by these historic events and mapped deposits. Zones consider multiple characteristics, including size and estimated return period.



Societal Risk

The risk of debris flow impacts to residents, buildings, and roads is assessed using the hazard zones and mapped deposits.



DOGAMI OFR O-25-09: Debris Flow Risk after the Eagle Creek Fire

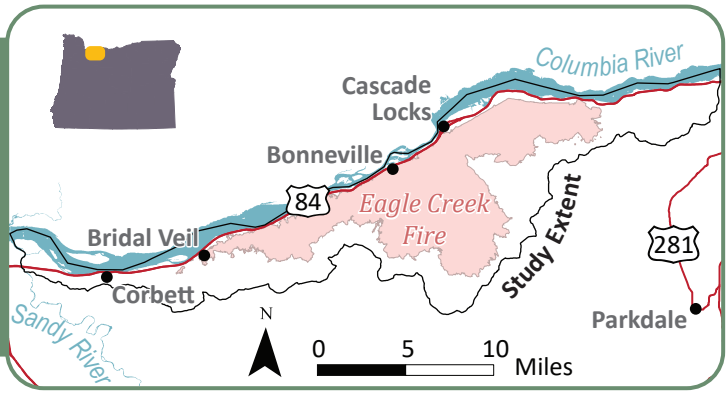
Oregon State Archives

Eagle Creek Wildfire

The Eagle Creek "megafire" occurred in September 2017 along Interstate 84 in Multnomah and Hood River Counties, Oregon. It left an already debris flow-prone landscape barren and more susceptible to future debris flows.

FEMA

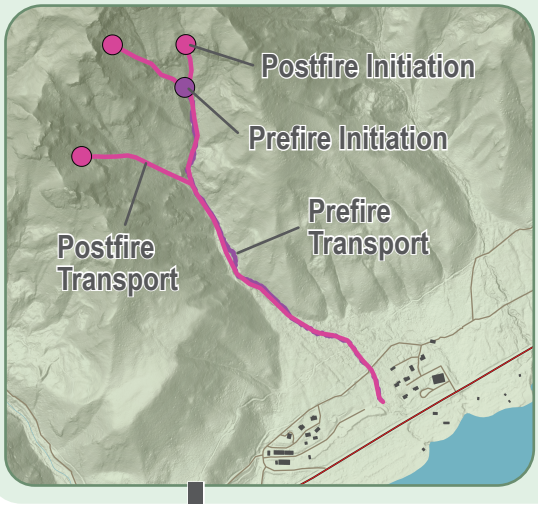
DOGAMI was provided funding by FEMA in 2021 to map historic debris flows, model future hazard areas, analyze risk, and develop a road map to risk reduction with the impacted communities for four fires: Beachie Creek-Lionshead, Holiday Farm, Archie Creek, and Eagle Creek (FEMA Grant # EMS-2021-CA-00011).



What have we found out?

Pre & postfire debris flow frequency

The average annual rate of debris flows in the Eagle Creek study area increased by ~16 times after the 2017 wildfire.



People and buildings at risk from future debris flows

The risk of a debris flow reaching a given location varies depending on the severity of the event (volume of material, travel speed, and extent of deposit). We modeled three escalating hazard zones, described below. The study area contains 2,031 buildings (1,637 are residential) and 3,202 permanent residents.

More common
Smaller impact

Less common
Larger impact

Hazard Zone (How often a hazard of that size is likely to occur)	Number of buildings and people exposed (at risk)
Typical *(10s to 100s of years)*	44 buildings, 61 people
Intermediate *(100s of years)*	86 buildings, 126 people
Extreme *(100s to 1,000s of years)*	110 buildings, 172 people

Be prepared!

Before a storm

1. Become familiar with the land around you. Identify if you live, work, or travel in potential debris flow zones. See new DOGAMI maps and/or hire a certified engineering geologist to evaluate your property.
2. Establish evacuation routes and practice. A storm could happen at night!
3. Contact your local emergency manager to learn more about preparing for an emergency.

During an extreme storm

1. Stay alert. Watch the weather.
2. Be ready to evacuate. Listen for unusual sounds and watch for changes to any stream channels around you.
3. Heed alerts from emergency officials.

Scan QR or click HERE to open report

Learn more about landslides in Oregon at www.oregon.gov/dogami/landslide