



What is? **FUEL**

Any material that burns.

You cannot have a fire without fuel. Fuel feeds a fire by providing energy, and can be anything from live or dead plant materials to structures, like homes. Fuel is the only component of the [fire behavior triangle](#) that land owners and managers can influence.

Fire behavior is dependent on certain fuel characteristics - type, amount (loading), availability, and arrangement.

Fuel type

Wildland fuels are grouped into fuel types based on the primary fuel that carries the fire. These include grass, grass-shrub, shrub, timber-understory, timber litter, and slash-blowdown. Fuel types create different fire behavior.

Grass fuels, for instance can catch and burn quickly through an area, while slash-blowdown may need more time to catch and burn. Fuels vary in type from one area of the country to another, within a state, and even within the same area.

Fuel amount (loading)

Fuel loading is simply the amount of fuel present in an area and is quantified in tons per acre. A grass fuel type would have a lower fuel amount than a slash-blowdown fuel type in most cases.

Fuel availability

Fuel availability refers to how ready a fuel is for burning. It is often related to fuel size, shape, and surface area to volume ratio. Fuels are characterized as 1-hour, 10-hour, 100-hour, or 1,000-hour based on how long it takes to change the moisture level within them, making them ready to burn. When they are dry enough to ignite, 1-hour and 10-hour fuels are largely responsible for ignition and initial fire spread. 1-hour fuels are ¼-inch or less in diameter and are flashy, light vegetation (dead needles and grasses) that respond very quickly to changes in temperature and relative humidity. Larger fuels (>3-inches) have a lower surface to volume ratio and don't ignite as readily as smaller fuels, but once they do ignite they may burn for longer time periods.



Fuel amount. Photo credit: Carrie Berger

FIRE FACTS

Fuel arrangement

Fuels are spread both horizontally and vertically in wildland environments. Fuels can be uniform or patchy and can include fuels laying directly on the ground (ground fuels), fuels in the understory (surface fuels), fuels that extend from the ground to surface into higher levels of the forest (ladder fuels), and fuels up in the forest canopy (crown fuels).



Fuel arrangement. Credit: Creative Commons

- Ground fuels include organic matter such as peat, duff, and decomposing roots.
- Surface fuels are fuels on the ground such as needles, grasses, moss, lichens, forbs, shrubs, twigs, branches, tree trunks, and other herbaceous material.
- Ladder fuels convey flames from the surface level up into the crown. Examples of ladder fuels are tall shrubs, small and medium-trees, and low-hanging limbs.
- Crown fuels are foliage and small branches of the forest canopy.

For more information:

For more information on Fire Behavior, Weather, Topography, Types of Fire, Parts of a Fire, Measures of Fire Behavior and Fire Regime visit the [Northwest Fire Science Consortium's website](#).

[Introduction to Wildland Fire Behavior](#), S-190. National Wildfire Coordination Group.
[Fire Science Core Curriculum](#). 2017. OSU Extension Service, EM 9172: 197p.

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