NORTHWEST FIRE SCIENCE CONSORTIUM

What is?

FUEL MOISTURE CONTENT

Fuel Moisture Content (FMC) is a measure of the amount of water in a fuel, such as vegetation, available to a fire, and is expressed as a percent of the dry weight of that specific fuel.

FIRE FACTS

FMC is one of the primary variables in many wildfire behavior prediction models and fire danger indices, as FMC affects ignition, combustion, the amount of available fuel, fire severity and spread, and smoke generation and composition. Fire behavior prediction models increase firefighter safety and can help determine the most effective use of resources.

Fuel moisture is dependent upon both environmental conditions (such as weather, local topography, and length of day) and vegetation characteristics. FMC is usually separated into live fuel moisture content and dead fuel moisture content.

All living vegetation is considered fuel for a fire, and all living vegetation has some level of moisture contained within it. Wood in tree trunks and branches, leaves and needles, twigs, living pine cones, grasses, forbs, shrubs and moss can all become fuel for a fire, but the moisture they contain must first be driven away. So, when fuel moisture content is high, fires do not ignite readily because the heat energy is driving water through evaporation out of the plant tissues before the plant can burn. The higher the fuel moisture the more resistant the vegetation is to heat injury. However, when the fuel moisture content is low, fires start easily and can spread rapidly because all the heat energy is available to feed the fire itself. Because moisture content of wildland fuels is expressed in relation to dry weight and not just the proportion of water in the fuel, it is possible for fuels to have a moisture content above 100%. Fresh foliage developing early in the growing cycle can have moisture content values as great as 300% and vegetation entering dormancy, etc. may have as little as 50%. When the fuel moisture content is less than 30%, that fuel is essentially considered to be dead and highly

flammable. Dead fuels consist of small to large diameter down and dead woody fuels, dead grasses and forbs, and surface litter such as fallen leaves and needles. Dead fuel moistures are classed by timelag and a timelag is a measure of the rate at which a given dead fuel gains or loses moisture.

The timelag categories are:

1. 1 hour timelag fuels: less than 1/4 inch diameter
2. 10 hour timelag fuels: 1/4 to 1 inch diameter
3. 100 hour timelag fuels: 1 to 3 inch diameter
4. 1000 hour timelag fuels: greater than 3 inch diameter

The moisture content in fine, dead fuels (#1) can change very rapidly, depending on the relative humidity of the air and precipitation. Moisture content in larger fuels (#4) changes, but at a much slower rate.

Fuel moisture content is the single most important factor determining how much of the fuel is available to burn, and how much fuel might be consumed during a wildfire. Understanding the amount of moisture present in fuels can help fire and fuel managers predict wildfire behavior, determine whether a site is eligible for prescribed burning, and even identify trends in drought conditions for a particular location.

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