Weather terms

Fire weather: Weather conditions that influence fire ignition, behavior and suppression.

Fire weather watch: Term used by National Weather Service fire weather forecasters to notify fire managers, usually 24 to 72 hours in advance, that current and developing meteorological conditions may evolved into dangerous fire weather.

Red flag warning: Term used by fire weather forecaster to alert the public to an ongoing or imminent critical fire weather pattern.

Fire weather outlook/forecast: a weather prediction specially prepared for use in wildland fire operations and prescribed fire.

Fire danger: Probability – based on weather, fuel moisture and other factors – of a fire occurring, and the likelihood of it spreading. Danger is categorized as low, moderate, high or extreme.

Fire danger ratings: (https://www.nps.gov/fire/wildland-fire/learning-center/fire-in-depth/understanding-fire-danger.cfm) A description of the combination of both constant and variable factors that affect the initiation, spread, and difficulty to control a wildfire in an area.

Low: fire starts are unlikely. Weather and fuel conditions will lead to slow fire spread, low intensity and relatively easy control with light mop up.

Moderate: some wildfires may be expected. Expect moderate flame length and rate of spread. Control is usually not difficult and light to moderate mop up can be expected.

High: wildfires are likely. Fires in heavy, continuous fuel such as mature grassland, weed fields and forest litter, will be difficult to control under windy conditions. Control through direct attack may be difficult but possible and mop up will be required.

Very high: Fires start easily from all causes and may spread faster than suppression resources can travel. Flame lengths will be long with high intensity, making control very difficult. Both suppression and mop up will require an extended and very thorough effort.

Extreme: Fires will start and spread rapidly. Every fire start has the potential to become large. Expect extreme, erratic fire behavior.

Wildland fuels/surface fire fuels

Fuels: Combustible material – such as grass, leaves, ground litter, plants, shrubs, trees and other vegetation – that feed a fire.

Fuel type: refers to the type of vegetation in which a fire is burning. Used in predicting fire behavior and determining what effects a fire may have in a given area. (An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.)

Aerial fuels: All live and dead vegetation in the forest canopy or above surface fuel level including tree branches, twigs, cones, snags, moss and high brush.

Dead fuels: Fuels with no living tissue, which means moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature and solar radiation.

Flash fuels: Fuels – grass, leaves, draped pine needles, fern, tree moss and some kinds of slash – that ignite readily and are consumed rapidly when dry. Also called fine or light fuels.

Ground fuel: All combustible materials below the surface litter – including duff, tree or shrub roots, punchy wood, peat and saw dust – that normally support a glowing combustion without flame.

Heavy fuel: large diameter fuels – such as snags, logs and large limbs – that ignite and burn slower than flash fuels.

Ladder fuels: Fuels that carry fire from the ground to the tree tops, often leading to crowning.

Live fuel: Living plants – such as trees, grasses and shrubs – in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms rather than by external weather influences.

Surface fuel: Loose litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones and small branches. Can be interspersed with grasses, forbs, low and medium shrubs, tree seedlings, heavier branches, downed logs and stumps.

Drought: A period of relatively long duration with substantially below-normal precipitation, usually occurring over a large area

Energy Release Component (ERC): Computed total heat released per unit area (British thermal units per square foot) within the fire front at the head of a moving fire. Used by fire managers to assess the potential fire behavior in forest fuels.

Wildland Urban Interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Describes an area within or adjacent to private and public property where mitigation actions can prevent damage or loss from wildfire.

> Wildland: Area in which development is essentially non-existant except for roads, railroads, power lines and similar transportation or utility structures.

Dead fuels: Fuels with no living tissue, which means moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature and solar radiation.

Drought index: Number representing the difference between normal and current moisture conditions. Net effect of evaporation, transpiration and precipitation in producing cumulative moisture depletion in deep duff or upper soil levels.

Fire intensity: Amount of heat generated by a fire.

Heavy fuel: large diameter fuels – such as snags, logs and large limbs – that ignite and burn slower than flash fuels.

Keech Byram Drought Index (KBDI): Drought index based on precipitation and soil moisture and used to determine wildfire potential. Ranges from 0 (no moisture depletion) to 800 (absolutely dry conditions).

Relative humidity and relationship to temperature: Ratio of the actual amount of moisture in the air compared to the maximum amount of moisture the air would contain if it were saturated. Low relative humidity results in dryer conditions and increased fire danger.

How precipitation affects fuel dryness: Fuel dryness is impacted by various factors … the fuel type, fuel size and whether the fuel is live or dormant (dead). Small fuels like

grasses can directly absorb moisture from the air or from water droplets, quickly replenishing moisture levels. Small fuels also lose moisture more readily due to low relative humidity values, wind and high temperatures. Live fuels retain moisture far more efficiently, including the smaller fuels, and are less susceptible to daily change. Various fuel types can absorb moisture more efficiently, especially into root systems, than others. Example: conifers remain "live fuels" all year and often have "tap root systems" that absorb moisture from deep soils. Rainfall has less impact on larger live fuels and greater impact on smaller dead fuels with shorter time scales.

Dry air/dry front: Dry air is defined as an air mass noted for low moisture content. Typically, evapotranspiration rates, or the release of moisture into the air from a fuel, is maximized when "dry air" is present (air vapor pressure is less than the fuel's surface vapor pressure, leading to evaporation). A "dry front" is a boundary between air masses where the air mass behind the front that replaces the prior air mass is either drier or equal in dryness but cooler. Also, the "dry front" does not produce any rainfall as moisture is not sufficient along its boundary to produce convection. Thus, the cold front pushes through an area "dry" and ushers in reinforcing or lower dewpoint air.

Dry air mass: A portion of the atmosphere that has a relatively low dew point temperature and where the formation of clouds, fog, or precipitation is unlikely. (http://www.nwcg.gov/glossary/a-z#letter_m)

Fuel sizes classes and shape:

1 hour fuels: 0 – ¼ inch in diameter

10 hour fuels: ¼ to 1 inch in diameter

100 hour fuels: 1 – 3 inches in diameter

1000 hour fuels: 3 – 8 inches in diameter

Fuel Dryness ratings: (based on combination of 100 HR fuels and ERC percentiles)

Above Normal: In the 0-49% percentile class (ERC); numbers reversed for 100 HR fuel moisture, i.e. 51-100%.

Normal: In the 50-74% percentile ERC class, (26-50% 100 HR)

Dry: In the 75-89% percentile ERC class, (11-25% 100 HR)

Critically Dry: In the 90-96% percentile ERC class, (4-10% 100 HR)

Extremely Dry: In the 97% or greater percentile ERC class, (3% or less 100 HR)

Fuel loading: The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.

Cured fuels, dry, dead, dormant:

> Curing: Crying and browning of herbaceous vegetation or slash.
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> Dry: fuels that have low moisture content because of prolonged exposure to sunshine, dry winds, drought or low relative humidity.
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> Dead fuels: Fuels with no living tissue, which means moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature and solar radiation.

Fuels, fuel types, loading, how each is affected by fire: Fuel models were created to describe how different fuel types or fuel type mixtures are impacted by fire, i.e. how quickly they burn, rate of spread, intensity and the effects weather play. For example, an acre of fine fuels will burn more quickly and spread more rapidly due to wind than a timber fuel type with

El Nino/ impacts: This is a weather pattern driven by warmer than normal sea surface temperatures in the tropical Pacific. In Texas, El Nino's have their greatest impacts during the winter months with increased rainfall amounts and cooler temperatures. El Nino can also impact the Atlantic hurricane season, making tropical systems less likely to hit the TX Gulf Coast.

La Nina/ impacts: This is a weather pattern opposite to El Nino, occurring when cooler than normal sea surface temperatures are present in the tropical Pacific. La Nina often brings drought conditions to Texas with warmer than normal and drier than normal winters. Conversely, tropical systems impacting the Gulf Coast are more likely during La Nina summers.

Flame length: Distance between flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

Fire behavior: Manner in which a fire reacts to fuel, weather and topography.

Active

Surface: Fire that burns loose debris on the surface, which includes dead branches, leaves, and low vegetation. (http://www.nwcg.gov/glossary/a-z#letter_m)

Crown: Movement of fire through the tops of trees and shrubs, usually independent of the surface fire.

Run: rapid advance of the head of a fire; includes a marked change in fireline intensity and rate of speed.

Running: Rapidly spreading surface fire with a well-defined head.

Spotting: Fire producing sparks or embers that are carried by the wind and start new fires outside the perimeter of the main fire.

Torching: Tree or small group of trees that suddenly erupts into flames, usually burning from the bottom, up.

Smoldering: fire burning without flame and barely spreading.

Flare-up: Any sudden increase in fire spread or intensity. Unlike a blow-up, a flare-up lasts a relatively short time and does not radically change control plans.

Blow-up: Sudden increase in fire intensity or rate of spread that is strong enough to prevent direct control or upset control plans.

Creeping: Fire burning on the ground with a low flame and spreading slowly.

Candle or Candling: Single tree in a very small clump of trees that is burning from the bottom, up.

Extreme: implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column.

Fire behavior forecast: Prediction of probable fire behavior, usually by fire behavior analyst.

Defensible space: Natural or manmade area spanning at least 30 feet around a structure where combustible material has been cleared or removed, providing a barrier between you and an advancing wildfire.

Ladder fuels: Fuels that carry fire from the ground to the tree tops, often leading to crowning.

Peak burning period:

> Burning period: time of the day when fires spread most rapidly; typically from 10 a.m. to sundown.

Flash drought: A flash drought is a sub-seasonal phenomena that occurs during the summer/ early fall months when extended periods (usually 30 days or more) of hotter than normal temperatures combine with little to no rainfall. Rapid drying of live fuels and soils due to maximized evapotranspiration rates lead to wilting, or fuels more receptive to ignition.

Burn ban: Declared ban on outdoor burning, usually because of high-to-extreme fire danger. Texas A&M Forest Service does not have the authority to enact or rescind burn bans. The agency provides information about weather conditions and fire danger to county officials, who make the decision locally on a county-by-county basis.

Green up: Beginning of a new cycle of plant growth.

Texas annual wildfire seasons – when, where, main drivers

> Fire Season: Period or periods of the year when wildfires are likely to occur, spread and affect resource values sufficient to warrant organized fire management activities. Texas does not have a set fire season, though fire activity historically picks up in late summer and then again after the first freeze, lasting until spring rains bring about vegetative green-up. Consider the driest part of the state, the Trans Pecos region, in particular, generally sees an increase in wildfires in the spring.
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> A formal Texas fire season is declared when fire activity and request for help from local departments begin to increase.

Contain: When a fire is contained, it is surrounded by a fuel break. This break can include natural barriers as well as line constructed manually or mechanically. The fire is not extinguished at this point.

Control: When a fire is controlled, it is surrounded by control line, its forward progression has been stopped and it is not expected to escape under foreseeable conditions. It is not completely extinguished, but it no longer poses a direct threat to surrounding homes or property.

Confine: Least aggressive wildfire suppression strategy; typically allows the wildfire to burn itself out within established, natural boundaries such as rocky ridges, steams or road under prevailing conditions.

Control line: Inclusive term for all contrasted or natural fire barriers – including swaths of fire retardant – used to control a fire.

Mop up: Extinguishing or removing burning material on a fire after it's been controlled. Designed to make the fire safe and reduce residual smoke.

Fireline: Linear fire barrier that is scraped or dug down to mineral soil – by hand or mechanically. More generally, the term "on the fireline" is used to describe working a fire.

Firebreak: Natural or constructed barrier used to stop or check fires that may occur or to provide a control line from which to work.

Black: Area of burned vegetation after fire has past.

Wildfire: Any non-structure fire – other than a prescribed fire – that occurs in the wildland.

Wet line: Line of water or water and retardant sprayed along the ground to serve as a temporary control line to stop a low intensity fire.

Brush: Collective term for vegetation dominated by shrubby, woody plants or low growing trees; usually undesirable for livestock or timber management.

Brush fire: Fire burning in vegetation that is predominantly shrubs, brush and scrub growth.

Burning Conditions: The state of the combined factors of the environment that affect fire behavior in a specified fuel type.

Debris Burning: Fire intentionally set to clear the land or eliminate garbage and other debris.

Duff: Layer of decomposing organic materials lying just below the litter layer of freshly fallen twigs, needles and leaves, and just above the bare, mineral soil.

Fingers of a Fire: Long, narrow extensions of a fire projecting from the main body.

Fire Front: Part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified, the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smoldering combustion.

Fuel Moisture (Fuel Moisture Content): Quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit.

Hotspot: Particularly active part of the fire.

Litter: Top layer of the forest or grassland floor, composed of loose debris of dead sticks, branches, twigs and recently fallen leaves or needles.

Mineral Soil: Soil with little combustible material; found in the layers below the predominantly organic horizons.

Prescribed fire: Fire ignited intentionally under certain, predetermined conditions to meet specific land management objectives related to hazardous fuels reduction or habitat improvement. A written prescribed fire plan must be approved prior to a fire, and National Environmental Policy Act requirements must be met.

Significant Fires: Generally, fires that are 100 acres or larger in East Texas and 300 acres or larger in West Texas.

Slop Over: Evaluation of the fire to determine what suppression efforts will be needed.

Snag: Standing dead tree or part of a dead tree.

Spot Fire: fire ignited by sparks or embers that are blown outside of the perimeter of the main fire.

Uncontrolled Burn: Any fire that threatens to destroy life, property or natural resources.

Ecosystem: Area of land distinguished by certain physical features, as well as its ability to sustain certain plants and animals.

Fire Triangle: Instructional aid in which the sides of a triangle are used to represent the three factors — oxygen, heat and fuel — necessary for combustion and flame production. Removal of any of the three factors ceases flame production.

http://www.nwcg.gov/glossary/a-z#letter_m