NWCG S-190: Glossary of Terms

Introduction to Wildland Fire Behavior

Compiled on October 02, 2025

Source: NWCG S-190 Instructor Guide

Introduction

Generating a comprehensive glossary of terms from the NWCG S-190 course, covering Units 1 through 7, to support wildland firefighter training and certification (Firefighter Type 2, FFT2). Terms are extracted from course materials, including slides, exercises, and text, with definitions as provided or contextualized.

Unit 1: Basic Concepts of Wildland Fire

Parts of a Fire

Term	Definition
Fire Perimeter	The entire outer edge or boundary of a fire.
Point of Origin	The location where a competent ignition source came into contact with the material first ignited and sustained combustion occurred.
Head	The most rapidly spreading portion of a fire's perimeter, usually to the leeward or up slope.
Flanks	The parts of a fire's perimeter that are roughly parallel to the main direction of spread.
Rear or Heel	That portion of a fire edge opposite the head. Slowest spreading portion of a fire edge.
Finger	The long narrow extensions of a fire projecting from the main body.
Pocket	Unburned indentations in the fire edge formed by fingers or slow burning areas.
Island	An unburned area within a fire perimeter.
Spot	Fire ignited outside the perimeter of the main fire by a firebrand.

Suppression Terms

Term	Definition
Anchor Point	An advantageous location, usually a barrier to fire spread, from which to start constructing a fireline. The anchor point is used to minimize the chance of being flanked by the fire while the line is being constructed.
Control Line	An inclusive term for all constructed or natural barriers and treated fire edges used to contain a fire.
Fireline	The part of a containment or control line that is scraped or dug to mineral soil.
Mopup	Extinguishing or removing burning material near control lines, felling snags, and trenching logs to prevent rolling after an area has burned, to make a fire safe, or to reduce residual smoke.

Continued on next page

Term	Definition
Contained	The status of a wildfire suppression action signifying that a control line has been completed around the fire, and any associated spot fires, which can reasonably be expected to stop the fire's spread.
Controlled	The completion of control line around a fire, any spot fires, and any interior islands to be saved. Burn out any unburned area adjacent to the fire side of the control lines. Cool down all hotspots that are immediate threats to the control line, until the lines can reasonably be expected to hold under the foreseeable conditions.
Chain	Unit of measure in land survey, equal to 66 feet (20 M) (80 chains equal 1 mile). Commonly used to report fire perimeters and other fireline distances. Popular in fire management because of its convenience in calculating acreage (example: 10 square chains equal one acre).

Behavior Terms

Term	Definition
Smoldering	Fire burning without presence of flame or direct flame and barely spreading.
Creeping	Fire burning with a low flame and slowly spreading.
Running	Behavior of a fire spreading rapidly with a well-defined head.
Spotting	Behavior of a fire producing sparks or embers that are carried by the wind and which start new fires beyond the zone of direct ignition by the main fire.
Torching	The burning of the foliage of a single tree or a small group of trees, from the bottom up.
Flare-Up	Any sudden acceleration in the rate of spread or intensification of the fire. A flare-up is of relativity short duration and does not change existing control plans.
Fire Whirl	Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame.
Backing	That portion of the fire with slower rates of fire spread and lower intensity, normally moving into the wind and/or down slope.
Flaming Front	That zone of a moving fire where the combustion is primarily flaming.
Crowning	A fire that advances from top to top of trees or shrubs more or less independent of a surface fire.

Fire Triangle

Term	Definition
Oxygen	The air we breathe contains 21%. Approximately 16% is required for combustion. The most abundant chemical element on earth; supports the chemical processes that occur during a wildfire. When fuel burns, it reacts with oxygen from the surrounding air, releasing heat and generating combustion products. This process is known as oxidation.
Heat	Natural or human caused. A heat source is responsible for initial ignition of a wildfire and is also needed to maintain the fire and enable it to spread. Lightning is the most common natural source. Humans can cause heat leading to wildland fires (e.g., abandoned campfires, arson, matches, dragging chains, burning trash).
Fuel	Grass, shrub, timber, slash, artificial materials. The material that is burning. Fuel can be any kind of combustible material, especially petroleum-based products and wildland fuels.

Methods of Heat Transfer

Term	Definition
Conduction	The transfer of heat through direct contact.
Convection	The transfer of heat by the movement of a gas or liquid. Occurs when lighter warm air moves upward (e.g., smoke column above the fire; hot gases and embers move and can dry and ignite other fuels).
Radiation	Transfer of heat in a straight line through a gas or vacuum other than by heating of the intervening space. Radiant heat warms you as you stand close to a campfire or in the sunlight; can dry surrounding fuels and sometimes ignite them.

Other Terms

Term	Definition
Combustion	The rapid chemical process of oxidation that produces heat and light; in wildland fires, it involves fuel gases evolving from solid/liquid fuels when heated.

Unit 2: Fuels

Term	Definition
Fuels	All combustible materials in the wildland fire environment, including live and dead vegetation, and human-made structures.
Ground Fuels	All combustible materials below the surface litter, including duff, tree or shrub roots, punky wood, peat, and sawdust.
Surface Fuels	All combustible materials lying on or immediately above the ground, including leaves and needles, twigs, branches, stumps, logs, herbs, low shrubs, and grasses.
Ladder Fuels	Fuels that provide vertical continuity between strata, allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease.
Aerial Fuels	All live or dead vegetation in the forest canopy or above surface fuels, including tree branches and crowns, snags, moss, and high brush.
Live Fuels	Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms.
Dead Fuels	Fuels devoid of living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature, and solar radiation.
Grass Group	Fuels characterized by herbaceous plants with little or no woody tissue, such as grasses, forbs, or tundra.
Shrub Group	Fuels characterized by woody plants with multiple stems, limited in height, and with foliage from the ground up.
Timber Group	Fuels characterized by trees with needles or leaves, including forests, woodlands, and sawgrass.
Slash Group	Fuels characterized by debris from logging or other human activity, including branches, logs, and bark.
Fuel Loading	The oven-dry weight of fuels in a given area, usually expressed in tons per acre.
Fuel Depth	The average distance from the bottom of the litter layer to the top of the layer of fuel, usually the surface fuel.
Fuel Size Classes	Categories of fuel by timelag (time needed under specified conditions for a fuel particle to lose about 63 percent of the difference between its initial moisture and its equilibrium moisture content), including 1-hour, 10-hour, 100-hour, and 1000-hour fuels.
1-Hour Fuels	Fine fuels with a timelag of 1 hour or less, less than ¼ inch in diameter, highly susceptible to weather changes.
10-Hour Fuels	Fuels with a timelag of 1 to 10 hours, ¼ inch to 1 inch in diameter.
100-Hour Fuels	Fuels with a timelag of 10 to 100 hours, 1 to 3 inches in diameter.
1000-Hour Fuels	Fuels with a timelag of 100 to 1000 hours, 3 to 8 inches in diameter.
Fuel Moisture Content	The quantity of moisture in fuel expressed as a percentage of the weight when the fuel is oven-dried at 212°F.

Continued on next page

Term	Definition
Fuel Continuity	The degree or extent of continuous or unbroken distribution of fuel particles in a fuel bed, affecting a fire's ability to sustain combustion and spread.
Horizontal Continuity	The horizontal distribution of fuels at various levels or planes.
Vertical Continuity	The vertical distribution of fuel layers from the ground to the brush and tree crowns.
Fuel Availability	The portion of the total fuel that would actually consume under various burning conditions.

Unit 3: Temperature and Moisture Relationships

Term	Definition
Dry Bulb Temperature	The air temperature in our day-to-day lives, measured in the shade, 4 to 8 feet above the ground, typically in Fahrenheit (°F).
Wet Bulb Temperature	The lowest temperature to which air can be cooled by evaporating water, indicating atmospheric moisture but not a direct measurement.
Dew Point Temperature	The temperature to which air must be cooled to reach saturation, one of the most reliable methods for measuring atmospheric moisture.
Relative Humidity (RH)	The ratio of the amount of moisture in the air to the maximum amount of moisture that air would contain if it were saturated, expressed as a percentage.
Automated Weather Stations	Provide hourly observations including temperature, humidity, precipitation, wind speed, and solar radiation, used in planned ignitions and wildfires.
Fixed Automated Weather Stations	Located in permanent locations throughout the country, providing weather data.
Remote Automated Weather Station (RAWS or Fire RAWS)	Portable units set up in temporary locations to represent a small geographic area, such as a specific fire or incident.
Belt Weather Kit	A belt-mounted case with tools like anemometer, compass, sling psychrometer, used to take weather observations including air temperature, wind speed, direction, and relative humidity.
Handheld Fire Weather Meters	Electronic devices measuring temperature, humidity, wind speed, and possibly other atmospheric variables, must meet NWCG performance standards.

Continued on next page

Term	Definition
Psychrometric Tables	Used to calculate dew point and relative humidity based on field observations from Belt Weather Kit or handheld fire weather meters, a mandatory component of the Belt Weather Kit.

Unit 4: Topography

Term	Definition
Topography	The arrangement of the natural and artificial physical features of an area.
Topographic Features	Canyons, ridges, chutes and saddles, and natural, or constructed barriers.
Topographic Characteristics	Slope, aspect, and position on slope.
Contour lines	Represent the shape and elevation of the land, such as ridges, valleys, and hills.
Narrow Canyon	A steep, narrow canyon where fires can easily spread to fuels on the opposite side due to radiant heating and spotting; increases in wind and strong upslope air movement expected at sharp bends.
Box Canyon	Classified as a steep-sided, dead end canyon; fires near the base can create strong upslope drafts, leading to rapid fire spread (chimney effect).
Wide Canyon	A canyon where fire behavior is heavily influenced by wind; prevailing wind direction can be altered by the canyon direction; cross-canyon spotting not common except in high winds.
Ridges	A long narrow elevation of land; a steep slope or a similar range of hills or mountains, typically consisting of a long high area sloping down to two different aspects.
Dominant Ridge	Forms a prominent skyline feature and may have one or more spur ridges that connect to it.
Spur Ridge	A small ridge which extends finger-like from a main ridge.
Flat Ridge	Has terrain that slopes down gently from one or both sides of the ridgeline; often good for fire containment due to easier travel and moderate fire behavior.
Knife Ridge	Has steep slopes that extend down both sides of the ridgeline.
Saddle	Depression or pass in a ridgeline; wind blowing through can increase in speed, leading to changes in fire direction and accelerated rate of spread, similar to the chimney effect.
Chute	Fairly narrow and straight depressions that lead up a ridgeline; wind blowing through can increase in speed, leading to changes in fire direction and accelerated rate of spread, similar to the chimney effect.

Continued on next page

Term	Definition
Natural Barriers	Include rivers, lakes, rocks, and rock slides; any obstruction to the spread of fire, typically an area or strip devoid of combustible fuel.
Constructed Barriers	Include roads, highways, reservoirs, and containment lines created by firefighters; any obstruction to the spread of fire, typically an area or strip devoid of combustible fuel.
Barrier	Any obstruction to the spread of fire, typically an area or strip devoid of combustible fuel, including natural and constructed types.
Slope	The amount or degree of incline on a hillside; affects the amount of fuel available and fire behavior, expressed as a percent (e.g., 100 feet rise to 100 feet horizontal equals 100%).
Aspect	Cardinal direction toward which a slope faces; determines the amount of heating from the sun, influencing fuel on that slope (e.g., north, east, south, west).
Position on Slope	Relative location on a hillside, described as upper, middle, or lower; corresponds with elevation in determining type, conditions, and amount of fuel.
Rate of Spread	The relative activity of a fire in extending its horizontal dimensions, usually expressed in chains or acres per hour for a specific period in the fire's history.

Unit 5: Atmospheric Stability, Winds, and Clouds

Term	Definition
Atmospheric Stability	The degree to which vertical motion in the atmosphere is either enhanced or suppressed.
Stable	If the air parcel temperature is equal to or cooler than the environmental temperature, it will stay at its current level or sink.
Unstable	If the air parcel temperature is warmer than the environmental temperature, it will rise.
Inversion	A layer of very stable air that acts like a cap or lid to severely limit the upward movement of air.
Haines Index (HI)	Used for determining atmospheric stability (referenced in IRPG for assessment).
Smoke Layer	Visual indicator of stable atmospheric conditions; mimics clouds in modifying the fire environment by changing temperature, relative humidity, atmospheric stability, wind, fuel temperature, fuel moisture, and fire behavior.
Stratus Clouds	Visual indicator of stable atmospheric conditions; associated with low-level fog, indicating limited vertical motion.
Mountain Wave Clouds	Occur under stable conditions, indicating strong winds aloft that could surface on the lee side of a mountain range.
Towering Smoke Plume	Visual indicator of unstable atmospheric conditions; associated with increased vertical motion.

Continued on next page

Term	Definition
Cumulus Clouds	Visual indicator of unstable atmospheric conditions; result from rising air parcels, could lead to cumulonimbus clouds.
Cumulonimbus Clouds	Visual indicator of unstable atmospheric conditions; result from rising air parcels, associated with thunderstorms and gusty winds.
Wind	The horizontal movement of air relative to the surface of the earth.
Wind Direction	Compass direction from which wind is blowing.
General Winds	Large scale winds caused by high- and low-pressure systems, typically found at mid- and upper-levels of the troposphere, responsible for transporting weather systems.
Local Winds	Winds generated over a comparatively small area by local terrain and weather, differing from general pressure pattern, found at lower levels of the troposphere.
Downslope Winds	Small-scale convective winds with speeds ranging from 2-5 mph, occurring due to local cooling at night, causing cooler air to sink down slopes.
Down-Valley Winds	Small-scale convective winds with speeds ranging from 5-10 mph, occurring due to local cooling at night, causing cooler air to sink down valleys.
Land Breeze	During evening and overnight hours, occurs when land mass cools, air over land becomes stable, and rising air over water is replaced by air over land.
Sea Breeze	During late morning and early afternoon, occurs when land mass warms, air over land becomes unstable and rises, replaced by air over water.
Mid-Flame Wind	The wind that acts directly on the flaming fire front at the level of half the flame height; an excellent approximation is the eye-level wind, measurable with a wind meter.
Beaufort Scale	Used for wind measurement (referenced in IRPG for wind speed assessment).
Clouds	A visible collection of moisture suspended in the atmosphere, forming under stable or unstable conditions, not all produce precipitation.
High Clouds	Classified by height, 6,000-50,000 feet, usually pure white, made up of ice crystals.
Middle Clouds	Classified by height, 6,500-23,000 feet, usually white and gray, made of water droplets and ice crystals.
Low Clouds	Classified by height, 0-6,500 feet, usually gray, made of water droplets.
Altocumulus Castellanus	Cloud of critical concern for firefighters (outlined in red on Fire Weather Cloud Chart).
Altocumulus Floccus	Cloud of critical concern for firefighters (outlined in red on Fire Weather Cloud Chart).

Continued on next page

Term	Definition
Mature Thunder-storm	Cloud of critical concern for firefighters (outlined in red on Fire Weather Cloud Chart).
Vertically Developed Clouds	Made up of water and ice, indicate unstable conditions.

Unit 6: Critical Fire Weather

Term	Definition
Cold Front	The leading edge of a relatively cold or cooler air mass, symbolized by a blue line with triangles, can quickly change the fire environment by producing strong and shifting winds, warm and sometimes dry air mass, and unstable conditions.
Foehn Winds	Strong, dry winds caused by the compression of air as it flows down the lee side of a mountain range, can persist for days, frequently reach speeds of 40 to 60 mph but can be as high as 90 mph, and lower relative humidity, causing high rates of fire spread.
Thunderstorms	A localized storm characterized by lightning and gusty erratic outflow wind, can occur in moist and dry air mass environments, with in-draft wind speeds ranging from 10 to 20 mph and outflow wind speeds from 25 to 35 mph with gusts over 60 mph, usually lasting 2 to 3 hours.
Pre-Frontal Environment	Air mass conditions ahead of a cold front, varying by geographic area, can be very warm and dry in the western U.S. (supportive of increased fire behavior) or warm and moist in the eastern U.S. (less supportive).
Post-Frontal Environment	Air mass conditions behind a cold front, typically more stable than pre-frontal, with cooler temperatures and higher relative humidity, may be more supportive of fire behavior and growth in the eastern U.S. compared to the west.
Downdraft	Winds generated by a thunderstorm downdraft reaching the ground and spreading radially, with velocities often 25 to 35 mph and can reach as high as 70 mph.
Virga	Precipitation falling out of a cloud but evaporating before reaching the ground, an indicator of downdraft.
Rain Shaft	A dark vertical shaft of heavy rain, localized over a small area, with precipitation reaching the ground, unlike virga, and an indicator of downdraft.
Dust Cloud	A result of an incoming front stirring up sediment from the ground, creating a dust cloud that travels in front of the incoming front, an indicator of downdraft.

Continued on next page

Term	Definition
Glacier Winds	Strong, shifting winds experienced in the spring across the west where snowpack and snow fields linger over higher elevations, impacting wildland fire behavior.
Low Level Jet	A region of relatively strong winds in the lower part of the atmosphere, commonly found across the plains at night, impacting wildland fire behavior.
Pyro-Cumulus	Unstable conditions where smoke moisture condenses to form cumulus, generated from large wildfires due to intense heating inducing convection, should be monitored for further development into cumulonimbus.
Pyro-Cumulonimbus	Formation from pyro-cumulus, with fire behavior concerns identical to thunderstorms, including gusty and erratic wind onset with little or no warning, possible lightning, and rain, often obscured by smoke.

Unit 7: Alignment

Term	Definition
Fire Environment	The interaction of fuels, weather, and topography, each with characteristics and properties affecting fire behavior.
Fuels	Components of the fire environment, including plants and other materials that can burn, affected by weather and topography.
Weather	Components of the fire environment, including temperature, humidity, wind, interacting with fuels and topography.
Topography	Components of the fire environment, including terrain features like aspects and drainages, affecting fire behavior through interaction with fuels and weather.
Alignment	When fuel, weather, and topography interact and align to create optimal conditions for extreme fire behavior.
Extreme Fire Behavior	Fire behavior that is more intense than expected, potentially dangerous, resulting from the alignment of fuels, weather, and topography.
Thermal Belts	Areas where terrain features cause low humidity through the night, mentioned in the context of topography-weather interaction.
Crowning	A fire behavior where fire spreads from the surface into the tree canopy, more prone in dense timber on north aspects, mentioned in topography-fuels interaction.
Live Fuel	Vegetation that is alive and typically resistant to burning, can turn into dead fuel under dry weather conditions, mentioned in weather-fuels interaction.
Dead Fuel	Vegetation that is dead and dry, easily combustible, such as frost-killed leaves, mentioned in weather-fuels interaction.

Continued on next page

Term	Definition
Surface Fuels	Fuels on the ground, like grasses and leaves, with reduced fire intensity under trees due to wind blockage, mentioned in weather-fuels interaction.