



# *FireWorks* *Glossary*

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**adaptation:** something about an organism that helps it survive and reproduce; an aspect of its form, function, or behavior that helps it out-compete other organisms

**animal:** organism that eats or absorbs nutrients from other organisms; **heterotroph**

**bark:** the tissue covering stems, branches, and roots of a tree or shrub, extending from the cambium to the outer surface. *FireWorks* compares a tree's bark to an animal's skin.

**botanist:** a person who studies plants

**branch:** limb of a tree or shrub that grows out from the trunk or main stem

**broad-leafed:** a tree that has wide, flat leaves, as opposed to needle- or awl-shaped leaves. Most broad-leafed trees in the northern U.S. drop their leaves in the fall.

**bud:** Plants have two kinds of buds. One kind is the flower bud, which is the developing flower—not yet open. The other kind, and the meaning used in *FireWorks*, is any starting point for plant growth. This kind of bud is often called a **growing point**; a technical term for it is **meristem** tissue. It may grow at the tips of tree and shrub branches, at the tips of roots, in the cambium layer of trees, at the bases of flower and plant stems, and in many other locations. Buds are composed of living cells.

**bulb:** an underground storage organ in a plant. A bulb has roots on its lower surface and fleshy leaves above. Perennial plants are able to reproduce from their bulbs.

**burrow:** a hole in the ground used by an animal for shelter

**cambium:** a thin layer of living cells beneath a tree or shrub's bark. The cambium layer produces two kinds of cells: those that carry water and minerals from roots to leaves (**xylem**), and those that carry sugars and other nutrients from leaves throughout the plant (**phloem**).

**cavity:** a hole in a tree stem; often used by animals for nesting and shelter

**cavity nester:** an animal that raises its young in a tree cavity

**carbon dioxide:** one of many gases in Earth's atmosphere. Carbon dioxide is produced by **combustion** and **respiration**

**cell:** the basic unit of living things, the smallest living part of an organism that can make new living parts. Some organisms have only one cell, but most plants and animals that we are familiar with contain millions of cells. In a complex organism, some cells are alive, and some are no longer alive but are used by the organism for structural support or other functions.

**charred fuel:** fuel that is partly burned, with its outside surface blackened

**chemist:** a person who studies the structure and composition of substances and how they interact (chemistry) or uses chemistry in his or her work

**combustion:** the process of burning; the process of combining a substance with oxygen and a heat source, which produces heat and light

**community:** in ecology, all of the living things that occupy a habitat; the populations of all species in a given habitat. In social science, all of the people who reside in one area, are subject to the same laws, and have the same interests.

**condensation:** the change of a gas to liquid or solid form; the change of a liquid to solid form

**cone:** the "package" in which a conifer stores its seeds; reproductive structure of a conifer

**conifer:** a cone-bearing tree

**control:** the aspects of an experiment that are held constant so they will not affect the experiment's outcome; a standard of comparison against which scientists check the outcome of experimental **treatments**

**convection:** the diffusion of heat through a liquid or gas by means of molecular motion. Because gases expand when heated, much of the heat from a fire diffuses upward from a burning surface through the process of convection.

**corm:** an underground storage organ of a plant. Perennials may reproduce from corms.

**crown:** a tree's top, where most of the leaves and above-ground buds are found

**crown fire:** fire that spreads in the crowns of trees and shrubs. Crown fires are usually ignited by surface fire. They are common in coniferous forests and chaparral-type shrublands.

**deciduous:** a kind of plant that is able to shed its leaves in the fall or when it becomes very dry

**dendrochronology:** the use of tree growth rings to learn about the approximate dates of past events

**density:** the number of plants or animals in a given area, for instance, trees/m<sup>2</sup>

**dispersion:** the process of scattering or spreading, often used to refer to the way in which smoke disperses through the atmosphere

**duff:** partially decomposed organic matter lying beneath the litter layer and above the mineral soil

**ecologist:** a person who studies the relationships between organisms and their environment

**ecosystem:** a community of organisms interacting with one another and with their environment through a flow of energy and cycling of materials

**elevation:** height above sea level, expressed in meters or feet

**embryo:** a plant or animal in the early stages of development after fertilization.

**energy:** the power to make things move or change. Physicists call energy the ability to overcome inertia and to do work. Energy is transferred in many ways, including by heat, light, and chemical reactions including those of **photosynthesis** and **respiration**.

**exoskeleton:** the hard material that forms the outside of an insect's body and provides its support

**experiment:** an activity in which **observations** are used to test an **hypothesis**. An experiment is often designed with two groups of subjects. One group is subjected to a **treatment** to discover its effects; the other group, the **control**, is not subjected to the treatment and is used as a basis for comparison.

**field site:** location in an ecosystem where plants and animals can be observed, measured, or studied

**filled seed:** seed that contains a plant **embryo** so a new plant can grow from it. Unfilled seed did not complete the process of fertilization and embryo development, so it cannot develop into a new plant.

**fire management:** Actions to prevent wildland fires, suppress them, or manage them for particular purposes, like improvement of wildlife habitat

**fire regime:** the pattern of fire occurrence, size, and severity in an area or ecosystem. An ecosystem's fire regime is like a story about the forces of fire, climate, human use, and species adaptations—all interacting to affect the ecosystem over thousands of years.

**fire scar:** a wound at the base of a tree caused by heat damage to the cambium. Fire scars are usually shaped a little bit like triangles. They are often blackened in the center and pitchy around the edges. The tree continues to grow, so its bark gradually curls over the edges of the scar and sometimes buries the scar completely.

**fire triangle:** the three things necessary for fire: fuel, oxygen, and a source of heat

**firestorm:** a wildland fire that results from biolent **convection**. This is caused by a very large, intense fire or many fires that burn together. A firestorm usually produces a towering smoke column, **spot fires**, and spinning, tornado-like winds.

**flammability:** the ease with which something will start on fire

**flower:** blossom; bloom; the reproductive part of a plant

**foliage:** the leaves of a plant

**food web:** a network of organisms that supply and consume energy in an ecosystem; composed of producers, consumers, and decomposers

**forester:** a person who studies forests and is concerned with their management, use, and enjoyment

**fuel:** the living and dead vegetation that can be burned in a wildland fire. Fuel includes dead woody material, leaves of trees and shrubs, litter, duff, grasses, and other plants.

**fuel moisture:** the amount of moisture in fuels, expressed as a percent or fraction of oven dry weight. Fuel moisture is the most important fuel property controlling flammability.

**fungus:** a consumer organism that decomposes living and dead organisms by digesting their tissues and absorbing the nutrients they contain. Mushrooms and mold are kinds of fungus.

**gas:** a state of matter in which molecules can move quite freely, can expand indefinitely, and are not bound in a particular structure. If cooled sufficiently, gases form liquids or solids.

**ground fire:** fire that burns in dead, decomposing fuels on the forest floor, mostly by smoldering combustion. Fires in duff, peat, dead moss and lichens, and punky wood are typically ground fires.

**growing point:** see **bud**

**growth ring:** annual layer of growth in a tree. Ecologists and foresters use growth rings to learn about the climate and fire history of a forest.

**habitat:** the kind of place where an organism normally lives

**heartwood:** central woody core a tree trunk. Heartwood provides structural support to the tree. It is made up of dead **xylem** cells; it contains no living cells and does not help transport water, as **sapwood** does.

**heat:** a form of energy that raises the temperature of matter

**heterotroph:** organism that obtains nutrition from plants and animals; heterotrophs are not capable of **photosynthesis**.

**histogram:** a graph of the frequency distribution of observations

**hypothesis:** a tentative explanation for something that is observed and can be tested; a guess at what the outcome of an experiment will be

**insulation:** material that absorbs heat slowly and releases it slowly, so it can be used to protect an object from rapid heating or cooling

**inversion:** atmospheric conditions in which temperature increases with height above the ground

**ladder fuels:** shrubs and small trees that fill the space between the forest floor and tree crowns with flammable material, so a fire might be able to “climb the ladder” from surface fuels into the treetops

**leaf:** a plant structure that can capture energy from sunlight and store it in the chemical bonds of sugars and similar compounds; the main location of **photosynthesis** in plants

**liquid:** a state of matter in which molecules can move quite freely and can flow, but do not expand indefinitely, as a **gas** can do. If cooled sufficiently, liquids form **solids**.

**litter:** the top layer of the forest floor, not yet rotten. Litter includes freshly fallen leaves, needles, fine twigs, bark flakes, fruits, matted dead grass and other plant parts that are little altered by decomposition.

**management goals:** the conditions desired for a wildland area in the future

**management plan:** the methods to be used for meeting **management goals**

**maximum:** the greatest number in a set of numbers

**mean:** average; a numerical value intermediate between two extremes, calculated as the sum of all observations divided by the number of observations

**median:** the middle value in a set of numbers sorted from smallest to greatest

**meristem:** plant cells that are not specialized yet, so they can develop into many different kinds of cell. **Buds** contain meristem tissue.

**meteorologist:** a person who studies weather and changes in the atmosphere.  
Meteorologists sometimes use their skills to forecast weather and fuel conditions that affect wildland fire behavior.

**mineral soil:** soil that contains no organic matter

**minimum:** the smallest value in a set of values

**model:** an object made to represent something that already exists or is being designed, or a set of mathematical equations that represents hypothesized relationships

**moisture requirement:** the amount of moisture needed for an organism to survive

**natural selection:** the way evolution works; the process in which organisms that are well suited to their environment reproduce successfully and are more numerous in the next generation, and organisms of that are poorly suited to their environment do not succeed as well

**needle:** a long, narrow kind of **leaf**

**observation:** information obtained from an experience, which can be used to test an **hypothesis**. Observations are usually measured and recorded during an experiment, then analyzed to see if they support the hypothesis.

**organic matter:** the material that comprises living and dead things; also the name for complex chemical compounds that contain carbon. Decaying organic matter is an important part of soil.

**oxygen:** one of many gases in Earth's atmosphere. Oxygen is produced by **photosynthesis** and is used in both **combustion** and **respiration**.

**parasite:** an organism that obtains nutrients directly from a host plant or animal. A parasite does not usually benefit its host organism.

**phloem:** the outer layer of cells produced by a woody plant's **cambium**. Phloem cells carry sugars and other nutrients from photosynthetic tissue (mainly leaves) to other parts of the plant.

**photosynthesis:** the process in which plants trap energy from sunlight and store it in molecules made from carbon dioxide and water

**physicist:** a person who studies matter and energy. Physicists investigate light, sound, heat, mechanics, electricity, radiation, and magnetism.

**plant:** a many-celled organism that uses **photosynthesis** to capture energy from sunlight and store it in the chemical bonds of sugars or other food molecules

**PM-2.5, PM-10:** the weight (in micrograms) of smoke particles less than 2.5 (or 10) microns in diameter per cubic meter of air

**prescribed fire:** a wildland fire ignited by managers to meet particular goals. A lot of planning is needed to get ready for a prescribed fire. The people who use prescribed fire usually work closely with neighbors and safety experts to make sure the fire will meet their goals safely.

**range manager:** a person who manages grasslands or areas containing a lot of grass. Range managers often plan and control grazing of grasslands.

**reproduction:** the process by which a plant, animal, or fungus produces a new organism of the same species

**respiration:** the process in which living cells obtain energy by breaking down carbon compounds and combining them with oxygen, releasing carbon dioxide and water

**rhizome:** a creeping stem of a plant that grows in the duff or soil. Rhizomes contain **buds**, also called **growing points**, from which new plants can grow.

**riparian:** living near the banks of a river or creek

**root:** the underground portion of a plant that absorbs moisture, obtains nutrients from the soil (and may store them too), and provides support

**safety zone:** an area around a building that contains little fuel and is large enough to protect the building from wildland fire

**sapling:** a young tree

**sapwood:** the outer woody part of a tree trunk, which surrounds the dead, woody center (**heartwood**). The cells of sapwood, also called **xylem** cells, carry nutrients and water up from the roots to branches and leaves.

**seed:** offspring of a plant. Each seed contains a tiny, living plant called an **embryo** and its protective covering, which is filled with nutrients. If a seed forms without an embryo, it is called **unfilled seed**. Seeds need just the right temperature, water, sunlight, and soil conditions before they can grow; some also need to be heated, cooled, or cracked open before they can grow.

**serotiny:** a property of tree cones, in which their scales are sealed by resin and they cannot release seeds until the resin is melted by heat

**slope:** the steepness of a land area

**soil:** the covering of Earth's surface. Soil consists of fine rock particles mixed with pieces of decayed organisms.

**solid:** a state of matter in which molecules are bound in a particular structure. If heated sufficiently, solids usually form **liquids** or **gases**.

**species:** a particular kind of living thing; the populations of organisms whose members interbreed under natural conditions and produce fertile offspring

**spot fire:** a new fire that starts when burning material is carried by wind or convection ahead of an existing fire

**sprout:** to put forth new growth on a plant; to grow a new plant from **buds** on an existing plant

**stable conditions:** atmospheric conditions that do not change without energy or disturbance from outside. An atmospheric **inversion** is very stable.

**stem:** the part of a plant that holds leaves and flowers up and connects them to roots. Most stems are found aboveground but some, like **rhizomes**, occur belowground.

**sublimation:** the process in which matter changes from **solid** form to **gas** form

**succession:** the process of change in a community. After a severe fire, this is the way succession often works: Grasses and wildflowers may be the most obvious plants for a few years; then shrubs dominate, and finally trees. The first tree species to occur may be replaced by other species as succession continues.

**surface area:** the total area of the outside of an object

**surface fire:** a fire that burns in the **litter, duff**, grasses, and wildflowers on the forest floor but does not burn in the crowns of trees. In *FireWorks*, we use the term to describe fires that do not kill the mature trees in a forest.

**survival:** length of life; ability to outlive other organisms

**temperature:** hotness or coldness of an object

**thermocouple:** a tool used to measure temperature. A thermocouple is a junction of two metals whose voltage varies with temperature.

**thermometer:** a tool used to measure temperature

**thin:** to cut some, but not all, trees in an area. **Foresters** often thin trees that are growing slowly so the remaining trees can grow more vigorously and better resist insects and fungi that would kill them or decay their wood.

**trait:** an inherited characteristic

**treatment:** the aspect of an experiment that is changed so its effects can be observed and measured; usually compared with an experimental **control**, in which the same aspect of the experiment is kept constant for a standard of comparison

**tree:** a woody plant that, when fully grown, has a large central stem called a **trunk**

**trunk:** central woody stem of a tree

**unfilled seed:** seed that forms without an embryo and therefore cannot grow into a new plant

**unstable conditions:** atmospheric conditions that change readily, without energy or disturbance from outside. Thunderstorms develop in unstable conditions.

**value:** the desirability or worth of a thing

**viable:** capable of living and developing normally

**visibility:** a condition of the atmosphere that describes the ease with which objects at a distance can be seen and identified

**volatile:** evaporating rapidly at room temperature

**volume:** the amount of space occupied by an object

**wildland:** an area where the species present and the processes occurring are relatively unchanged from times before settlement by European Americans. Wildlands are often contrasted with agricultural and urban lands.

**wildland fire:** any fire, other than **prescribed fire**, occurring in a wildland

**wildlife biologist:** a person who studies wild animals and their habitat

**wood:** the tough, fibrous material that comprises tree stems and branches under the bark

**xylem:** the inner layer of cells produced by a woody plant's **cambium**. Also called **sapwood**. Xylem cells carry water and nutrients (mainly minerals) from roots to leaves.

**zoologist:** a person who studies animals

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