

Chapter Introduction: Fire Ecology

Three components – fuel, heat, and oxygen – are necessary for a fire to ignite and spread. These three components are known as the “fire triangle.” “Fuel” simply refers to the combustible material that burns and, in the case of a forest fire, typically consists of vegetation. Dead, dry vegetation, such as leaf litter or dead wood, is usually more flammable than living tissue (though some plants have leaves specially adapted to burn easily). The second component of the fire triangle is oxygen which is always present in the air. The third component, heat, can be provided by a lightning strike or by humans in the form of a carelessly discarded match or cigarette. All three components of the triangle must be present for a fire to start. The fire will die if any one of the components is eliminated. Firefighters use this principle to their advantage when trying to control a forest fire. For example, they may stop a fire’s progress by eliminating potential fuels with a “fire line” (an area around the perimeter of the fire which has been cleared of vegetation or fuels and which the fire therefore cannot cross). They can deprive the fire of oxygen by smothering it with a chemical, fire retardant, or water (this is called a wet line).

Frequent wildfires have shaped the North American landscape for thousands of years. As a result, most native plant and animal species and plant communities have evolved, adapted, and are often dependent upon the reoccurrence of fire. Rogue Valley summers are hot and dry enough that lightning ignited fires occur frequently. At the Table Rocks, the landscape historically experienced low intensity fire as often as every 3 to 5 years.

In addition to lightning caused fires, Native Americans in this region dramatically shaped the landscape by intentionally lighting fire in the forest. Fire served as a tool to extensively manage the land and maintain a healthy ecosystem (as it is used by land managers today). It also served a variety of other purposes. The use of fire promotes healthier, more abundant food resources. It maintains open habitat for deer and elk which prefer freshly sprouted vegetation. In turn, large game is easier to hunt in cleared areas. Native Americans used fire as a tool during warfare to force enemy tribes to evacuate their homes. Smoke from fires was used as a cover or to signal tribal members to gather for warfare.

There are many different types of fire in nature. These can be classified in various ways depending on the topic at hand. For the majority of the lessons on Fire Ecology, the fires are classified by their level of intensity: low intensity fires burn with less severity and lower heat and high intensity fires burn with greater severity and higher heat. In most plant communities in our region, a higher intensity fire causes greater ecological impact. Thus, if a fire is a low intensity fire, it has little ecological damage and serves an important part of a healthy ecosystem in southwestern Oregon. Occasional high intensity fires are a part of our historical fire pattern. Some plant communities, like the lodge pole pine community, rely on high intensity fires for regeneration. Lodgepole pines have serotinus cones dependent on fire to open and disperse their seeds. This plant community is usually involved in high intensity, high severity fires, resulting in high mortality of the parent plant. However, the frequency of high intensity fires in southwestern Oregon’s landscape has increased significantly with the land management practice of fire

suppression and consequent buildup of fuels. Because of the extreme heat generated by a high intensity fire a number of damaging ecological impacts can occur, including sterilization of soil. This results in a longer ecological recovery.

Plant Adaptations

With a long history of frequent fire in the landscape, many plants in our region are adapted to survive in environments with fire. Some plants even depend on fire to help them grow and disperse. There are various adaptations plants use to survive and live with fire. Plant species can typically be classified into 5 different categories based on their adaptations, though some can fit into more than one category.

Resisters

Resisters are the species that can survive moderate to low-intensity fires with little to no damage. Some adaptations of Resisters include: thick bark to shield them from fire; deep roots protected from fire; the shedding of their lower branches to prevent fire from climbing; and moist, short needles or leaves that are hard to burn. Some examples include: ponderosa pine, sugar pine, and Douglas-fir.

Sprouters

Sprouters are the species that endure fire. Sprouters resprout from their roots, trunks, limbs, and/or crown after a burn. Many shrubs are sprouters. Some of these species also have hard shelled seeds relying on fire to crack them open. While the parent plant may be injured in a fire, the new sprouts are able to grow in nutrient rich soil and have less competition. Some examples include: oak, aspen, and madrone.

Seeders

Seeders are adapted to evade fire by shedding lots of seeds that sprout after fire. These sprouts thrive from the rich nutrients recycled into the soil. Right after a fire is a prime time for a plant to disperse its seeds and germinate because there is more space to grow and less competition for resources like sunlight, water, and nutrients. Many Seeders are dependent on fire to create the habitat needed for their seedlings to sprout and grow. Seeders are not invaders because they already inhabited the area before the fire and their population does not spread as rapidly as invaders. Some examples include: buckbrush, lodgepole pine, and manzanita.

Invaders

Invaders take over recently burned areas. Their populations are either limited or unknown prior to fire. Invaders tend to have seeds that are highly dispersive by wind, animals, or people. Many invaders are noxious weeds that take over areas after disturbances such as a fire, flood, or development. Some examples include: star thistle, fireweed, and scotch broom.

Avoiders

Avoiders are least adapted to fire because they grow in areas where fire does not normally occur. They are typically found near water or in high elevations. Avoiders are a late successional species, thus they are not found in recently burned areas. Avoiders have thin bark, shallow roots, and lots of resin, which can help a fire spread.

Few avoiders survive moderate to high intensity fires. Some examples include: white fir, vine maple, western red cedar, and western hemlock.

Just as some plant species need fire to regenerate, some plant communities require periodic fire to maintain their health, or even their existence. Grassland and oak savannah are two such fire-dependent plant communities. A light surface fire will not kill an established oak tree, but will thin out undergrowth and seedlings of other plant species which would otherwise encroach on the open, grassy understory of the oak savannah. Animal species also rely on fire to stimulate new plant growth for foraging and to maintain diverse habitat types.

How does fire keep the forest healthy?

Burned Plants Give the Soil Nutrients

Nutrients from burned, organic material are recycled back into the earth and enrich the soil. Seeds of many plants will actually lay dormant in the soil until there is a fire, and then they will sprout in the nutrient rich soil. Plants like buckbrush and manzanita have seeds with a hard shell that require the heat from fire to break them open so they can sprout. Both of these brush species encourage fire by shedding their bark and twigs. When burned, nutrients from this fire prone fuel load are recycled into the soil below the plant.

Fire in the Forest Clears Clutter

Fires clear brush and debris that can cover the forest floor and prevent other plants from sprouting. Low intensity fires that clear brush and debris decrease the likelihood of a large, severe wildfire.

Fire in the Forest Creates Space

In order to remain healthy, plants and trees need space to obtain proper nutrients, sunlight, and water. When fire is suppressed, trees become crowded and shade tolerant species dominate, decreasing a forest's diversity. A diverse forest is a healthy forest, providing a greater variety of habitats and food for wildlife, as well as forest products for humans.

Fire in the Forest Kills Pests and Diseases

Regular intervals of fire help to keep pests and diseases from taking over plant communities, helping keep the plants healthy. Many animals depend on plants as a food source. An animal's survival can be threatened when diseases and pests take over a plant community.

Fire in the Forest Can Help Control Noxious Weeds

Regular, low intensity fire intervals destroy noxious weed infestations, making more room and a healthier environment for native plants. However, high intensity fires may actually help noxious weeds spread because they do well in disturbed areas.

Fire in the Forest Create Habitats

Trees that do not survive a forest fire turn into food and homes for bugs and small cavity nesting animals. There are actually more living species in and on a dead log

than in a live tree! Fires help create these important habitats and maintain a diverse and healthy forest.

Despite the many benefits of fire, for several decades (from the end of WWII until recently), fire suppression was the accepted policy on public lands. Prior to the dominance of fire suppression as a land management strategy, most western ecosystems experienced relatively frequent low to moderate severity fires that burned off leaf litter, underbrush, and dead vegetation, preventing these fuels from accumulating. Suppressing these natural fires has allowed fuel to build up, increasing the risk and frequency of high intensity, high severity fire. Fire suppression can have negative effects on many fire dependent species such as an increase in disease, insect infestations, and displacement by non-native weeds.

Returning fire to the ecosystems of the west is a serious and important challenge facing land managers today. Decades of fire suppression have resulted in unnaturally heavy fuel loads. Suburban development has expanded the wildland-urban interface (the area where wildland and development meet). Thus, reintroducing fire must be done with the utmost planning and precaution. Often a combination of practices, such as reducing fuel loads by manually removing overgrown vegetation, planning prescribed burns, and managing naturally ignited fires, is necessary. By gradually restoring natural fire patterns on public lands, we can protect ecosystem health, natural resources, and human life, communities, and property.