WILD Kids

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Fire in Arizona's Wildlands

Fire is one of the great forces of nature. It can have both positive and negative impacts on wildlife. Since most animals survive a wildland fire, perhaps the worst time for wildlife is after fire, when cover from predators is inadequate and food is scarce or nonexistent. But in the long term, as vegetation recovers, fires can improve wildlife habitat. The burned vegetation releases nutrients into the soil, encouraging new plant growth, which attracts wildlife to the burned area. Fire does not eliminate wildlife habitat, it changes habitat, and can often increase plant and wildlife diversity. Some species actually depend on fire to maintain a healthy population.

Chaparral


Scrub live oak

Of all Arizona habitat types, chaparral is one of the most highly adapted to fire. In fact, chaparral vegetation is often described as *fire-dependent*, because its health depends on frequent fire. Chaparral is characterized by short trees and shrubs (such as scrub live oak, mountain mahogany, and manzanita), which are adapted to recover quickly and reestablish after a fire. Frequent fires prevent trees from growing very large in chaparral communities.

The seeds of some chaparral plants need the heat of fire to *scarify* them so they will open and germinate. Other plants have adaptations which increase their flammability. The leaves of manzanita contain many substances that ignite and burn easily: oils, waxes, resins, fats, alcohols, and others. In addition, the small size of the leaves and twigs increases the plant's flammability. Manzanita have either extensive surface roots *or* a long tap root, which allows the plant to recover quickly after a fire. Because manzanita live in dry climates, strips of bark and branches die each year. After 30 years, nearly half of each plant has died, making it more likely to burn.

Fire in chaparral habitat has an important but short-term effect on wildlife. Decreased cover after a fire may cause rodents to abandon chaparral. But as cover regenerates, they quickly return. Deer and other herbivores benefit from new shoots that sprout after a fire.

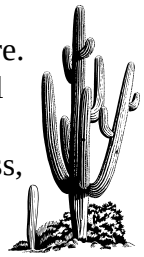
Forests

In general, trees are more resistant to fire damage than other types of plants because their bark protects the *cambium layer* (the layer just inside the bark that produces new plant tissue). The Ponderosa pine is a thick-barked tree, which is defined as *fire-resistant*. It has fire-resistant needles and tends to lose its lower branches, minimizing the spread of fire to the crown. In the past, ponderosa pine forests were much more open. Today, many areas are covered with small pine trees which greatly increases the risk of large fires, and allows fires to spread to the crown canopy. *(Question: What has caused the increase in understory growth, resulting in larger forest fires during the last 100 years?)*

Aspen trees are characterized as *fire-intolerant increasers* (they can't withstand fire, nor do they have any adaptations to fire other than they resprout and reseed). Before a fire, a chemical in the leaves and buds of aspen trees keeps the roots from sending up new shoots. But when a fire moves through, the leaves and buds are killed and the trees' roots send up thousands of new shoots (most groups of aspens spread from massive root complexes called *clones*). Fire also stimulates aspens to produce large quantities of seeds.

In the long term, fire creates more forest *edge* which provides habitat for a greater variety of animals than the forest did before the fire. In some areas, elk population numbers have tripled during the first few years after a fire.

Deserts



Fires in the Sonoran Desert were once very rare. As a result, native desert vegetation is not well adapted to fire. But, with the introduction of non-native plants such as red brome, cheatgrass, and black mustard, the frequency, size, and intensity of desert fires has increased. These non-native plants were introduced to the southwest unintentionally as a result of importing livestock or seed from other parts of the world. Red brome and black mustard are fast-growing plants that outcompete native plants for available water and nutrients. By late spring, the non-natives *desiccate* (dry out). The smallest spark on a hot day can start a fast-moving fire.

Following a desert fire, the non-native plants become the dominate vegetation type. Given hundreds of years, burned areas could recover under normal conditions, but the post-fire non-native plant communities make future fires more probable. Desert fires that occurred only once every 300 years in the past may now occur as often as every 10 years. Plants that were not killed by the first fire will most likely be killed by the second.

Although non-native plants are quick to come back after a fire, native Sonoran desert vegetation such as the saguaro, palo verde, and ocotillo are easily killed by fire, and slow to reestablish. In addition, young saguaros need "nurse plants," such as palo verde and ironwood trees, which provide shade and protection. After a fire, until palo verdes or other desert trees return, saguaros will have little opportunity to become reestablished. It may take 150 years before environmental conditions are ideal for saguaros to become well established again.

How does this affect desert wildlife? More than 16 species of birds, including the Gila woodpecker, elf owl, and cactus wren nest in saguaros. The saguaro fruit is eaten by white-winged doves, curve-billed thrashers, Gambel's quail, coyotes, javelina, deer, and almost all wildlife in the desert. The wildlife that depend on saguaros will not return to a burned area until a reproducing saguaro population is reestablished.

Grasslands

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Grasslands, by definition, are described as an ecosystem in which the dominant vegetation is *herbaceous* species (those with soft rather than woody stems). Trees and shrubs are sparse in this habitat type under natural conditions. The sparsity of trees in grasslands is attributed not only to *aridity* (dry conditions), but also to periodic fires that occurred naturally about every 10 years. Fires discriminate against trees because the majority of the vegetative matter in trees grows well above the soil surface and is more susceptible to the effects of major fires. Grasses, in contrast, have the majority of their vegetative matter near or below the ground, and as a result tend to be resistant to fire. In addition, the woody material of trees and shrubs represents several years of growth, which can be cancelled in a single fire, while the portion of grass lost in a fire represents a much shorter growing season.

Introduced non-native species of grasses, such as red brome and South African Lehmann lovegrass, outcompete native grass species. Lehmann lovegrass grows much faster than native grasses and responds well to fire. In southeastern Arizona, it is replacing native grasses in vast areas.

Mesquite trees can also outcompete native grasses. A low density of mesquite trees in grasslands is actually beneficial to wildlife and livestock. The trees provide shade for animals and the grass growing beneath them stays green longer and is more nutritious. As livestock feed on mesquite they spread the seeds, as well as reduce grass cover. Thus, overgrazing of livestock can cause an increase in mesquite, a reduction in native grasses, and disrupted fire in grasslands.

Most small mammals survive grasslands fires in underground burrows. However, due to lack of cover, population numbers may decrease after a fire but recover quickly. Pronghorn flee during a fire, but return to feed on the grasses that sprout soon after fire.

1. Contact the following agencies, or check their websites, to learn about their wildland fire management policies: National Park Service, Bureau of Land Management, and U.S. Forest Service. (Have their policies changed over time?)

2. To learn how wildland fires effect different wildlife species, check this website *(http://www.fs.fed.us/database/feis/welcome.htm)*. Write a report about the effects of fire on three different Arizona wildlife species.