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Wildfire and Wildlife: Living in Fire-Based Ecosystems

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Many people believe that all wildlife flee before the flames of a fire like the animated characters in the movie Bambi. Contrary to this belief, during the 1988 burns around Yellowstone Park, animal behavioral scientists didn't observe large animals fleeing the fire; to the contrary, most seemed completely indifferent even to crowning fires. Bison, elk, and other ungulates grazed and rested within sight of flames, often 100 yards or less from burning trees. Smaller mammals and most birds that left their habitat while it was burning returned within hours or days.

An animals ability to survive a fire depends on their mobility and on the fire's uniformity, severity, size, and duration. Large animals die most often in very large, active fires with wide flaming fronts, active crown fires, and thick ground smoke. For example, most of the large animals killed in the Yellowstone fires of 1988 died of smoke inhalation. Animals with limited mobility living above ground are most vulnerable to fire-caused injury and mortality. Animals that live in moist habitats, such as amphibians, are least likely to be affected. Season is also important with burning during the nesting season being the most damaging.

Fire most commonly affects wildlife by modifying the proportions and arrangements of habitats across a landscape. Wildlife habitats are not static, but evolve in response to fire and the subsequent changes in vegetation and structure that follow a fire. Immediately after a fire food and shelter are temporarily lost. Hidden runways and burrow openings become exposed and predation increases.

Particular successional stages or structures are important to many wildlife species when looking for a place to hide, escape to, or reproduce in. Species will immigrate to new areas when the food and cover they require are not available after a burn. The time it takes for a particular species to return to an area will depend on how much fire altered the habitat structure and food supply. Wildlife populations can shift from species that require cool, moist conditions, such as warblers and wood mice, to species that require warm, dry conditions, such as ground squirrels and quail. Unburned areas adjacent to burned areas create a mosaic, increasing wildlife choices from a range of habitat structures and conditions. Herbivores and species that prefer herbaceous vegetation for cover prefer early successional, grass/forb habitats or broad-leafed seedlings that

establish after a burn. Depending on the vegetation type, burning often increases or improves wildlife forage from a few years to as long as 100 years. Sometimes, the nutritional content and digestibility of plants increases for a few years. Dead wildlife becomes food for scavengers, including grizzly and black bears, wolves, coyotes, bald and golden eagles, crows, and ravens, and fire-killed trees become food for millions of insect larvae (and the animals that feed on them) and provide perches for raptors.

As succession continues, conifers succeed broadleafed trees, which become snags and add to dead wood accumulating on the ground. Snags and downed logs provide important habitat for cavity nesters, small mammals, and even large mammals like bears. Openings created by downed and dead trees are invaded by shrubs and saplings. When interspersed with dense patches of shrubs and trees in long-unburned areas, openings provide excellent food and cover for deer and elk. By suppressing fire, this mosaic of disturbance-born habitats succeed to forests, and wildlife species dependent on early and mid-successional stages move away.

Invertebrate populations tend to decrease after a fire because eggs, food supplies, and/or shelter are destroyed. Flying insects are especially vulnerable because they are attracted to fire by heat or smoke and are incinerated in great numbers. Surface insect populations, such as grasshoppers, also tend to decrease. Other insect populations, especially bark beetles and wood borers, increase after a fire, as trees damaged or killed provide large amounts of suitable habitat. Ants also tend to increase after fires and can eat large amounts of seed. Soil dwelling and aquatic invertebrates generally suffer little immediate damage, though indirect and long term effects are less understood or unknown. Earthworms generally live 4-8 inches under the soil surface and are probably protected from the direct effects of heating. Amphibians and reptiles avoid direct effects of fire by either moving away from it or burrowing into the soil.

Wetlands are less likely to burn, and when they do, are burned less severely than upland sites. Wetlands provide a refuge from fires for many wildlife species and activities such as breeding by aquatic species may be carried out with little interruption. Although fire in wetland areas usually increases open water and stimulates vegetation favored by many aquatic and semiaquatic species, removing adjacent riparian habitat can cause problems. Riparian vegetation shades wetland habitats and vegetative root systems hold the soil and prevent or decrease deposition of sediment into the water. When riparian plants are removed, water temperatures usually increase and dissolved oxygen content decreases, which can increase fish diseases and reduce spawning efficiency. Fine sediment can also clog fish gills, suffocate eggs and aquatic larvae on the bottom of the stream, fill in the spaces between bottom cobbles where fish lay eggs.

From the elk browsing in the meadows to the trout swimming in the streams, western wildlife has evolved and adapted to living with fire.

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