

Fire can be destructive, but it also plays an important role in the life of our natural environment. Read the selection to find out more and answer the questions that follow.

from ***Fire: Friend or Foe***¹
by Dorothy Hinshaw Patent

ADAPTATION TO FIRE

- 1 **F**ire came to Earth long before living things, so it's no surprise that both plants and animals have ways of dealing with this powerful natural force. Living things are not helpless before fire.
- 2 Each kind of natural environment, or ecosystem, has its own rhythms with relationship to fire. While it's natural for grasslands to burn every few years, the lodgepole pine forests of Yellowstone National Park burn every 250 to 350 years.

Plant Adaptations

- 3 Long-lived trees, such as ponderosa pines and redwoods, have thick, fire-resistant bark. A giant sequoia redwood can have bark a foot thick. In an ancient redwood grove, many of the trees are scarred by fires that occurred dozens to hundreds of years ago. Trees like these are rarely killed by fire, which is one reason they manage to live for so long.
- 4 Other species, such as the lodgepole pine, are adapted to rare, devastating² fires like those in Yellowstone in 1988. The lodgepole burns easily when dry, but it produces two kinds of cones. One kind opens by itself and contains seeds that sprout during years when there are no fires. The other type of cone is held shut by sticky resin. These fire-resistant cones, called serotinous cones, do not open in an ordinary year. When a hot fire roars through a lodgepole forest, it kills almost all the mature trees. But the heat from the fire also melts the resin that protects the serotinous cones, opening them. Once the seeds are released, they will germinate and grow into the next generation of lodgepoles. Other trees, such as the jack pine of the North and the Baker cypress, which lives in Northwestern forests, also have

¹ *foe* — enemy

² *devastating* — extremely damaging; destructive

serotinous cones. Many shrubs also have seeds that require fire to germinate, which can lie dormant³ for decades awaiting a burn.

- 5 The longleaf pine, which lives in the American Southeast, has its own unique way of dealing with fire. Low intensity fires on the forest floor, which could kill small seedling trees, burn frequently in the longleaf pine forests. Instead of sprouting as a seedling tree, the young longleaf grows like a clump of grass for several years, protecting the growing tip in the center. After the young plant has developed deep roots, the longleaf sends up a strong, fast-growing shoot that carries the vulnerable⁴ growing tip quickly above the danger zone.

- 6 Aspen trees live in areas with moist soil, such as along creeks or near underground springs. Each clump of trees actually arises from the same roots. Aspen are adapted to periodic fire, which kills the old trees in a clump that may have been damaged by very cold winters or insects. The clump is rejuvenated by fire when healthy new growth sprouts after the old growth is killed off. If the clump goes too long without fire, its health can be weakened by having no young vigorous growth.



New growth of some plants thrives after fire.

- 7 Grasses are especially well adapted to fire. The growing point, or crown, of grass lies at the surface of the ground, where it is protected from fire that sweeps quickly through the dry grass. The roots of grasses penetrate deeply into the soil and easily survive a normal fire.
- 8 Many wildflowers thrive after fires that open up the ground to sunlight. The underground stems of fireweed are protected from burning, and it flourishes after a fire, blooming with bright pink flowers. Its dandelion-like seeds are also scattered by the wind into burned areas, where they sprout into vigorous plants.

Winners and Losers

- 9 A burning fire can harm or benefit animals. Hunters, such as hawks and coyotes, are attracted to its edges, where they feed on small animals like mice that are fleeing the fire. Insect-eating birds, too, often feed around a fire as their prey is forced to

³ *dormant* — in an inactive state

⁴ *vulnerable* — unprotected

fly. Many animals, such as prairie dogs and ground squirrels, are hardly affected. They simply burrow into the ground to wait out the fire. The popular image of frightened deer racing to escape a forest fire as portrayed in the movie *Bambi* is false. Deer and large grazers, such as elk and bison, will feed right near the edge of a fire. If a fire becomes very intense, they can easily outrun the flames.

AFTER THE BURN

10 **T**he first rainfall after a fire brings a rapid flush of green. During the spring after the Yellowstone fires of 1988, tiny lodgepole seedlings, surrounded by the blackened trunks of their dead parents, were already stretching their shoots upward toward the abundant sunlight. Joining the pines were twenty kinds of grasses as well as wildflowers such as glacier lilies and shooting stars.



Young pine seedlings sprouting in the aftermath of fire.

Return of the Birds

11 Fire may destroy the homes of some birds, but it provides new homes for others. The burned Yellowstone forests rang with the *rat-a-tat-tat* of woodpeckers feeding on bark beetles and making nest holes where they could raise their young. Warblers and sparrows increased in numbers because they prefer the varied landscape left in the aftermath of fire to the dark and closed mature lodgepole forest. But birds such as goshawks, which need the old growth, retreat into the untouched stands of trees that remain after fire. Their numbers may decrease until the mature forest returns.

Changes over the Years

12 Every ecosystem has its own timeline, changing with the years after a major event such as a fire. The first plants to grow are those that are resistant to fire and resprout from their roots and also those whose seeds lie dormant, waiting for the stimulus⁵ of fire to germinate. These plants are sun lovers, sending up flourishing growth with the stimulation of open space and nutrients in the ashes.

⁵ *stimulus* — something that causes a response

- 13 Fast-growing shrubs accompany the grasses and wildflowers, as do young trees. Over the years, the shrubs and trees shade out the sun, and some of the plants that grew quickly after the fire, such as fireweed, disappear. In a few more years, the trees grow tall enough to shade the shrubs, and they decline as well.
- 14 As the plant species change, so do the animals. Grazers like elk thrive in the burned-over forest on the nutritious new plant growth, and birds feed on insects that specialize on those same plants. Ground nesters, like meadowlarks, and birds that nest in holes in dead trees, such as bluebirds and woodpeckers, are also common in burned-over areas.
- 15 By the time the forest is mature again, much of the animal life is gone. With reduced sunlight to fuel plant growth under the trees, there is little food for insects, so insect-eating birds are few. Dead trees fall and block the forest floor, making it difficult for large animals to get around. A mature lodgepole pine forest, for example, is a place of little life other than the pine trees themselves. The deadwood and weaker, old trees provide the perfect fuel, awaiting a dry year, another fire, and another cycle of renewal.