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## Wildfires and Grizzly Bears

Grizzly bears have lived with wildfire for as long as they have roamed the Earth and have adapted to living with fire for thousands of years. Wildfires typically create mosaic patterns of burned and unburned vegetation; because bears are highly mobile and opportunistic, they move to the unburned areas in search of food and cover. The overall long-term impact of forest fire as a natural process is that it increases diversity of habitats and maintains resilience and vigor in ecosystems, which is beneficial to grizzly bears.

While some sources of food and cover may be removed by fire in the short-term, bears quickly return to burned areas in search of carrion from animals killed by the fire. They also forage on lush revegetation of grasses and forbs, which occurs quickly, aided by a flush of nutrients recycled to the soil. As dead trees fall to the ground, they provide habitat for ants and other insects, another important component of the grizzly bear's diet. Within 3-7 years or more after the fire, berry-producing shrubs begin producing a crop again; grizzlies that have moved to unburned portions of their home range to forage on berries in late summer and fall then return to this renewed food source in burned areas. If whitebark pine stands are burned, there will be an immediate decrease in the availability of pine nuts; bears may move to new areas in the fall, searching for alternate foods, which may result in increased encounters with humans. However, the long-term effect of fire is positive for bears, because it increases ecosystem diversity and creates a greater variety of bear foods over time.

### The 1988 Yellowstone National Park Fires: A Case Study

The fires within the Yellowstone recovery zone in 1988 burned approximately 1.4 million acres. Of the 38 bears wearing radio transmitters, 21 had home ranges that contained one of more of the fires. Of these bears, 13 moved into burned areas after the fire front had passed, 3 (adult females without young) stayed within active burns as the fire progressed, 3 remained outside the fires at all times, and 2 adult females could not be located during the fires. One of these missing bears was located in 1990, and the other (a female with cubs of the year) was never found. Grizzly bears in burned areas were observed feeding on carcasses of ungulates killed in the fires, grazing on newly emerged sedges and bluegrass, digging in logs and anthills for insects, and excavating tubers and corms in non-forest surface burns. As more bears were drawn into burned areas, they were less likely to encounter humans.

Research for 5 years after the 1988 Yellowstone fires found that they had no apparent effects on bears' home range sizes, mean rates of movement, or choice of den sites, 5 of which were located in burned areas. On average, the bears used burned habitats in proportion to their availability within their ranges. During spring and summer months, bears grazed more often at burned than unburned forested sites. Reduced canopy coverage and increased soil nutrients from the fires increased the supply of foliage and tuberous roots. Ants, another bear food, thrived as dead trees provided habitat.

Another result of the 1988 fires is that about 30% of the park's mature, most productive whitebark pine trees were burned or injured, potentially reducing the short-term pine cone production from these trees; however, the amount of reduction attributable to fire damage is difficult to measure, because cone production is highly variable from year to year. The long-term impact of fire on whitebark pine is positive; fire promotes the species' regeneration and vigor.