The Effects of Fire on Rare Plants

Forest fires, and the way the Forest Service manages fires, have been in the news a lot for the last couple of years. Lawmakers are concerned, the Chief of the Forest Service is concerned, people that live in forest communities are concerned, but should conservation biologists be concerned? There is no doubt that uncontrolled wildfires in forests that are congested with excessive fuel-loads are very dangerous and have taken a heavy human and economic toll in recent years. However, fire intensity varies greatly depending on many factors, and the effect of fire on forest communities and rare species may not always be immediately apparent. The majority of concerns over the impact of fires on rare species have focused on rare plants. Most animals can move out of the way of approaching wildfires and avoid the immediate and direct effects of fire (not to discount the often significant, short-term impact on their habitat). Plants, on the other hand, are generally not able to escape. But does that mean that "fire" is bad for plants? As it turns out, in most cases it is not. This counterintuitive fact has lead to some misleading information about the overall impact of wildfire on the biological resources of public lands.

The impact of this misunderstanding on national policy is illustrated in documents prepared by White House staffers last summer. The White House announced its Healthy Forest Initiative (HFI) in the shadow of the Squires Fire (Oregon) in August 2002. They specifically cited the adverse effects of wildfire on endangered species like Gentner's Fritillary <http://www.whitehouse.gov/infocus/healthyforests/sect6.html> as one of the factors motivating the development of the HFI. However, as it turns out, one of the factors identified as contributing to the need for listing Gentner's Fritillary as endangered in the first place was the suppression of natural fires (Federal Register March 23, 1998, v. 63 no. 55 pp 13819-).

To fill the fire-effects information gap and to support the programs of the Forest Service and other agencies, I classified the effects of fire on the 186 Federally listed, proposed, and candidate plant species that are known or suspected of occurring on National Forest System Lands across the nation. Effects information came primarily from U.S. Fish and Wildlife Service documents, state Natural Heritage Programs, and NatureServe reports. Plants were classified into one of four fire-response classes: Requires Fire, Tolerates Fire, Not Affected by Fire, and Adversely Affected by Fire.

For Additional Information:
Wayne Owen: USDA Forest Service, National Botany and Rare Plant Program Leader

Plants that Require Fire (++):

Twenty-five percent (47 of 186) of all listed, proposed, and candidate species actually require fire to maintain and sustain their native populations. In most of these cases, fire is necessary to maintain the ecological conditions that the plant requires to thrive. For example, Smooth Coneflower (*Echinacea laevigata*) requires frequent fires to maintain its preferred open-canopy habitat. In contrast, some rare plants such as Kincaid's Lupine (*Lupinus sulphureus* ssp. *kincaidii*) depends on pollinators (such as the rare Fender's blue butterfly) that require fire-maintained habitats for their survival.

Plants that Tolerate Fire (+):

Sixty-five plants on the list of listed, proposed, and candidate species (35 percent) tolerate fires without long-term adverse impacts to their local populations. Some of these plants, like *Spiranthes diluvialis*, occur in habitats that burn infrequently or at long intervals. Others, such as Winkler's cactus (*Pediocactus despainii*) are typically dormant during the primary fire season in the places they live and are therefore usually not exposed to fire.

Plants that are Not Affected by Fire (0):

Thirty-eight percent (70 of 186) of the plants considered are not affected by wildfire at all. These plants typically occur in habitats that never experience fire. For example, aquatic plants like the mat-forming quillwort (*Isoetes tegetiformans*) never experience fire.

Many plants live in habitats with so little plant-life that there is essentially no fuel to carry a fire. There are several desert species (such as *Astragalus desereticus*) and beach or dune species (such as *Cirsium pitcheri*) that fit in this category. There are also several species on the list that occur in the tropical forests of the Caribbean National Forest, such as the El Toro Babyfoot Orchid (*Lepanthes eltorensis*), that have never experienced a natural fire.

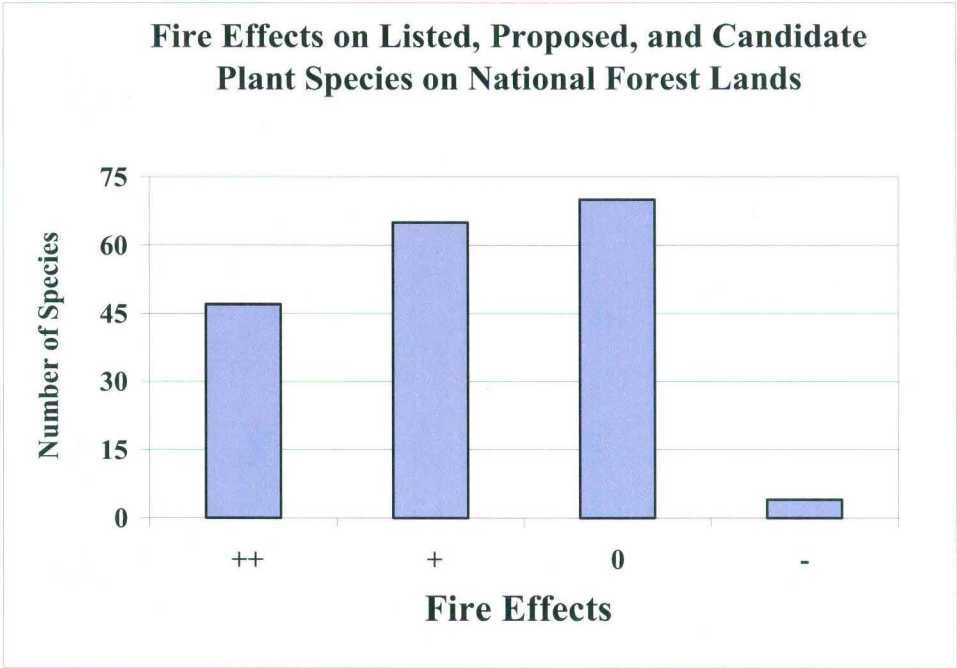
Plants that are Adversely Affected by Fire (-):
There are just four plants (about two percent) of the 186 listed, proposed, and candidate species occurring on National Forest lands that are actually harmed by fire. All four species occur in the Southeast in southern Appalachian late seral (old-growth) forest types. Two of these species are rare trilliums (*T. persistens* and *T. reliquum*). The large-flowered skullcap (*Scutellaria montana*) is immediately threatened by land conversion (suburbanization) and exotic species. The rock gnome lichen (*Gymnoderma lineare*) is one of only two lichen species protected by the Endangered Species Act.

Persistent Trillium

Relic Trillium

Large-flowered Skullcap

Rock Gnome Lichen



++ Plants that require fire to maintain their populations or requisite ecological conditions.
\+ Plants that tolerate fire without adverse population consequences.
0 Plants that are not effected by fire.
\- Plants that are adversely affected by fire.

Data derived primarily from U.S. Fish and Wildlife Service documents and NatureServe Explorer Reports. n=186.