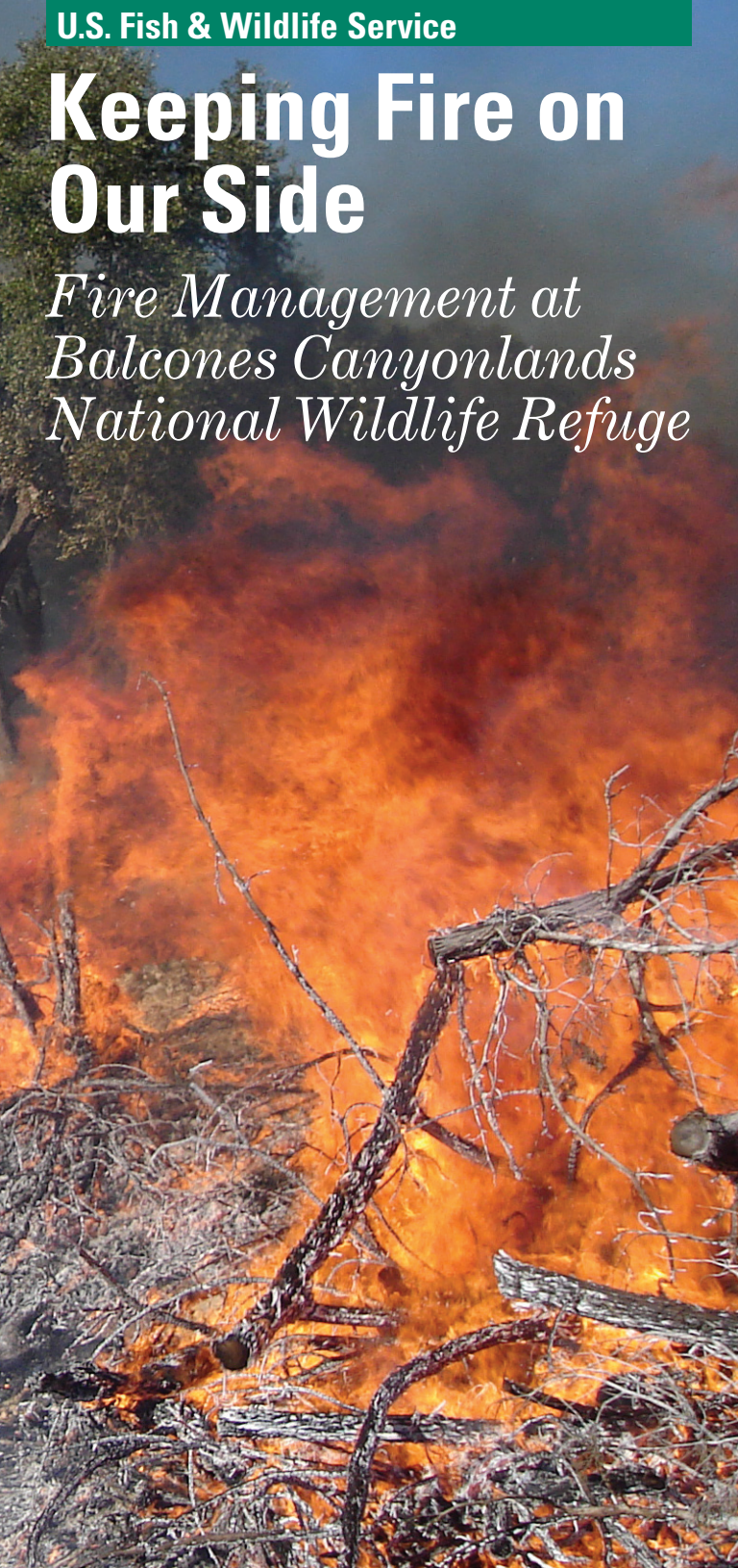
U.S. Fish & Wildlife Service

Keeping Fire on Our Side

Fire Management at Balcones Canyonlands National Wildlife Refuge



Prescribing Fire for a Healthier Refuge

Balcones Canyonlands NWR

Pairing the word "fire" with "health" may seem like a contradiction. Yet, flames have shaped the ecologically rich landscape of Balcones Canyonlands NWR over the eons. Without fire, the endangered black-capped vireo's nesting habitat is at risk. Without fire, the prolific Ashe juniper takes over the grasslands.

Just as farmers add fertilizers to garden soils, fire releases nitrogen and phosphorus in plants back into the earth. The blackened surface warms the soils and aids this natural fertilization. That's why you often see the first lush plants of the new growing season in recently burned areas.

For much of the past century, managers attempted to put out fires to protect lands and people. But they also suppressed the natural role of fire in keeping habitats healthy and diverse. Without regular burns, more fuels build up so that when wildland fires do start, they have a higher likelihood of burning out of control

Today, the Balcones team of fire experts use prescribed burning to improve wildlife habitats and reduce the risk of catastrophic fires. They are returning the process of fire as a natural tool to restore grasslands, savannahs and woodlands that harbor a tapestry of bird and animal life.

Prescribed burns restore wildlife habitat and healthy ecosystem.
FWS photograph

Wildfires often burn with greater severity on lands that have not benefited from prescribed burns or removal of hazardous fuels.
FWS photograph

What's at Stake?

Two endangered migratory songbirds fly north each spring to nest within Balcones Canyonlands NWR, established in 1992 to preserve and maintain their dwindling habitat, along with many species of concern in the Texas Hill Country. To bring back the black-capped vireo and golden-cheeked warbler from the brink of extinction will take restoring their strikingly different nesting habitats with the aid of prescribed fire. The vireo selects shrublands of varied heights that extend to ground level and are found in patches within grasslands and tend to avoid areas with higher juniper densities. The golden-cheeked warbler nests in dense forests and woodlands containing Ashe juniper and a variety of oak and other deciduous trees.

Learning from Historic Records

"We were, in fact, just entering a vast region, of which live-oak prairies are the characteristic." Olmstead (1857).

Fire managers study historical conditions to learn about the fire process of the past. They know that in addition to lightning-caused burns, Native Americans and even early settlers ignited some fires to invigorate plant growth. A few historical records give clues to how the refuge lands once appeared. One author noted the "timber is much interrupted by open, grassy uplands" (Bray, 1904). Another described the large grasslands with woodlands on "rough slopes and hillsides, breaks of streams and summits of plateaus and mesas" (Foster, 1917).

A firefighter ignites a prescribed burn that takes place only after considerable planning.
FWS photograph

The lands before 1850 appeared to be more open than found today, with grasslands punctuated by "cedar brakes, oak savannahs, oak thickets and mesquite savannahs" (Smeins, 1980). From 1850 to the present, fires have been greatly diminished on the prairies and woody plants have spread into the grasslands.

Despite efforts to control its spread, fire has never left this landscape. A wildfire in 1879 burned thousands of square miles. The Texas High Plains fires blanketed more than one million acres in November of 1906. Today, even with modern organized fire suppression and a landscape fragmented by roads and developments, the potential for large fires exists.

The Climate Connection

Rainfall and droughts have long influenced fire patterns that in the past burned at different intensities and created a mosaic of habitats. The refuge receives about 32 inches of rain annually with peaks in May and October. August is normally the driest and hottest month. Spring rainfall nourishes grasses and forbs to become the fine fuels of late summer that carry surface fires across prairies and savannahs. During extended dry periods and droughts, the woodland vegetation also becomes desiccated and susceptible to wildfires.

How long between fires?

Fire managers and ecologists decide how often lands should burn to restore natural conditions. If an area burns twice in less than seven years, those fires could significantly reduce many wood species that are less adapted to fire. An interval of 10 to 20 years between fires would maintain grassland or savannahs without eliminating most woody plants. Longer intervals could generate massive fuel loading and stand-replacing fires during droughts. All of these scenarios would maintain the landscape diversity in a grassland/woodland mosaic.

Goals for Refuge Fire Management

Fire management goals are three-pronged: to revive the health of grasslands and savannahs; to restore forests, woodlands and shrublands; and to enhance wildlife habitat diversity across the landscape—with special attention on the black-capped vireo and golden-cheeked warbler.

The Balcones fire management team includes experts in both prescribed and wildland fires. They develop burn plans to retore the role of fire for habitat diversity. They also protect wildland urban interface communities from the threats of fire by reducing fuels. The team even travels to other refuges to help them with prescribed burns.

Prairie grasslands historically burned frequently—a natural ecological process.
FWS Photograph

Reviving Grasslands and Savannahs

To visit a native prairie in this part of Texas is to step into a life-filled land where big bluestem and Indian grass ripple in the winds, where foxglove and Indian paintbrush bloom and songbirds take shelter. Most of the native grasslands and savannahs have vanished after years of plowing and intense grazing. However, the refuge grasslands hold the promise of a native prairie's return. Prescribed fires are promoting native plant restoration, and the control of invasive plants like second-growth juniper, prickly pear and false willow, as well as of exotic plants like the King Ranch bluestem.

Higher nighttime humidity helps extinguish many fires.
FWS Photograph

Restoring Forests, Woodlands and Shrublands

Beyond the open lands lie a myriad of woodlands. Juniper-oak forests line the canyons, valleys and drainages. Shin oak woodlands grow in the uplands. Oak-elm-juniper savannahs extend on both uplands and broad floodplains. In some places, Ashe junipers are taking over former grasslands, because of fire suppression and improper livestock management. In these habitats, the role of prescribed fire varies. For example, fire managers strive to prevent catastrophic fires in juniper-oak forests, while applying fire as a tool to thin shin oak woodlands.

Prescribed burns typically use natural and human-made fuel breaks to contain the fire.
FWS Photograph

Hope for the Black-capped Vireo

The black-capped vireo weaves a cup nest in the fork of a low branch in shin oak or sumac. Managers use prescribed fire to maintain, enhance or create shrublands of the suitable height for preferred nesting sites. They also mechanically remove the invading Ashe juniper. Their goal is to assure the vireo has plentiful stands of open oak brush (also called patches, mottes or "shinneries") between one and about nine feet tall for nesting and raising young.

How Fire Shapes Vireo Habitat

Fires that burn in vireo habitat affect the trees and plants differently, depending on the intensity. A more severe fire destroys all above ground vegetation, which leads to resprouting of shrublands—setting back succession. A lighter fire may burn the smallest live branches of trees and consume the dead branches closest to the ground.

Black-capped vireos nest in shrublands that require periodic fire to maintain them.
FWS Photograph

Golden-cheeked warblers nest in dense forests that can be destroyed by wildfire. Managers construct shaded fuel breaks around nesting habitats to reduce wildfire threat.
FWS Photograph

Fire managers avoid nesting season when they prescribe burns. To maintain habitat, they set light or "cool" fires to penetrate part way into the oak-mottes. The flames leave the taller bushes and trees intact, remove understory and prevents to many Ashe junipers from growing in the area. To return the oak shrublands to an earlier succession stage, managers apply fire and mechanically remove taller trees that survive the burn. When the vireos arrive in spring from a winter in Mexico, they find their nesting places more inviting than ever. The refuge then helps the birds further by trapping brown-headed cowbirds that prey on vireos by laying their eggs in vireo nests.

Hope for the Golden-Cheeked Warbler

Nesting only in the mature juniper-oak woodlands of Texas, the endangered golden-cheeked warbler finds some of its best remaining habitat within Balcones Canyonlands NWR. This songbird seeks forests with an unbroken canopy of trees that are relatively tall with a high density of oaks—found mostly on steep slopes, riparian areas and other wetter sites.

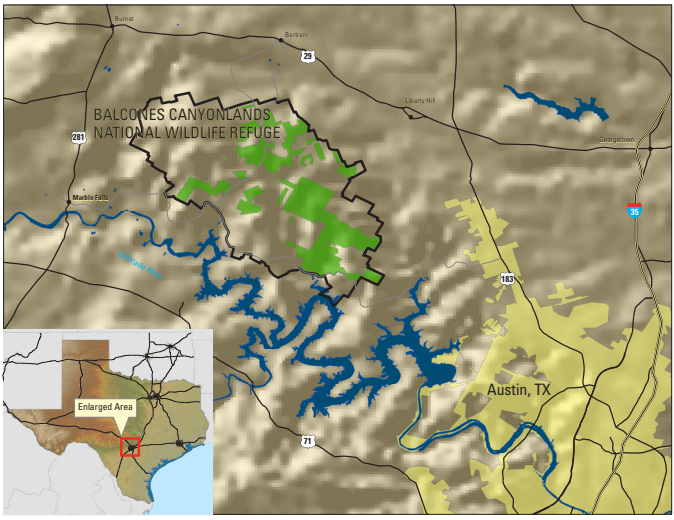
The warbler also needs the shedding bark of Ashe juniper to weave its nest. Junipers must be at least 20 years old before they start shedding back and shed more bark which is more available nesting material.

Keeping Fire Out of Prime Warbler Habitat

In contrast to the vireo, the golden-cheeked warbler inhabits areas where fire was historically less of an influence. Rocky escarpments and limestone karst formations serve as natural barriers to fire, protecting some of the denser, older forests. However, wildland fire has the potential to destroy prime habitats on the refuge. Here, managers create shaded fuel breaks surrounding known nesting warbler areas that maintain some of the important habitat elements. They also remove brush-clearing piles, fence posts and other potential fuels.

Prescribing Fire for Future Warbler Habitat

Managers apply prescribed fire to enhance low quality woodlands for future nesting. The fires help recycle nutrients, thin juniper saplings and stimulate hardwoods to sprout and grow more vigorously. They also thin stands of young junipers around the mature hardwoods to give seedlings a better chance for survival.



Research Partners

Prescribed fire is an evolving science with many partners. Balcones Canyonlands NWR is teaming up with the National Park Service, Lady Bird Johnson Wildflower Center, Texas State University, Baylor University, and the Texas Agricultural Experiment Station to test prescribed fire methods aimed at restoring native grasses and forbs. Located at the San Marcos National Fish Hatchery and Technology Center, the project features test plots on the facility's small tract of blackland prairie. There, the partners compare burning, mowing, and herbicides on the eradication of invasive King Ranch bluestem. Researchers also conduct summer prescribed burns for prairie maintenance and restoration.

For More Information

For current fire danger levels and burn bans, visit the Balcones Fire Management Program web site at: www.fws.gov/southwest/refuges/texas/balcones/firemanagement.html

You can contact the Balcones Canyonlands NWR Fire Management Program or the Refuge Manager at the address on the brochure's back cover.

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Prescribed burn at Balcones Canyonlands NWR
FWS Photograph

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