

# CONTROLLED BURN



## Environmental Effects of Prescribed Burning

By Lorie Woodward Cantu

Editor's note: This is the second installment in a 6-part series on prescribed burning, which is also referred to as controlled burning. Although fire is an important tool in a range manager's toolbox, its role is sometimes misunderstood by the general public, who see only its potential for destruction.

In dry times, particularly when burn bans are in effect, county leaders find themselves in the difficult position of balancing the conservation needs of ranching constituents with public safety.

To help facilitate informed discussions and sound decision-making, this series will provide an introduction to the topic and then explore: the effect of prescribed burning on the environment, equipment of a prescribed burn, public relations of a prescribed burn, managing smoke during a prescribed burn, and safety practices of a prescribed burn.

Historically, grassland habitat was maintained by large, nomadic herds of grazing animals and fire. Periodic fires prevented woody plants from spreading beyond the riparian areas and rocky canyons where they occurred in abundance. The flames consumed the lifeless plant litter that, over time, affected the plant community's vigor and impeded the movements of ground nesting birds such as quail, interfer-

ing with their ability to avoid predators and raise their young.

In their wake, fires left black footprints that soon turned brilliant green as plants responded with a renewed vitality. The flames released important nutrients that had been bound up in the dead plant material, renewing the soil. The fresh, lush growth, with its enhanced nutrition and improved palatability, attracted an array of insects, birds and other wildlife, as well as increasing the diversity of plants on the range.

"Prescribed fire, when it is carefully and judiciously applied, can have the same positive benefits on grasslands today," Dr. Sandra Rideout-Hanzak, assistant professor of Fire and Restoration Ecology at Texas A&M University-Kingsville, says. "The plants and animals evolved with fire, and they depend on it to maintain the habitat that they require. While many people view fire only as a source of devastation, it can also provide renewal."

### Fire + weather = results

Unlike wildfires, prescribed burns are carefully planned to help land managers reach their objectives. One of the first decisions landowners must consider is the time of year they'll burn, because soil moisture, temperature and overall weather affect the outcome.

"You never just have fire effects,

you have weather plus fire effects," Rideout-Hanzak says. If a land manager burns and has a wet year, the results are different than if the land manager burns and the weather turns dry, she says.

"Obviously, you can't control what the weather does after you burn, so you have to be very aware of the amount of soil moisture prior to burning," Rideout-Hanzak says. "If the soil moisture is low, it may be necessary to defer the burn until there is adequate moisture to ensure that the plants come back strong, healthy and as quickly as possible."

Cool season, or dormant season, burns are conducted during the cooler months of the year when plants are dormant. Warm season burns are conducted during the spring or summer when plants are actively growing.

In cases where landowners have basic goals such as knocking back woody plants and encouraging fresh growth, dormant season burns generally are recommended, Rideout-Hanzak says. Because of the cooler temperatures, the fire is easier to manage and the physical stress on the fire crew is less than in the heat of summer, making the process safer overall, she says.

Another benefit of dormant season burning is that, as the name implies, the grass is dormant. When the fire passes over the grass, it removes the

lifeless leaves and stems leaving the roots intact to support the new growth in the spring. Because the plant is not growing, it does not have to tap into its carbohydrate reserves to recover as a growing plant would, eliminating a potential source of stress. When the temperatures warm up, the top-burned dormant grass begins to grow without any ill-effects.

### Wildlife response to fire

Prescribed burning in the dormant season also provides an additional window of safety for wildlife.

“Our native wildlife and birds evolved under an ecosystem that included fire as a component,” Rideout-Hanzak says. “They are adapted to fire and instinctively know how to respond.”

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She has conducted prescribed burns throughout the state and has witnessed grassland birds flying back into the burned areas before the smoke clears to begin foraging for seeds or insects. Rideout-Hanzak has also watched birds of prey, such as hawks and, once, a barn owl, come into pastures where burns are occurring and hunt the edges of the fire in anticipation of grabbing an easy meal.

In a study conducted during a prescribed burn in an East Texas forest, the scientists followed the movements of 3 endangered Louisiana pine snakes using transmitters that had been imbedded in the reptiles. All 3 of the snakes, which were above-ground before the fire began, made it back to their burrows as the fire approached, she says.

“With fire there is a small degree of mortality,” she says. “But it is not nearly what people mistakenly believe it to be. As I tell my students, it is possible that a prescribed burn may kill an individual animal or 2, but the burn is making the habitat better for the whole population. We cannot discount an effective practice because it might hurt a single specimen, when the practice will benefit the species as a whole.”

While the mortality is minimal in any season, choosing to burn in the late fall and winter, eliminates any potential threat to the young because animals and birds are not reproducing, Rideout-Hanzak says.

In addition, many reptiles and small mammals are hibernating in underground burrows during the dormant season. The ground is an effective insulator, she says. In one study, Rideout-Hanzak placed thermocouples underground prior to a burn to record the temperature as a fire passed over the surface. Thermocouples buried an inch below ground did not record any temperature change, she says.

### Invertebrate response to fire

During the dormant season, many insects are also in diapause, the invertebrates’ equivalent of hibernation. According to Michael Warriner, invertebrate biologist with the Texas Parks and Wildlife Department, many species burrow into the ground and, therefore, are unaffected by a dormant season burn. The species that are most affected are those that overwinter in leaf litter.

“The insects that overwinter in leaf litter are hit hard by a dormant season burn,” Warriner says. “But the effects are short-term, especially if a landowner leaves an area unburned, so the insects can re-colonize.”

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After a prescribed burn, Warriner says, the overall population declines, then both numbers of insects and number of species skyrocket as the plants begin to recover. The lush growth attracts herbivorous insects such as grasshoppers and leaf-sucking insects such as aphids, he says. Fire encourages more vigorous flowering, which is a boon to species like bees and butterflies that rely on nectar and pollen.

Even wood-boring insects are attracted to the burn site because woody plants that have been weakened by fire are the ideal hosts for their eggs and larvae, he says. Generally, wood-bor-

ers cannot overcome the defenses of woody plants that are in good health.

“Whatever impacts the plant community has a similar impact on the insect community,” Warriner says. “The insect population follows the state of the plant community.” As the plant community returns to its pre-burn state with more mature plants, increased thatch, decreased diversity, the insect population slowly declines, he says.

“In a lot of systems, fire has historically maintained habitat,” Warriner says. “Prescribed burning, done well, is needed by the plants and animals that depend on it.”

Rideout-Hanzak says, “Prescribed burning is equal parts science and art. We practitioners take it very seriously because we know that prescribed burning can help us manage rangelands in perpetuity. In order to keep prescribed burning a viable tool in our toolbox, we are dedicated to being careful and doing it right.” ■