

Fire Management and Wildlife

Habitat Extension Bulletin

No. 49

Prescribed burning can be an effective management tool for improvement of wildlife habitat. Farm and ranch owners in the state of Wyoming can improve habitat for wildlife, and increase forage for domestic livestock by including prescribed burning in land management planning.

A prescribed fire is quite different from a "wildfire." Wildfires are unplanned and can be destructive, while prescribed burns are carefully planned to maximize benefits and minimize the chance of uncontrolled burning.

This bulletin describes the steps to complete a prescribed burn, expected results, and the effects on certain wildlife species.

Prescribed fire is traditionally associated with management of public forest lands. However, a great deal of fire management can be implemented on private lands where sagebrush communities predominate. Much of the 94 million acres of sagebrush habitat in the West can be improved for wildlife and livestock. Since sagebrush communities are so widespread in

Fire starting with a drip torch.



Habitat Extension Services



WYOMING GAME AND FISH DEPARTMENT



Mule deer (left) and other big game thrive on grass, shrubs, and aspen rejuvenated by fire. A controlled burn (next page) improves forage in the year following the fire (below).

Wyoming and burning of these areas is relatively common, they are discussed throughout this bulletin.

All sagebrush is not created equal: there are several subspecies, many of which occur in Wyoming. Common examples include Wyoming big sage, bud sage, black sage, and silver sage. These subspecies occur at elevations ranging from 2,000 to 10,000 feet and differ enough that unique fire prescription plans are needed for each type.

Planning Prescribed Burns

Before burning is conducted, or perhaps even considered as an option, the landowner should evaluate the condition of his or her property. Prescribed burning is one of many tools useful for range improvement; it is not a cure-all. While some range problems can be solved using prescribed burns, many others can not. There are three sound management reasons to burn areas:

Over-utilization is a nice word for overgrazing. Overgrazing normally leads to a loss of grasses and forbs, after which plant species such as big sagebrush become the dominant plants in the area. In certain cases, lands that have been abused in this manner can be rejuvenated through burning.

Under-utilization is not common but can be a problem, particularly in grasslands. Periodic burning of prairie communities was a natural cyclic occurrence in years past. Fire suppression in these areas combined with little or no grazing can lead to under-utilization. Bunch grasses (those species which colonize areas through root stocks rather than rhizomes) can become decadent, with old growth choking out new, eventually impeding plant growth. Prescribed burning can remove dead growth, return nutrients to the soil, and stimulate plant root systems to produce new growth only days after a fire passes.

Finally, *succession* is a sound reason for prescribed burning. In areas where fire has been suppressed, many undesirable species of

grasses, shrubs, and in some cases, trees, may invade the area, reducing preferred forage quality and availability. Prescribed burning provides a way to reduce these invading plants and encourage establishment of more desirable forage plants.

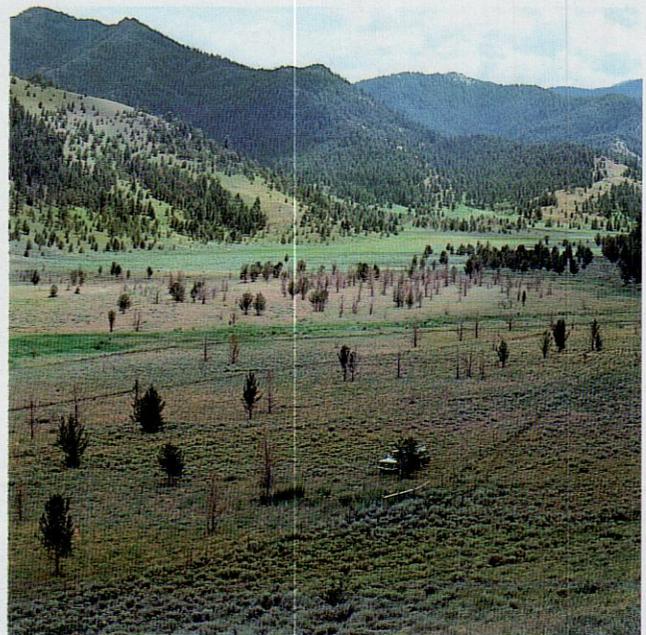
After reviewing the range condition and determining that a prescribed burn can achieve the desired improvements, the landowner should formulate a *fire use plan*. This plan consists of the following components:

1. Burn Area

First, the burn area borders must be clearly defined. This will help later when fire breaks are established. Rather than burning large acreages, plan on burning smaller sections within the larger area on a yearly rotational system. This rotational burning will maintain habitat diversity and benefit a variety of wildlife species.

2. Burn Objectives

Secondly, burn objectives must be clearly identified. What is the purpose of the burn? What effect(s) is/are desired? When should the burn be conducted (season, time of day, number of days)? Variables of a prescribed burn can be manipulated so a landowner can achieve the exact desired results.



3. Burn Prescription

Thirdly, a fire prescription must be developed to reach the established objectives. The prescription is comprised of a number of components which result in a fire that accomplishes these established objectives. For example, a fire that burns too hot may destroy preferred vegetation or sub-surface tissue of preferred plants, or it may jump fire breaks and become uncontrolled. A fire that burns too cool may not spread adequately throughout the burn area, resulting in incomplete combustion of fire fuels, spot burning, and failure of the burn objectives.

One of the major prescription components is the time of year for burning to obtain desired results. From a wildlife standpoint, this decision can be critical. Ground nesting birds, including sage grouse, can be severely impacted if burns are conducted between April and August. To prevent wildlife impacts and still provide other benefits, early spring or fall are the best times to conduct a prescribed burn.

Deciding when to burn is partially dependent upon burn objectives and the plants indigenous to the site. Burns should be conducted when preferred plants are dormant. Warm season grasses such as buffalo grass and blue grama benefit from a spring burn, while they are still

dormant. Cool season grasses such as blue-bunch wheatgrass, Idaho fescue, western wheatgrass, and prairie junegrass benefit from a fall burn following their growing season. In general, forbs are negatively impacted by spring burns and benefitted by fall burns, particularly those forbs which grow from root stocks.

Examining each burn season reveals other considerations.

Spring burns

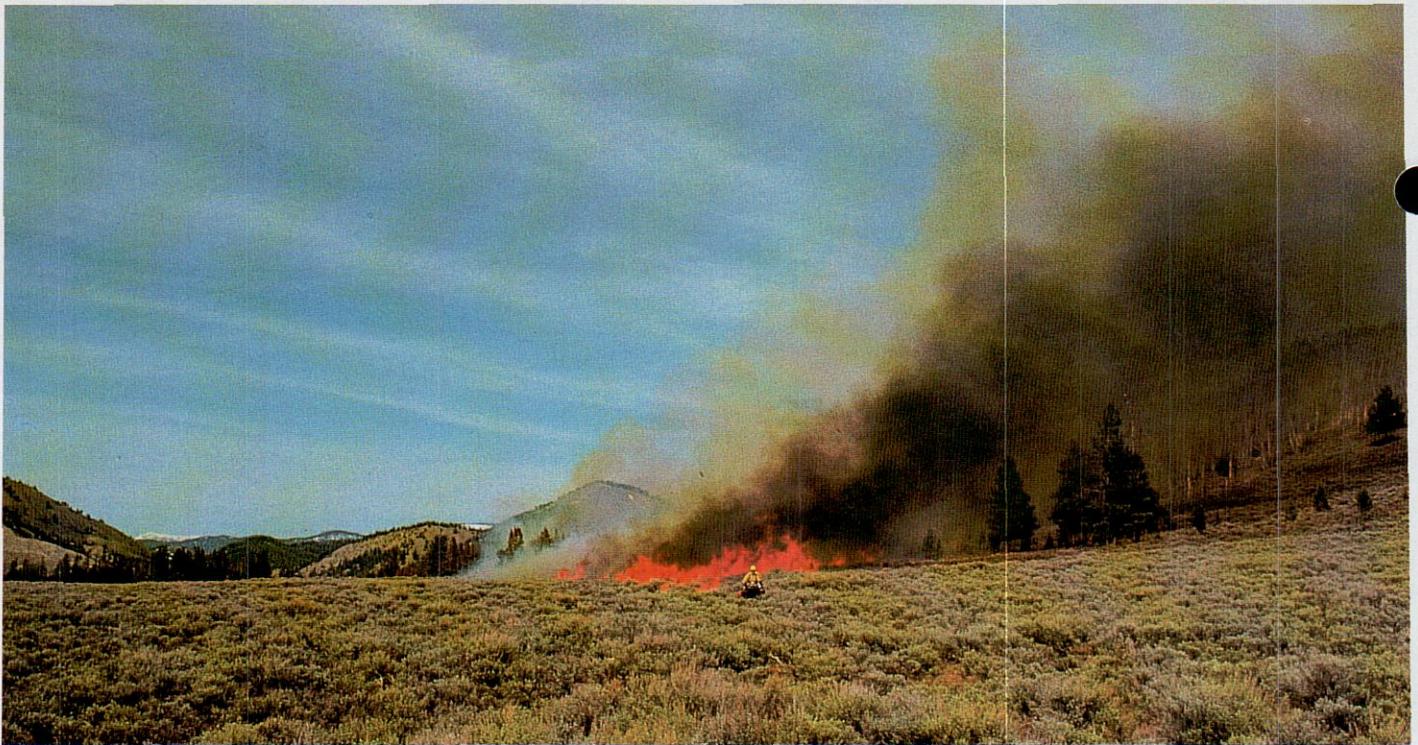
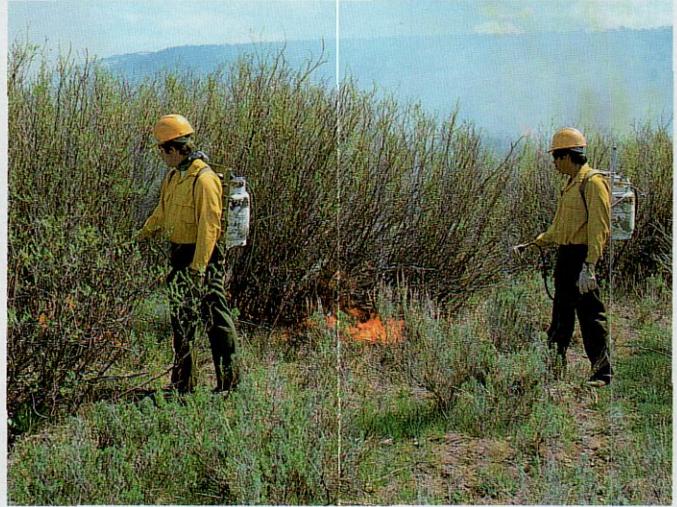
Fuel moisture is relatively high during this period, resulting in a cooler burn that still kills sagebrush. Cooler fires are easier to control and much less likely to leap fire lines. Snow banks can be used for firebreaks to reduce firebreak construction efforts and associated burning costs. Spring burns allow regrowth during the summer growing season. This may be important, for example, on a big game winter range where vegetative regrowth will provide critical forage for big game during the coming winter. However, in spring, fuel moisture content may be too high to successfully carry a fire, producing incomplete and spot burning.

Fall burns

In the fall, fuel moisture content is typically low enough to achieve burn objectives, and weather conditions are usually favorable for



Fire in old stands of willow (center and next page) or sagebrush (bottom) stimulates new growth and improves forage value. A wildflower sprouts in the aftermath of a ground fire in Yellowstone (left).



prescribed burning.

Typically, fall burns are more effective in eliminating big sagebrush. Since big sagebrush drops its seeds in late fall, early fall burning removes both mature plants and their seeds. This helps to prevent quick re-establishment of sagebrush the following spring and allows desirable forage plants to colonize the burn area. Grasses and bitterbrush, often associated with big sage communities, drop their seeds in early

summer, thereby avoiding detrimental effects from fall burning. Burned areas provide a superb environment for these seeds to germinate and establish themselves.

On the negative side, fall burns may require more firebreaks, and the hotter, drier conditions of a fall burn increase the risk of fire leaping a firebreak or spotting to other areas. Despite these potential drawbacks, fall burns are recommended for big sagebrush stands.



4. Burning Plan

The last component of a fire use plan is the burning plan. This is the actual "blueprint" of the planned fire and includes the following components:

Fuel Treatments

In certain cases, sparse fuels may have to be more evenly distributed or augmented in the burn area to obtain the desired results. However, fuel may be limited in some areas and excessive in others. Fuel may need to be more evenly distributed to avoid very hot burns or blowups that might result in fire escaping.

Fire Lines

Fire lines, whether natural or constructed, should completely encompass the treatment area. In most cases, fire lines 10 feet wide will contain a fire, but there are exceptions to this rule. For instance, the downwind fire break may need to be 50 feet or more wide to prevent a prescribed burn from escaping.

Prescribed Burning Effects

What effects can a land manager expect from a successful burn, and how does this benefit wildlife? One of the most visible effects of a prescribed fire is a decrease in canopy cover of timber and large shrubs such as sagebrush. This allows more sunlight to reach the ground, stimulating growth of desirable grasses and forbs.

Soil temperatures tend to be higher on burned areas and become snow-free sooner in spring as the exposed, blackened soil is warmed by the sun. The added nutrient availability produced by burned vegetative material encourages seed

germination sooner than other areas. Vegetation from burned areas has a higher palatability and nutritional content that is very attractive to livestock and big game alike. Increased nutrient flow and increased soil moisture also result from a prescribed burn.

Burned areas should be rested from domestic livestock grazing for at least two years. This allows desirable plants to become fully established, while minimizing colonization of weedy species. If this rest period is not observed, the likelihood of sagebrush re-invasion is high, with reduced benefits of burning. Prescribed fire affects wildlife in different ways. Some of

these effects are listed below:

Small mammals

Most small mammals are initially adversely affected by fire. Populations of small mammal species as well as the number of species (diversity) of small mammals in a burn area will be initially reduced. Burrowing animals often escape the flames and heat from all but the hottest fires by remaining underground during fire passage. Most small mammals are killed indirectly from cover and food reduction in the burned area. For example, small mammals foraging in a burned area become easy targets for predators such as hawks and owls. As vegetation regenerates however, small mammals from nearby locations will re-colonize the burned area.

Bird Species

Areas known to support nesting birds should not be burned until fall to avoid loss of nesting cover. This allows nesting birds to use the available cover and successfully raise broods. In the spring following a burn, adequate residual nesting cover may be lacking. To accommodate ground nesting birds in this situation, burns should be relatively small to maintain a portion of the area in nesting cover at all times.

Pronghorn Antelope

Few studies have been conducted regarding fire effects on pronghorn antelope and their range. Although antelope feed on a combination of grasses, forbs, and browse, they prefer forbs particularly in spring and summer. They rely

heavily on sagebrush during the winter months, so anything done to promote forb production while at the same time preserving 30 to 50 percent of the original shrub cover present will be beneficial to antelope.

Mule Deer

Mule deer, like most big game species, will readily utilize burned areas, especially after green-up. Deer are attracted to newly developing, succulent shoots and young sprouts on the burn area. Studies indicate that the higher nutritional value of these plants will be maintained for 1 to 3 years post-burn. After that period, forage nutrient levels will decline until they reach a level that existed prior to the burn. At that point, the area may need to be burned again.

Studies also show that increased forage quality of burned areas leads to healthier, larger animals, and in the case of does, higher ovulation rates and higher birth rates. A critical consideration for deer is to avoid burning all cover in an area. This can be accomplished by burning smaller areas (up to 60 acres) to leave nearby cover for deer or preserve localized patches of cover within a burned area. In either case, 40 percent or more of the original shrub cover should remain to optimize deer numbers.

Elk

Elk feed on a combination of grasses, forbs, and browse. Prescriptions that promote regeneration of these plants will likely benefit elk. Prescribed burning studies of elk habitat indicate that fall burns have the best long-term effects for elk herds. If a fall burn is correctly done, maximum use by elk will occur after 7 years.

One favorite food item of elk normally promoted by fire is aspen. Aspen trees regenerate by producing shoots from the parent tree. This process, called "suckering," is often stimulated by fire, resulting in an upsurge of aspen shoots and increased forage for elk.

One other beneficial effect of fire in elk habitat is a resultant decrease in browse height. Not only is regenerated browse easier for elk to reach, but the succulence and nutritional value of browse are increased, resulting in healthier animals.

Conclusions

The process of prescribed burning is far more involved than simply setting fire to an area. It involves considering a number of interrelated variables to meet specific management objectives. The process, because of its complexity and associated danger, demands that only experts conduct such activities.

For more information about prescribed burning and possible treatment of your lands, consult one or more of the following persons: your local Agricultural Extension agent, the Soil Conservation Service, the Wyoming Game and Fish Department's fire management supervisor or habitat personnel, and the U.S. Forest Service fire management supervisor in your area.

For further reading on the subject of prescribed burning, please consult the following references:

- Chandler, Craig, Phillip Cheney, Philip Thomas, Louis Traubaud, and Dave Williams. 1983. *Fire in forestry*. John Wiley and Sons, New York, NY. 450 pp.
- Pyne, Stephen J., 1982. *Fire in America, a cultural history of wildland and rural fire*. Princeton University Press, Princeton, NJ. 654 pp.
- Pyne, Stephen J., 1984. *Introduction to wildland fire, fire management in the United States*. John Wiley and Sons, New York, NY. 455 pp.
- *Smith, Michael A., Jerrold L. Dodd, and J. Daniel Rodgers. 1985. *Prescribed burning on Wyoming rangeland*. Agricultural Extension Service bulletin B-810.
- Wright, Henry A., and Arthur W. Bailey. 1982. *Fire ecology, United States and Canada*. John Wiley and Sons, New York, NY. 501 pp.

*Dr. Smith is a fire extension specialist in the Department of Range Management at the University of Wyoming, Laramie. He will conduct prescribed burns on private lands for landowners.

Written by Evin Oneale, through the Wyoming Cooperative Fishery and Wildlife Research Unit.

This publication is one in a series of habitat extension bulletins produced by the Wyoming Game and Fish Department. Call 1-800-842-1934 for additional information or assistance.

Habitat Extension Services

