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After Wildfire: Range Recovery

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In the grip of drought, livestock producers often must deal with the additional impact of wildfire. While drought conditions develop gradually and can be anticipated, losses due to wildfire are sudden and devastating.

Because fire is a natural component of Northern Great Plains grassland ecosystems, prairie vegetation is very well adapted to recover following a fire. With prescribed burning you choose the conditions that make fire a beneficial management tool. Unfortunately, those conditions are absent in many wildfires.

A fire prescription or burn plan designed to reduce one species or group and encourage another would include specific conditions such as a target fuel load, favorable growing conditions, good moisture, and acceptable wind speed, wind direction, and relative humidity. These conditions most often exist early in the growing season. If prescribed conditions are not met, the burn is not conducted.

In contrast, wildfires occur when conditions may be very unfavorable for vegetation.

Wildfire has impacts on the soil as well as on the vegetation. Under normal conditions, the soil surface is protected by a layer of litter—old plant material undergoing the decay process. This litter layer and standing vegetation reduce evaporation and protect the surface from soil movement caused by wind or rain. Litter also promotes rainwater infiltration, reducing runoff and enhancing soil moisture. During winter, standing vegetation is important in capturing snow that later contributes to soil moisture.

Standing vegetation and litter are removed, sometimes completely, by a wildfire.

Wildfires also remove whatever live plant tissue is present at the time of the burn. As plants initiate new growth following the fire, they will draw down stored reserves to reestablish photosynthetic leaf tissue in the same manner as when putting on new growth in the spring. If reserves have not been replenished by the time autumn freezes occur, the plant's reserve status will be compromised and recovery the following spring may be less vigorous.

Although the landscape may appear devastated following a fire, grassland species are adapted to fire. They will recover.

In contrast to woodland fires where fuel loads may lead to extended periods of very hot temperatures, grassland fires generally move over individual plants very rapidly, minimizing the duration and intensity of elevated temperatures. The rate of post-fire recovery is controlled primarily by the condition of the vegetation before the fire and moisture conditions following the burn. Healthy, vigorous rangeland will recover rapidly following a fire. Recovery of rangeland vegetation stressed by long-term overgrazing will be much slower.

While tame grasses introduced for forage production may be less well adapted to fire, if they have reached dormancy by the time of a summer wildfire, they are unlikely to be severely damaged. With fall moisture and cooler temperatures they should begin regrowth rapidly.

When favorable growing conditions return, the first plants to respond will be annual broadleaves. These weedy species are nature's mechanism to protect the soil surface as rapidly as possible. While this flush of growth is normally transient and will be replaced by perennial plants, you must be alert

to the invasion of troublesome weeds during the early stages of post-fire recovery. Early treatment of small plants or patches will be much more effective than later treatment of well established weeds.

Best management for rangeland following a burn is rest from grazing.

Unfortunately, regrowth following a burn is both palatable and nutritious. Exclude livestock from burned areas for as long as possible. For example, if only a portion of a pasture has burned, a temporary fence to exclude grazing should be established.

The greatest benefit for vegetation following a fire will be a complete growing season rest, perhaps grazing again after vegetation is dormant in the fall. If an area must be grazed, delaying at least until important plants have reached maturity and set seed will be beneficial. Productivity of plants surviving after a fire will be reduced.

For example, we monitored recovery by measuring forage production from unburned and burned areas following the September wildfire at the South Dakota Grassland Coalition managed intensive grazing demonstration site. We set up five exclosures on the burn line in May 2006 and measured forage biomass and soil temperatures in the burned and unburned areas in May, June, and July. Green biomass and litter portions of each sample were separated and oven dried.

Green forage biomass was reduced by 43% in the burned area compared to the unburned area at the May sampling date (Table 1). However, both burned and unburned areas had similar green biomass at the June sampling date. At the July sampling date the burned area had 20% less green biomass compared to the unburned area. Averaged over the summer, the burned areas had 25% less green biomass compared to the unburned areas.

These data indicate that wildfire reduces forage production the following year, especially if it is a dry year (April-May 2006 precipitation was 59% below normal compared to the 6-year average, 2000-2005, of 2,500 lb/acre.

Protective litter was 6 times greater in the unburned site (Table 1). However this did not translate into the expected temperature differences between the burned and unburned areas. The dry and hot summer may have minimized any protective advantage the abundant litter in the unburned area could have provided.

Season-long stocking rates, at the very minimum, should be reduced by 25% to reduce the risk of overgrazing. Delaying turnout until later in the summer would also be advisable because the differences in green biomass between the burned and unburned areas decreased later in the summer.

It is apparent from this example, that a wildfire followed by a dry spring limited forage production.

While there is a strong desire to "do something" following a fire, there is no evidence that tillage or other soil treatments or reseeding will be of any benefit. In fact, some research indicates they can be detrimental.

Management following a fire boils down to matching animal demand and feed supply by reducing animal numbers and/or identifying alternative sources of feed. Delaying a return to grazing on burned areas will benefit the vegetation and restore its productivity.

Table 1. Average green forage biomass, litter, and soil temperatures at the South Dakota Grassland Coalition management intensive grazing demonstration site near Highmore, S.D., May–July 2006.

	May 15		*June 15*		*July 14*	
Measurement	*Burned*	*Unburned*	*Burned*	*Unburned*	*Burned*	*Unburned*
Green biomass, lb/acre	610[b]	1070[a]	890[a]	990[a]	750[b]	930[a]
Litter, lb/acre	200[b]	2040[a]	260[b]	1590[a]	330[b]	1390[a]
Soil temp at 0.5-inch depth, °F	-	-	105[a]	102[a]	112[a]	107[a]
Soil temp at 2-inch depth, °F	-	-	90[a]	85[a]	93[a]	88[a]

[a,b] Means followed by different letters within a row and common sampling date are significantly different (P<0.05).

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