



Patch Burning as a Management Tool for Coastal Rangelands in South Texas

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Prescribed fire is widely used as a method of habitat management in coastal grassland ecosystems. For much of the South Texas Gulf Coast, fire has been a major feature of the natural landscape going back thousands of years.



Prescribed fire burns through a mature stand of gulf cordgrass at El Sauz Ranch. Image Credit: J. Silverio Avila-S.

This natural disturbance contributed to nutrient cycling, increased biodiversity, the reduction of brush, and slowed non-native species establishment. In part due to the historical importance of fire and the fire-adapted nature of many native coastal plant communities,

PRESCRIBED BURNING IS COMMONLY USED TODAY TO MIMIC THE EFFECTS OF A NATURAL FIRE REGIME ON RANGELAND CONDITIONS.

Along the South Texas Gulf Coast are thousands of acres of coastal rangelands including the East Foundation's El Sauz ranch located in Willacy and Kenedy counties. The El Sauz Ranch is located at the convergence of the Coastal Sand Plain, Lower Rio Grande Valley, and Laguna Madre Barrier Islands and Coastal Marshes ecoregions. As is the case with the rangelands on and surrounding the El Sauz ranch, historical and natural fire regimes played a critical part in shaping and forming this portion of coastal rangeland.

El Sauz boasts vast native coastal prairie plant communities, including gulf cordgrass (*Spartina spartinae*), which provide wildlife habitat and support cattle production. Gulf cordgrass, also called sacahuista, is a large bunchgrass with evergreen leaves that become stiff and coarse as they mature. It is considered a poor forage for cattle and only fair for wildlife, but it is often the most widely available grass in an area because it creates dense stands that outcompete other plant species. Understanding the relationship between

gulf cordgrass and other native plant communities is important to our understanding of how to best manage these unique rangelands. As land stewards, we are interested in the effects of prescribed fire on these coastal rangelands and seek a better understanding of its role in supporting wildlife conservation and cattle production.

By studying the effects of prescribed fire on coastal rangelands, we will help inform best management practices moving forward to improve the long-term sustainability of livestock production, wildlife management, and native rangelands.

East Foundation, in partnership with the Caesar Kleberg Wildlife Research Institute at Texas A&M University-Kingsville, designed a large-scale and long-term experiment to begin addressing questions related to:

1. Diversity of plant species
2. Plant nutritional response
3. Cattle grazing response
4. Seasonality of burning

To understand how fire would impact coastal and gulf cordgrass-dominated rangelands, we designed a patch-burn grazing project on the El Sauz Ranch. Patch-burn grazing is a strategy that has been used in other areas to increase biodiversity throughout rangelands, support sustainable livestock production, reduce cattle impact on intensively grazed areas and maintain or recover grass-dominated rangelands. Patch-burn grazing exposes sections of a rangeland to a combination of prescribed fire and free-range cattle grazing to create a diverse mosaic of vegetation containing different stages of plant succession.

We established 10 separate burn-plots averaging 550 acres each. Plots were randomly assigned to each burning treatment: Winter (January-February), Summer (July-August), and no-burn control (Figure 1). Before and after each burn, we collected plant community and forage nutritional data of gulf cordgrass in each of the burn plots. Cattle movement and utilization data was collected using GPS collars that were deployed on 20 cows.

Prescribed fire temporarily opens up the canopy of established plant species, allowing other plants to establish and compete – thus increasing plant diversity. This is especially important to note on landscapes dominated by gulf cordgrass where mature cordgrass stands outcompete other plants from establishing. As a result of an open canopy,

FOLLOWING THE BURNS THERE WAS AN INCREASE IN PLANT DIVERSITY FOR BOTH FORBS AND GRASSES.

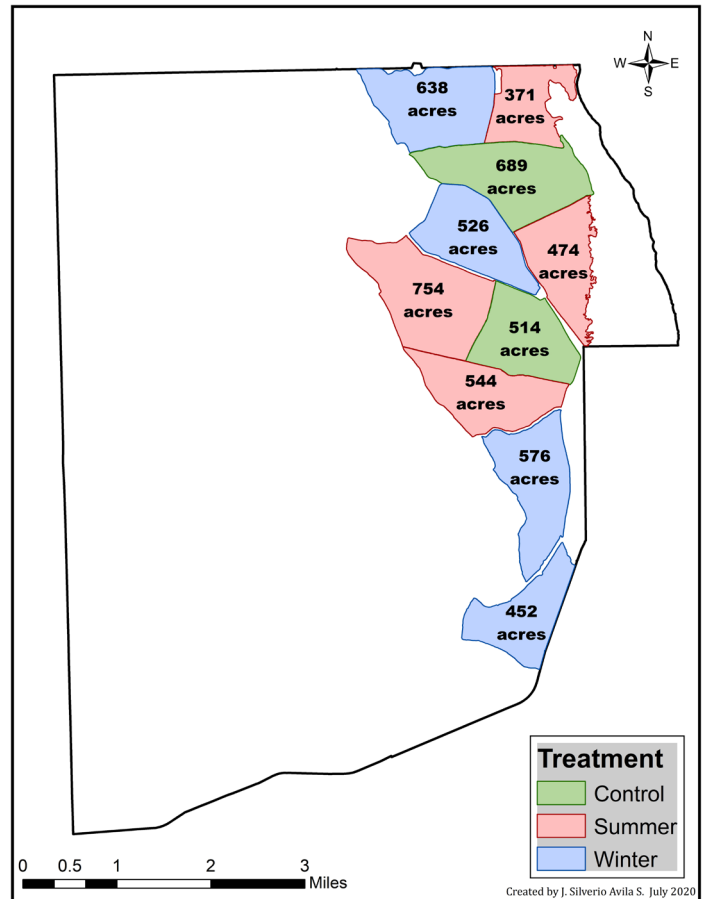


Figure 1. East Foundation's El Sauz Ranch near Port Mansfield, Texas. Burn plots assigned winter, summer, or control.



Prescribed burning created a diverse post-burn plant community on El Sauz Ranch. Image Credit: J. Silverio Avila-S.

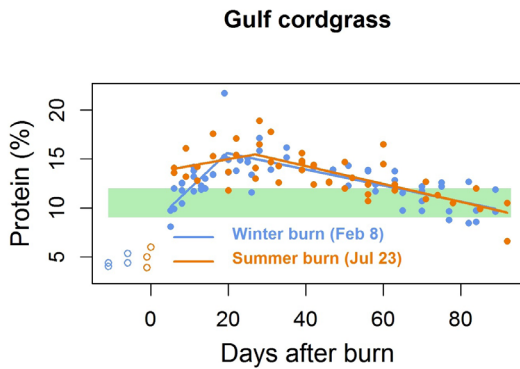


Figure 2. Crude protein in gulf cordgrass increased dramatically after winter and summer prescribed burning. Green shaded zone indicates the amount of crude protein necessary for maintenance of lactating cattle.

This increase in diversity has been shown to directly benefit a wide range of wildlife species including bobwhite quail, white-winged dove, migratory songbirds, waterfowl, and white-tailed deer. In contrast, our control plots (no burning) did not experience an increase in plant diversity and remained static throughout the length of the study. This was attributed to the excess of old growth material which prevented new plants from establishing.

FOLLOWING BOTH OUR WINTER AND SUMMER BURNS, WE OBSERVED SIGNIFICANT INCREASES IN CRUDE PROTEIN OF SAMPLED GULF CORDGRASS STANDS (FIGURE 2).

Although the rate of the rise in crude protein differed slightly, both seasons of burning increased protein to a point higher than the maintenance level of at least 6% for dry cows and 9% for lactating cows for at least 90 days following burning. Although time since fire explained much of the difference in nutritional content of gulf cordgrass, it did not explain it completely. Other important factors include soil moisture, soil nutrients, and the degree of grazing after burning. As would be expected, cattle responded favorably to the increased forage quality resulting from the fires and increased their time in the pastures almost four-fold.

Considering all times of the day, in the three months before burning, cattle spent 13% of their time within plots that were to be burned. After burning, cattle spent 49% of their time within those plots for up to five months (Figure 3). We were most interested in where

cattle spent their time during the prime grazing hours, 7:00 to 10:30 a.m. and 5:00 to 8:30 p.m. We found an increase in the time that cattle spent in the burned areas, from 17% before burning to 41% after burning. Whether we used all locations or only those recorded during grazing hours cattle spent more time in the recently burned plots with no difference between winter and summer burning.

Although we found very few differences between winter and summer burning in coastal rangelands, these were the first burns applied to this area of the El Sauz ranch in recent memory. Repeated summer burning should favor forbs over grasses because of the negative effects of defoliation of warm-season grasses during their reproductive and post-reproductive stages. Repeated winter burns may favor grasses over forbs because many forbs would be killed in their early growth stages. Additionally, patch burning in a continuous grazing system to improve forage quality would be less expensive than mechanical methods and would result in a more even distribution of livestock, as in a rotational grazing system.

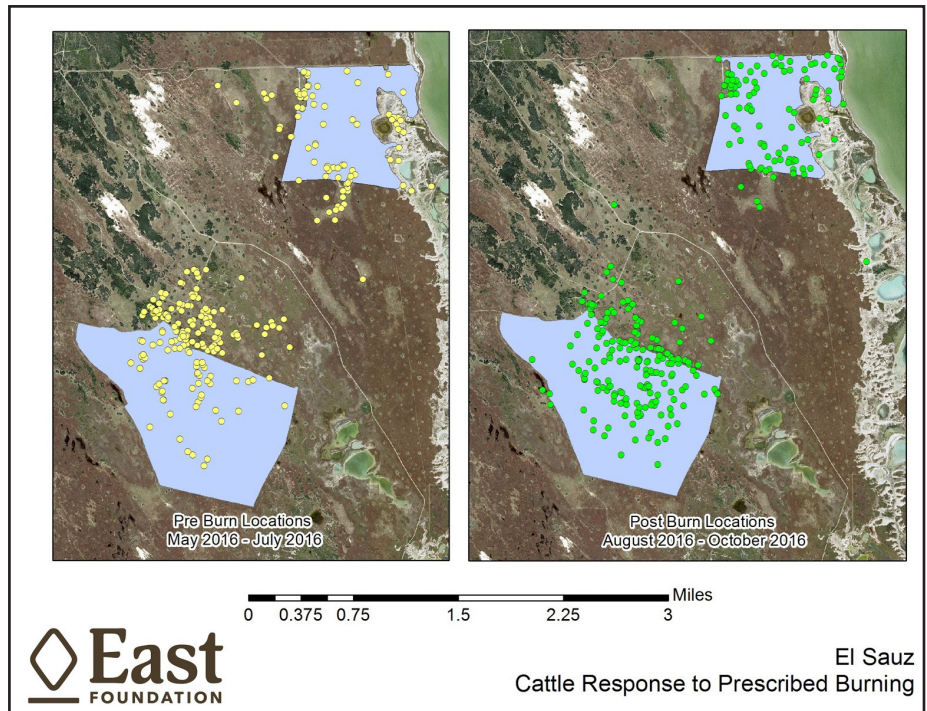


Figure 3. Locations of collared cattle in and near the burn plots for three months before and after prescribed burning during the summer.

FOR LANDOWNERS WHO WISH TO PROVIDE A VARIETY OF HABITAT, COVER, AND FORAGE FOR WILDLIFE, A PLAN OF REPEATED PRESCRIBED BURNS, HOLDING THE SEASON OF BURN CONSISTENT WITHIN VARIOUS PLOTS OVER MULTIPLE YEARS, MAY BE IDEAL.

It is important to remember that applying fire to your land is not as simple as picking a day when the conditions are favorable. By establishing your management goals and desired outcomes you can then begin to develop a prescribed fire plan that will most effectively and efficiently achieve your goals. East Foundation and Caesar Kleberg Wildlife Research Institute at Texas A&M University-Kingsville will continue to apply scientific principles to better understand fire's role on our South Texas rangelands. For additional resources in developing and carrying out your own prescribed fire program, please refer to resources provided by [Texas A&M AgriLife Extension](#), the [Texas Department of Agriculture](#), and [Texas Parks & Wildlife](#).

SUGGESTED CITATION

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