



Fire is used at Prairie Dunes Country Club as a management tool to maintain the prairie ecosystem in the natural areas and reduce encroachment from fire-susceptible trees.

Fire as a Landscape Management Tool

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FIRE! Shout it out at a movie theatre, and you are subject to a class A misdemeanor. Yet fire played as much of a role in the history of the ecosystem of the continental United States as temperature, soil, air, and water. Only in the last few years have many ecological stewards begun implementing fire as an important management tool in the preservation of plant biodiversity.

Mention trees and you have touched upon one of the savior symbols of the environmental movement. More trees mean more carbon dioxide converted to oxygen,

resulting in cleaner air. More trees mean more woods, restoring our environment to its pristine state. Yet Stephen Pyne, History Professor at Arizona State University, in a landmark historical book titled *Fire In America*, found that savanna, a Spanish term meaning grassland with widely spaced trees, was the predominant ecosystem in much of America at the time of European settlement. Pyne goes on to say that dense forests are a result of, not a victim of, European settlement. Confused? Let us take a historical look through time at the role fire played in the American landscape.

During the Tertiary geological era in America, a score of a million years ago, dinosaurs, mastodons, camels (camels?), and other large mammals roamed America. During this time, our climate experienced a large warming and drying period, resulting in the western grasslands formation.

As the drying continued, dinosaurs became fossils, and the grasslands spread east with the prevailing westerly winds. The Colorado short grass begot the Kansas mid-grass, which begot the Missouri tallgrass — each regime increasing in size as it got closer to the influence of Gulf moisture. At this

point the grasslands (and all prairie species associated with them) met with trees and staged one of the greatest ecological battles in American history. During wet cycles the trees predominated, pushing the grassland back west. During extended drought, the grassland reclaimed occupied territory, even advancing across the Mississippi into Illinois, Indiana, Ohio, and all the way to Long Island!

It was during this time that grasslands found their greatest ally — lightning. Lightning strikes started massive fires that, fanned by the prevailing west wind, burned hundreds of thousands of acres at a time. These fires moved grassland plants (fire resistant) into areas frequented by trees (fire susceptible). Fire was a mode of transportation for life then (through uncontrolled lightning), as it is now (controlled in the cylinders of planes, trains, and automobiles).

Indians observed the benefits of lightning fire and used it to enhance their living conditions. They burned to control dangerous infestations of insects. They burned to expedite travel (if dense woods were the original America, we would be hacking our way through Kentucky about now). More important, they burned for hunting purposes. Buffalo were attracted to the fresh growth of grass after a fire, so the Indians burned an area and waited for the herds, and subsequent feast, to show up. Fire also was used to drive off the enemy. Hostile warring tribes or threatening early European explorers sometimes died trapped in grassland fires. Lewis and Clark's Indian guides were so paranoid of it that they became livid when orders were given to camp on dormant prairies.

It wasn't long before this paranoia was transferred to the Europeans. Where fire was beneficial to the nomadic Indian, it was an enemy to the more sedentary European communities. Villages, slow-footed livestock, and covered wagon caravans all stood to lose much as a result of landscape fire. Fire became outlawed during the late 1700s to early 1800s, and the effects on the environment were massive. As the grasses had moved east with the pyrogenic Indians, the trees moved west with the Europeans. Savannas became dense woods (a typical midwestern savanna has 350 plant species, ten times that of dense, overgrown woods), and prairies were lost to trees. In 1819 naturalist Edwin James wrote, "The fires have been eliminated, and dense groves of oaks and elms have sprung up." Soil scientist Curtis Marbut noted in 1914, "The growth of brush spread with great rapidity, young seedlings sprang up, and if not burned for a year or so, they were soon large enough to live through the average fire. The tree growth made the growing of grass impos-



Communication and preparation are essential to a successful prescribed burn.



In early times, lightning started massive fires on the grasslands that burned thousands of acres at a time. The fires moved grasslands into areas previously occupied by trees.

sible." Elimination of fire, combined with overgrazing and the advent of the steel plow, ushered ecological degradation into the 19th century in America in a fashion not seen before.

One may wonder, "If we return to fire as a landscape tool, are we going to return to log cabins and horses?" The answer is: Not at all. Due to Mother Nature's conservative

time clock, most ecologists believe that ecological restoration is not recreating the past, but discovering the future. To circumvent prejudice and misunderstanding, let us equate the natural ecosystem with our circulatory system. The similarities are striking.

A recent medical report on the human diet focused on the difference between modern man and cave man. Our forerunners were a



Specific weather conditions relative to necessary temperature, humidity, wind speed, and wind direction should be outlined in the prescribed burn plan.

hunting-and-gathering society, feeding on nuts, berries, leaves, grains, and lean meat (when their aim was good). In the millennia since then, we have changed exponentially on the outside, but on the inside, we are exactly the same. A digestive and circulatory system that evolved on fruit and fiber is now stuffed with burgers and fries. Hypertension, obesity, arteriosclerosis, and heart disease — previously non-existent with hunter gatherers — run rampant.

Unfortunately, the same has happened to our natural ecosystem. Mother Nature is the original conservative. Due to her deliberate time clock, very little plant evolution has taken place in the last million years. Five centuries ago, Mother Nature's American chapter suffered a shock to the head from which she is still reeling. Settlements, plows, livestock, dams and dikes, and fire control have ushered in a new era of imported plant material, fed to a habitat whose digestive and circulatory system have evolved from a completely different diet. In effect, we have hardened the arteries of our ecosystem.

Fire can serve as the catheter of our ecosystem. Its benefits are many: stimulating early green-up, increasing stem and flower density, reducing plant disease, evicting exotic plant material, and increasing light for new plant development. In horticultural terms, fire serves as nature's dethatcher.

But fire, like anything else, suffers from use turning into abuse (although non-use also is an abuse). Add that to the destructive connotation most people associate with the term fire, and you have a "volatile" subject. Let's examine how fire can be properly used in landscape management.

Ken McCarty is the Land Steward for the Missouri Department of Natural Resources.

His responsibility is the maintenance of all the state park ecosystems, covering hundreds of thousands of acres in Missouri. After observing the onset of encroaching non-native brush in designated natural areas, he no longer feels a "hands-off" approach will result in survival of protected areas. His approach has been to reintroduce prescribed fires to preserve threatened species.

Doug Ladd, Director of Science and Stewardship for the Missouri chapter of the Nature Conservancy, is responsible for the protection of 34 preserves and manages them for the survival of rare and endangered species and exemplary natural communities. To ensure survival, Ladd believes fire is not only essential, but mandatory. Ladd burns preserves varying from woods (burning leaf litter resulting in long, slow eight- to ten-hour exercises in smoke inhalation), to savanna (burning prairie species amongst scattered tree openings), to prairie (hot fires that travel faster than you can run). Preparation is everything for the success of the prescribed fire. A typical burn project for him and his six-person crew entails:

1. A prescribed burn plan detailing location, plant species, specified weather conditions (temperature, wind, and humidity), a burn plan map, location of firebreak construction, manpower needs, potential hazardous areas, suppression plans, and a mop-up plan.

2. A door-to-door notification of neighbors.

3. Notification of police and fire officials and procurement of necessary burn permits.

4. On-site weather specification needs: temperature (40-80° F), humidity (25-60%), wind speed (5-15 miles per hour), and wind direction (away from sensitive areas).

5. Final pre-burn meeting of the fire crew personnel (who previously must have passed an aerobic stress test) and issuance of tools, instructions, water, backpack water sprayers, fireproof suits, hard hats, and radios.

6. Several months afterwards a post-burn analysis and checkup are conducted to monitor species diversification and density, and the effect of fire timing and frequency.

Prescribed Fire on the Golf Course

Stan George is the golf course superintendent at Prairie Dunes Country Club, in Hutchinson, Kansas. Prairie Dunes' natural areas were being invaded by the non-native Virginia creeper, poison ivy, grape vine, and wild dogwood. In 1992, he began a prescribed fire program to preserve the prairie ecosystem at Prairie Dunes. His program is a textbook example of the use of fire management. He oversaw the following steps:

1. Recruitment of a Professor of Rangeland Management from Kansas State University to provide technical assistance in the materials and methods of prescribed fire.

2. Attendance at a fire science workshop by the grounds committee chairman, appropriate club personnel, and himself.

3. Involvement of the local fire department to assist in the actual burning.

4. Publishing three newsletters sent to the membership and surrounding community detailing the program, yearly step-by-step procedures, and benefits accrued.

5. Training of all staff employees in the prescribed fire workshop.

6. Follow-up monitoring of environmental responses by ecologically trained personnel.

The initial ecological responses at Prairie Dunes have been encouraging. Stan will continue to manage his natural areas through the use of prescribed fire as conditions warrant.

Stephen Pyne stated that if fire were presented as a new landscape management tool today, it would never make it past the Federal Regulatory Agency. Therefore, when using fire as a management tool, it is essential to observe all existing codes and regulations.

Frequently, nature's fire elicits heaven and hell on earth. In many cases, it can produce intense heat and flame, but used properly it can be easily controlled. In the majority of land-use scenarios, it is a necessary element of ecosystem preservation. After the conflagration comes renewed life. Grasses, sedges, flowers, and shrubs sprout from the warmed soil, and above- and below-ground insects and animals return. A paradise of diversity provides everlasting displays of texture and color. Fire proves what we have thought all along — in order to get to heaven, one must go through hell.