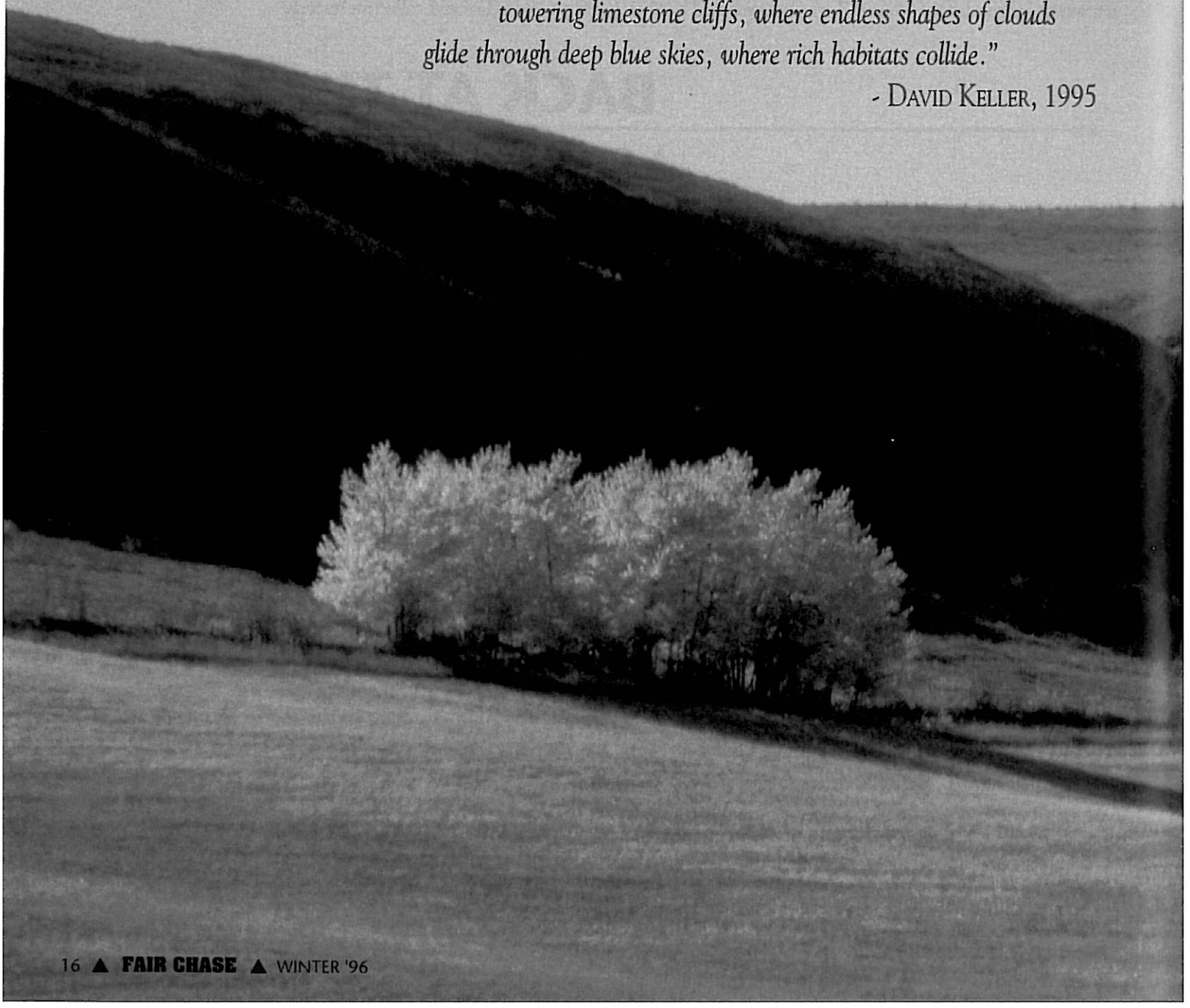
THE ROCKY MOUNTAIN FRONT

A Landscape in Transi

"The Front is a place where grasslands roll up against towering limestone cliffs, where endless shapes of clouds glide through deep blue skies, where rich habitats collide."

- DAVID KELLER, 1995



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In northcentral Montana, running north to south along the eastern fringe of the Rocky Mountains there lies a landscape unlike any other in the West. Here the sweeping Great Plains and the majestic Rocky Mountains collide, creating a diverse transition zone that appears frozen in time. Low human occupation has left most of this landscape undeveloped and human impacts have been slight. However, recent evidence has shown that this landscape has actually changed dramatically since first settlement by Euro-Americans in the 1860s. Over the last 130 years, the landscape of the Front has shifted from a homogenous fescue prairie to a more diverse landscape, patterned by patches of limber pine, aspen, and shrub communities. The factors causing this change are not yet fully understood.

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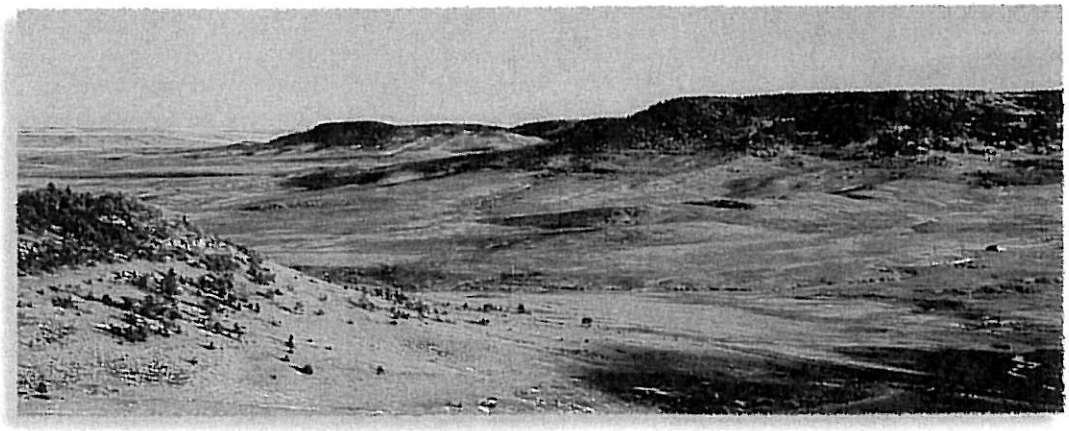
Photos by author

In this article, I present a possible explanation, founded on scientific research and principles of landscape and community ecology. I propose that historically, an array of ecological processes successfully prevented the invasion of tree and shrub communities into the grasslands. However, with the arrival of white settlers and their subsequent influence on ecosystem processes, conditions on the Front became more favorable for limber pine and other tree and shrub communities to establish. By understanding the factors that have shaped this landscape in the past, we might be able to identify future directions in management of land and resources on the Rocky Mountain Front.



THE HISTORICAL LANDSCAPE: BISON, FESCUE AND BLACKFEET

Humans have occupied the Rocky Mountain Front at least since the last glaciation, 11,000 years ago. The Great North Trail, along the base of limestone reefs on the Front, was a well-traveled passage that ran the full length of the Rocky Mountains, from what is now Canada to Mexico. Native American migrants, trappers, war parties and hunters made their way north and south along this trail. More permanent residents of the Front included the Blackfeet people. Many bands established winter and spring camps, following the migration of bison, their primary source of sustenance.

Anecdotal evidence from journals and oral history suggest that the landscape of the Front during this era was more homogenous than today with low habitat diversity. Descriptions suggest that grasslands stretched continuously from the vast prairie up into the foothills of the Rocky Mountains. The hillsides, valleys and ridgetops of the plains were bare, void of timber, and the vegetation was mostly short-grass and fescue prairie. Huge herds of wintering bison depended on these grasslands, as did other big game species, including elk, mule deer and pronghorn.

Throughout the Great Plains, scientific research has shown that historically fires frequently swept over the grasslands, in some areas occurring as frequently as every five years. Although many fires were lightning-caused, some were also ignited by humans. The Blackfeet, like many other Native American tribes, intentionally ignited grasslands in an effort to attract game by increasing forage productivity. Grasslands evolved with these frequent fires and many grass species have adapted to this type of disturbance by depending on fire for maintaining productivity. When fires sweep across grasslands they typically remove all aboveground biomass, including dead grass, recycle nutrients, and kill off invasive trees and shrubs. For many forest-grassland transition zones, research has shown that fire has effectively sustained the prairie character by prohibiting invasion by fire-intolerant species. Fire may have also limited the invasion of limber pine on the Front. Here, the high frequency of fires probably prevented young saplings from reaching maturity and producing cones.

Fire was not the only process that made these grasslands inhospitable for limber pine. Bison were probably quite effective in preventing encroachment because they concentrate their grazing activities in areas where limber pine also tends to grow. Trampling, wallowing and heavy grazing by bison in these mutually preferred areas would have destroyed young seedlings. Bison may have also limited limber pine invasion indirectly; recent research suggests that their species-specific and seasonal grazing preferences created conditions that maintained the productivity of fescue prairie. (See Editor's Note) Grazing disturbance, like fire, removes dead grass and promotes nutrient recycling, thereby establishing dominance of fescue prairie. The highly water-efficient fescue may have successfully outcompeted limber pine for water, thereby preventing germination and survival of limber pine. For several millennia, this disturbance regime of bison grazing and grassland fires restricted limber pine to bare, rocky outcrops, cliffs, and steep riparian corridors—areas absent of these disturbances. In fact, these areas are the only places on the Front where I have found limber pine trees that are older than 150 years.

LOSS OF THE FOOTHILL PRAIRIE: A CENTURY OF PINE INVASION

The invasion of limber pine into the grasslands on the Rocky Mountain Front probably began with Euro-American settlement in the 1860s. With suppression of fires and the elimination of bison grazing, conditions became more favorable for limber pine invasion. Bison were exterminated from the Front by 1883 and in the years following, were replaced by domestic livestock. By 1884 there were a reported 100,000 cattle, 60,000 sheep and 10,000 horses grazing on the Front. This intensive grazing pressure on fescue prairie was further compounded by a shift in the seasonal pattern of grazing from winter-only to year-round. This change resulted in a decline of fescue, leaving bare soils and plants that were less palatable. The change in species composition and abundance in the grasslands allowed for limber pine to successfully compete for the limited resource of water.

Heavy grazing also reduced fine fuels which aided fire suppression efforts. The subsequent decline in fire frequency, intensity and spread enabled limber pine to survive long enough to produce cones and successfully reproduce. As environmental conditions on the Front changed from inhospitable to

those more favorable, limber pine was able to begin widespread invasion into grasslands. Research has shown that most large limber pine on the Front are between 90 and 120 years old, established during this time of intensive grazing and land settlement.

THE PRESENT LANDSCAPE: "THE AMERICAN SERENGETI"

These changes suggest that gradually, over the last century, fewer fires and year-long grazing has allowed for successful expansion of limber pine—from river corridors and rocky outcrops into the grasslands. As limber pine spread eastward, the conditions created by their presence created new wildlife habitat and probably increased the rate of invasion. Forested areas are known to ameliorate harsh winds and trap drifting snow, yielding greater soil moistures throughout spring and summer. This probably increased the rate of successful germination of limber pine and promoted a diversity of understory plants. On the fringes of these limber pine stands, aspen groves and shrub communities have established, subsequently adding to the diversity of the landscape. This diversity, in turn, has provided additonal habitats for wildlife on the Front.

Wildlife biologists and land managers are only now beginning to understand the relationships of limber pine habitats and associated wildlife communities on the Front. The importance of limber pine as habitat differs among species but can be grouped into three categories: incidental, suitable, and obligatory. Incidental species might include grizzly bear and elk—species which do not appear to be dependent on limber pine but have been observed using the stands. The suitability of an area on the Front is improved by the presence of limber pine for species like mule deer and blue grouse, that are found in many different areas, but appear to prefer areas with limber pine. Clark's Nutcracker has evolved into a obligatory relationship with limber pine. Limber pine relies on Clark's Nutcracker, which cache between 70-90% of the annual seed production, for dispersal of its large, nutritious seeds, which have no others means of dispersal other than gravity. Clark's Nutcracker open the cones while they are still on the tree and then caches the seeds in groups of two to a dozen in sites that are accessible during winter.

A LANDSCAPE STILL IN TRANSITION: HERE TODAY, GONE TOMORROW?

As local residents and visitors to the Front today can attest, the landscape is diversified by its many habitats. The ridgetops and hillsides support expanding stands of limber pine. These stands are lined with patches of shrubs like rose, serviceberry, shrubby cinquefoil and chokecherry. In the moister ravines, aspen groves grow thick and provide a cool refuge during hot summer months. The patchwork of these different types of habitats supports an array of wildlife species including elk, mule deer, grizzly bear, wolves, coyotes, blue grouse, Bohemian waxwing, mountain bluebird, mountain lions and badgers, as well as many other species. Probably because of this habitat diversity, the Front today supports both higher populations and a greater diversity of wildlife than recorded by settlers 130 years ago. Hunters, hikers, biologists, writers, locals and visitors have all come to love and appreciate this incredible diversity and scenery of the Rocky Mountain Front.

The environmental conditions of the Front, as we understand them today, suggest that limber pine has become an integral component of the landscape, by defining new habitats and supporting wildlife. *But this is not the final picture; the landscape is still changing.* Ecological processes are shifting yet again, and limber pine appears to be dying out. Since the early 1970s, an infestation of blister rust has infected many stands along the Front, gradually killing them and leaving only "ghost" stands. These foreboding changes may be related to human land use practices, climate change or possibly new, unknown, inhospitable conditions. Without fully understanding the historic processes that led to the invasion of limber pine, it will be difficult to ascertain what the future landscape and wildlife of the Front will be. Quite possibly in another 130 years, biologists will describe the landscape of the Rocky Mountain Front, and hypothesize on the ecological processes that caused the shift from a landscape of limber pine foothills with a diverse array of wildlife to the present landscape, one perhaps of thick Douglas-fir forests, or perhaps maybe once again, of vast prairies of fescue grassland, treeless and bare, except for a scattered few, old limber pine and the occasional bull elk.

EDITOR'S NOTE: SEE THE ARTICLE, "THE ROCKY MOUNTAIN FRONT: HOME TO BISON," IN THE FALL 1995 ISSUE FOR FURTHER INFORMATION ON BISON AND GRAZING ON THE FRONT.