



Virtually eliminated from the landscape after the arrival of European settlers just 150 years ago, the tallgrass prairies and oak openings of the Midwest have become a proving ground for the practice of ecological restoration in its purest form. Chicago-area restorationists, in particular, have pioneered working with volunteers to carry out high-quality restoration projects on a large scale, leading to an emerging vision of a "Chicago Wilderness" in which restored prairies, wetlands, and oak openings are a prominent feature of the landscape and restoration itself a popular activity and form of civic celebration. Here a volunteer gathers seed on the prairie that is under restoration in the accelerator ring at Fermi National Accelerator Laboratory in suburban Chicago.

Photo courtesy of Fermilab

The Tallgrass Prairie

Prospects for the future of the ecosystem that has provided one of the first proving grounds for the restorationist's craft

by Robert F. Betz

In 1672, 180 years after Columbus' first landfall in the New World, the explorer Louis Jolliet was commissioned by Governor Frontenac of French Canada to trace the course of the Mississippi River. Journeying westward from Quebec, he met Father Jacques Marquette at St. Ignace Mission on the Straits of Mackinac. On May 17, 1673, Jolliet and Father Marquette, along with five other Frenchmen and a party of Indian guides, set out in canoes across Lake Michigan toward the Wisconsin shore. Pro-

ceeding south through Green Bay, they ascended the Fox River to the narrow strip of land that separated that river from the Wisconsin River at the present site of Portage, Wisconsin. Transferring their canoes across the portage to the Wisconsin, they followed it downstream (westward) to its mouth at the Mississippi River. They continued downstream (southward) on the Mississippi and explored it to the mouth of the Arkansas River before turning back.

On this historic trip these seven explorers were probably the first Europeans ever to see the virgin tallgrass prairie as they paddled their canoes up and down these midwestern rivers. The prairie in its natural state must have been an impressive and wondrous sight! A vast grassland with an occasional grove or ribbon of river timber on the far distant horizon. A host of blooming flowers amid tall grasses inhabited by herds of bison, wolves, bobcats, cranes, swans, geese, eagles, vultures, curlews, and many other animals. In open groves and dark flood-plain forests dwelled elk, white-tailed deer, mountain lion, bobcat, and black bear. Along the clear rivers running over gravelly bottoms, there were countless herons, parakeets, beaver, muskrat, raccoons, and mink.

From its eastern outliers in Ohio to its western ones in

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A Prairie Cemetery

For the first time it struck Doctor Ed that this was really a beautiful graveyard. He thought of city cemeteries; acres of shrubbery and heavy stone, so arranged and lonely and unlike anything in the living world. Cities of the dead, indeed; cities of the forgotten, of the "put away." But this was open and free, this little square of long grass which the wind forever stirred. Nothing but the sky overhead, and the many-coloured fields running on until they met that sky. . . Nothing could be more undeathlike than this place; nothing could be more right for a man who had helped to do the work of great cities and had always longed for the open country and had got to it at last.

"Neighbor Rosicky"
Willa Cather

Kansas, Nebraska, the Dakotas and Saskatchewan, the tallgrass prairie was a working cyclical ecosystem with numerous food chains and food webs. There was a continuous flow of energy from prairie plants, which captured the sun's energy, through prairie herbivores and thence to prairie carnivores. Elements and compounds flowed between members of the prairie community and were reused over and over again. With the appearance of the Europeans, the whole system began to unravel.

It started with the movement of the population westward after the war of 1812 and the opening up of the country for settlement. With the rush of settlers to the Midwest, the tallgrass prairie's destiny was sealed. The first members of the system to go were the large herbivores and furred carnivores. The next to disappear were the prairie plants when the farmers plowed the virgin soils. Without the prairie plants at the base of the food chains, the smaller mammals, birds, insects, arachnids and worms also vanished from many areas. Despite this, however, fragments of the prairie still in old settler cemeteries, along certain railroad rights-of-way, and in nature preserves (Betz and Cole, 1969; Betz and Lamp, 1989; Betz and Lamp, 1992).

If the prairie is to survive, the process of preservation and restoration must begin with these prairie fragments. These small bits and pieces are all that remain of the presettlement prairie and must be protected and properly managed to prevent their total disappearance. Continuous study of their complex biological inter-relationships and the development of management techniques needed to keep them in good condition are crucial to their survival. These prairie fragments also serve as models and as sources of seed and animals needed for prairie restorations and reconstructions.

Unfortunately, these isolated prairie fragments cannot be relied upon entirely to carry the burden of the prairie's survival. They are just too small to sustain thriving and reproducing populations of the prairie's myriads of spe-

cies over long periods of time. Without constant re-introductions, these small prairie fragments slowly lose species due to localized catastrophes caused by stochastic perturbations in the normal physical and biological conditions.

To overcome this continual loss of species, which is characteristic of small prairies, large ones of hundreds or even thousands of acres, will be required to sustain vigorous and diverse species populations. These future reconstructions of prairie should best be undertaken on agricultural fields adjacent to prairie remnants along railroad rights-of-way. Using the ecological successional method of prairie reconstruction being developed at Fermilab in Batavia, Illinois, these agricultural fields could be planted into initial *prairie matrices* of competitive grasses and forbs using agricultural machinery (Betz 1986). Enrichment of these developing prairie matrices with less aggressive species could occur by natural invasion along the contiguous interfaces between the railroad remnants and the developing prairie matrices. Additional enrichments of the prairie matrices could also be achieved by collecting seed from other prairie remnants and sowing it into the developing prairies.

These large reconstructed prairies would be able to sustain large and viable populations of animal and plant species. In addition, they would also be easier to manage and protect because of their relatively smaller interfaces with surrounding humanized disturbed areas than is presently the case with the small remnants. They would also ensure survival of animal species that require two different habitats to complete their life cycles by providing a mixture of plant communities such as marshes, wet and dry prairies, savannas and forests, and various transitional plant communities.

However, the struggle to save the prairie will not end with the reconstruction of large prairies, but will continue far into the future. These large reconstructed prairies will be subjected to all sorts of new threats in the centuries that lie ahead. Developers will covet them for purportedly "needed" housing sites. Highway departments will find it "necessary" to construct roads and highways through them. Most likely there were be attempts to conduct "research" involving destructive mass collections, diggings and soil manipulations, and the effects of biocides. There will also be the "people problem" or the "humanization" of the prairies by the mere presence of people in the preserves. In addition, the prairies will undoubtedly be affected by changing world-wide temperatures, by increased radiation, and by the lowering of water-tables, all caused by human activities. Other potential threats can only be dimly imagined at this time.

Today the Earth is faced with a flood of humanity that threatens not only the eastern tallgrass prairie, but all other biological communities as well. From 1 billion people in 1850, the human population has increased to more than 5 billion in 1987 and is expected to continue increasing during the 21st Century. Will the prairie survive under this human onslaught? Unfortunately, this generation will never know. We can hope it will survive along with the rest

of Nature, but this will probably not happen until we learn to appreciate the interdependence of man and the biological world from which he arose and learn to curtail both our numbers and our destructive tendencies.

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