

the worst offenders, especially downy sunflower (*Helianthus mollis*) with its long underground rhizomes and compass plant (*Silphium laciniatum*) with its taproot.

My grasses and forbs are now doing well. The most desirable ones have a chance to develop while the most aggressive ones are being restrained. As the more desirable forbs become larger and more numerous, the competition among them becomes keener and gradually some of them begin to suffer. For instance, heath aster (*Aster ericoides*) at first spread so rapidly, it soon became a candidate for removal. But I did nothing about it and gradually it diminished. Not much of it is left. The puccoon plants are smaller now and some have disappeared altogether, much to my regret. The same applies to the alliums, butterfly-weed (*Asclepias tuberosa*) and black sampson (*Echinacea angustifolia*). The beautiful cobaea penstemon (*Penstemon cobaea*) has disappeared. It means, as I have learned belatedly, that some species must be protected from too much competition or else they will be crushed.

Other forbs are doing very well, holding their own without spreading excessively. Among these are 3 species of wild indigo (*Baptisia leucophaea*, *B. leucantha*, *B. australis*), the phloxes mentioned above, prairie coneflower (*Ratibida pinnata*), Canada anemone (*Anemone canadensis*), spiderwort (*Tradescantia bracteata*), gayfeather (*Liatris squarrosa*), and many others.

Competition in a natural prairie is keen but kept within limits by occasional fires and repeated grazing. The absence of fire and grazing from my prairie leads to uninhibited growth with the resulting increase in competition. The bindweed disappeared long ago along with other

weeds like dandelions. I never combated them; the native grasses and forbs did that far more effectively than I could have without herbicides. The very wet spring and early summer of 1982 resulted in a massive growth, with a height and density never reached before, but with relatively few flowers. Only the prairie coneflower put on a spectacular show.

Late in the fall, when the growing season is over, I mow my prairie with a rotary mower that shreds everything. This is hard work and takes a lot more time than mowing the front lawn. But in the end, the area is clean and smooth. The shredded material remains on the ground, forming a mulch.

I never burn my prairie. As a result, a host of tree seedlings becomes established every year, mainly elm, oak, and mulberry. At first, I thought nothing of it, knowing they would be mowed off in the fall. However, by then they were dormant and mowing did not hurt them. The following spring saw them produce new shoots from a root system that had remained intact. Again I let them be, and again they were mowed off. By the third year, however, the root system was so well-developed that the new shoots quickly turned into sturdy, woody, well-branched young trees, all in one growing season. They had to be removed with a saw! The lesson: pull them out with their roots when they first appear.

The close contact with my prairie has given me much pleasure as well as a greater appreciation of the prairie as a plant community, of its ecological intricacies, and of its beauty. Managing it is satisfying because it is so instructive. Certainly, to have a prairie is worth the effort that should go into it.

MICHIGAN CEMETERY PRAIRIES AND THEIR FLORA

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Abstract. The remnant prairie flora of Michigan cemeteries is described and the possibilities for preservation are discussed. The significance of Michigan's first cemetery prairie management project at Harrison Cemetery, Prairie Ronde Twp., Kalamazoo Co. is reviewed.

INTRODUCTION AND METHODS

The prairie cemeteries of Michigan and the Midwest present a rich resource of history, natural beauty, and information concerning the original vegetation of the region.

Over 100 sites were examined in this study which concentrated in southwest Michigan where previously documented prairies exist (Butler 1947, 1948, 1949; Veatch 1928; Scharrer 1971). Locations elsewhere in southern Michigan which were previously examined by the author for historic materials and were later checked for native vegeta-

tion provided a relatively random comparison group. For the purpose of this study the term "prairie cemetery" includes any cemetery with any significant amount of native grassland flora. No attempt is made to recognize a subcategory of savanna or oak-opening cemetery.

These sites are found in a variety of locations including dusty roadsides, among fields of corn, in small remaining groves near early homesites and on the edges of landfill dump sites. Most often they are under shadowy planted pines on the edges of original prairies or in sites originally occupied by oak openings. The great number of prairie cemetery sites found both on the edge of "historic" prairie areas and at great distances from traditionally recognized prairies and notably in southeast Michigan, suggest that native grassland plants were widely distributed within the state at the time of settlement, or that plants of these com-



munities spread rapidly after forests were cleared during the years of first settlement (Pleznac 1980).

Examination of Michigan cemetery sites for original flora begins with the premise of, it should be there. Locating the cemetery on a topographical map or in the reference source *Michigan Cemetery Compendium* (1979) implies that prairie could be there. But the true test is to pull out a county map, visit the site, walk the fencerows, examine the plots close to the gravemarkers and learn to recognize the vegetation in a minute, mowed form.

Visits at different times of the year can give varying impressions to the investigating botanist. In Michigan, a good cemetery prairie indicator is the early buttercup, *Ranunculus fascicularis*. Because of its early season emergence in April or May and its small stature, it often eludes mowers and thus provides a clue to the possibilities of later season native vegetation. A second visit should be made to the site in mid-August to check for plants that may survive close to gravestones, or stand along the fencerows, or remain unmowed in the summer heat.

When traveling through the Midwest one can locate cemeteries where native vegetation is preserved and appear to burst with energy-spreading foliage as in Queen Anne Prairie Cemetery, Woodstock, Illinois; German Settler Cemetery, LaPaz, Indiana; Clay Prairie, Allison, Iowa; as well as sites in Wisconsin and Ohio. In Michigan, where 2 cemeteries are currently managed for prairie, the usual situation is that the most notable native plants are in hedgerows around the cemeteries, as those plants inside are usually kept mowed. Mowing does not totally eradicate the evidence that prairie vegetation existed here but shows that prairie now survives in only unplowed pockets.

HARRISON AND GENESSEE PRAIRIE CEMETERIES

Prairie Ronde, once the largest and perhaps the richest prairie in southwest Michigan, now contains only scattered prairie remnants in roadside ditches and in damp pockets of undrained marsh. Today, what may be the largest concentration of native vegetation on Prairie Ronde is found in the back corner of a small township cemetery, Harrison Cemetery, where some of the first settlers are now buried. In 1980, this land became the first cemetery in the state to be managed as prairie.

Concern for the remaining native vegetation on Prairie Ronde was expressed as early as the 1940s by Clarence and Florence Hanes (1947). Their view was that in some rural cemeteries remnants of the prairie flora still remained. "When the prairie was broken up for the planting of crops, the only undisturbed refuge [prairie violet, *Viola pedatifida*] had was along roadsides, in fencerows, in cemeteries, and on the right of ways of railroads. In Prairie Ronde Township it has been found in the Harrison Cemetery."

Many of the Hanes' extensive field notes on Kalamazoo Co. were stored away until prairies became popular topics for study and people began to search for the remnant landscapes. When Harvey Ballard of Vicksburg, Michigan, explored the pioneer cemetery on Prairie Ronde in the late 1970s, it was mowed on a regular basis, but on close observation the fencerows showed several native species. This suggested possibilities of additional dormant vegetation in the body of the cemetery. There in the edge, in the thick black soil, several rosinweeds, *Silphium integrifolium*, raised their sunny heads, and between the oldest part of the cemetery and the farmer's cornfield several white baptisia, *Baptisia leucantha*, bloomed, offering exciting possibilities. In the northeast corner of the cemetery early buttercup and prairie violet still persisted, as seen by the Haneses. Eventually, the Michiana Prairie Society approached the Township Board with the suggestion of leaving an unmowed corner of approximately 33 × 66 feet to see if, given an

opportunity, more prairie species would reappear. The Township agreed. This was a decision that required a bit of courage from them for Michigan law makes it clear that a township board may be sued to vacate a cemetery that has become a commons, or has become neglected or abandoned, or has become a public nuisance. To avoid offending anyone who visited the site, or thought the board was being lax, a sign was erected to explain what had taken place.

By the spring of 1982, it was apparent native plants had achieved dominance. Now came the expansion of the prairie area to one-tenth of an acre and controlled burning to improve the vegetation and allow for a more natural development of the prairie. This site is now in its third year and has produced 21 typical prairie species, most notably 3 forbs on the Michigan threatened list.

North of Prairie Ronde is a cemetery on a smaller historic grassland, Genessee Prairie. Remnants should have also survived in the cemetery located here, and in the fencerows single stalks were found of spiderwort, *Tradescantia ohioensis*; butterfly weed, *Asclepias tuberosa*; and yellow coneflower, *Ratibida pinnata*; along with a clump of switchgrass, *Panicum virgatum*. Examination in spring revealed early buttercups and pussy toes, *Antennaria neglecta*. As summer approached, trimming was less careful, allowing black-eyed susans, *Rudbeckia hirta*, butterfly weed, and several white baptisia to appear at the corners of the stones.

FURTHER SITES

Locating prairie cemeteries takes time, patience and curiosity. There are locations where one would expect to find prairie vegetation, places with names like Flowerfield on the south end of Prairie Ronde, a descriptive name for the area but no indication of prairie. At Little Prairie Ronde, Cass County, vegetation possibilities exist but the township has decided that anything brushy is to be removed and thus destroyed all hedgerow remnants. Other sites on historic prairie, such as Cook's Prairie, Branch Co.; Shook's Prairie, Calhoun Co.; and Grand Prairie, Kalamazoo Co.; show no remnant vegetation.

Upper Flatbush, St. Joseph Co., would appear to be 1 of the least likely places to find prairie vegetation. Tucked behind a family vegetable garden and beside a pile of junk cars, the cemetery has small unmowed patches where big bluestem, *Andropogon gerardii*, and flowering spurge, *Euphorbia corollata*, flourish. It is by chance that this vegetation survives; one neighborhood child said, "I wish they would cut the grass better so I could put my [plastic] flowers by the stones."

In larger cities and towns, native vegetation is an unlikely commodity but the "backyards" of these cemeteries can yield unique finds. Mountain Home in Kalamazoo, has a patch of ground that is too steep to mow and thus a small community including black-eyed susans and Culver's-root, *Veronicastrum virginicum*, survives. The grounds of Oak Grove Cemetery in Coldwater, Michigan, are high above the roadway with steep banks covered with seasonally changing native vegetation creating a mass of color from the time of the roses to sunflowers. Although the vegetation consists of the more common plants, the community of Coldwater

should be approached with an eye toward managing the slopes and the restricting untamable bad brush. A third location is Three Rivers, St. Joseph Co., where the pioneers were buried under oaks that overlook the river. Between the river and settlers' graves is a floodplain which abounds with prairie grasses.

Preservation and restoration of cemeteries containing prairie remnants can begin with a process as uncomplicated as decreased mowing. At Sumnerville, Cass Co., mowing is on a regular schedule, but when rain delays a cutting, the gravesites are covered with nodding wild onion, *Allium cernuum*, butterfly weed and prairie grasses. This cemetery is one of the few black-soil mesic prairies available for preservation in Michigan. The extensive native flora seen indicates that a good native vegetation could be established. In other locations, areas that have been ignored for some time flourish with plants typical to the soil structure. Cavanaugh Road, near Coldwater, has New Jersey tea, *Ceanothus americanus*, bergamot, *Monarda fistulosa*, blazing star, *Liatris aspera*, and flowering spurge among others. Close to the gravesites can be seen promise of more prairie if it were only allowed to develop. The steep slopes of Mount Hope Cemetery, Barry Co., have produced spiderworts, blazing stars, prairie phlox *Phlox pilosa*, butterfly weed, and sunflowers *Helianthus* spp., all in a large dramatic hillside cemetery. Johnson Cemetery, Hillsdale Co., which may appear dull in front, has thick stands of big bluestem and samplings of the prairie species of summer in an unmowed area at the back.

Currently under informal preservation as of July 1982 is the City of St. Joseph's Brown School Road Cemetery, a dry-mesic site near the Lake Michigan shoreline. The last

burials here were in 1932. Mowing has been limited, with outlying areas being generally ignored. A walk through the preserved 2-acre plot on a July afternoon led to the discovery of 36 species. By August, another 11 species had emerged.

CONCLUSION

In an old graveyard on Prairie Ronde, there was once a marker that read, "He plowed the first furrow on this prairie or in this county" (Butler 1947, 1948, 1949). Because of vandalism and lack of attention the stones at this site have been broken and pieces now reside in the basement of the local museum. As they deteriorate and break into fragments, the stones can be stored but the prairie cemeteries they marked cannot be safely packed away. They can only be preserved and maintained where they now exist if someone will notice or care.

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MANAGEMENT AND NATIVE SPECIES ENRICHMENT AS AN ALTERNATIVE TO PRAIRIE RECONSTRUCTION

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Abstract. Attempts at reconstructing prairie plant communities on bare ground have practical limitations in size, richness, and authenticity. Management and native species enrichment of existing native grass stands, old fields, and degraded prairies provide an alternative that can work with ongoing local processes. This approach can result in larger prairie simulations and, in the right conditions, more complex native grassland recreations than those developed by the typical prairie reconstruction.

Certain techniques for reconstructing prairie plant communities on bare earth have gained widespread use in recent years (Rock 1974, Smith 1980, Schramm 1970). As effective as these methods are in quickly establishing reconstructed prairies, alternative approaches to establishing native grasslands including management and native species enrichment of old fields, native grass stands, and degraded prairies should not be overlooked. In the

right circumstances, management and enrichment may be less expensive, more true to local conditions, and more likely to result in a rich prairie community. At the very least, the use of this low-intensity method is philosophically appealing to the ecologist because it offers another answer to the problem of establishing complex native grasslands. Diversity in methods, as in all things, ought to be fundamental to ecology.

Prairie reconstruction¹ on bare ground is essentially a labor-intensive process which aims to impose profound and rapid change on a site. Unfortunately, fast establishment tends to limit a plant community's complexity and to simplify its structure (Schwartzmeier 1973).

In preparation for planting, the typical prairie reconstruction site is tilled several times and herbicide is

