

September 23, 2021

**Statement to the Greater Rockford Airport Authority
about Bell Bowl Prairie**

I am John White, from Urbana, and I am here to speak to you about Bell Bowl Prairie.

I designed and directed the Illinois Natural Areas Inventory, which identified Bell Bowl Prairie as outstanding. I also helped establish or oversee similar inventory projects in every other state and several other nations.

Four years ago, I set out to study our high quality prairies closely, in unprecedented detail. I am learning that prairies such as Bell Bowl have a marvelously intricate ecology and are astonishingly rich in species.

I cannot begin to discuss this ecology now, but I can give you an idea of how rare such prairies are. I drove 183 miles to be here; along the way north to Winnebago County, I passed one other prairie that is similar to Bell Bowl in terms of its size and quality.

Bell Bowl Prairie is a rare treasure. And fragile: if you try to move it, it will disintegrate and die away, replaced by weeds.

This prairie still exists because of the airport. You can be proud of that. Thank you. Please continue to care for it.

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September 30, 2021

**Expanded statement
to the Greater Rockford Airport Authority
about Bell Bowl Prairie**

John White

To the Board of Commissioners of the Greater Rockford Airport Authority:

I will elaborate on five things that I said to you at your meeting on September 23.

First, to introduce myself further, I have been working with prairies for 56 years, ever since I was old enough to drive a car. George Fell hired me after college to work for the Illinois Nature Preserves Commission. It was George who persuaded the Greater Rockford Airport Authority to protect Bell Bowl Prairie in 1968.

In the 1970s I designed and directed the Illinois Natural Areas Inventory, the first project of its kind in the nation. In the 1980s, as Chief Ecologist for The Nature Conservancy, I helped establish or oversee similar projects all across the Western Hemisphere. Since 1990 I have been self-employed; my prairie research and prairie advocacy are unpaid.

Since 2017 I have been carrying out an intensive study of prairie ecology. I devote between 8 and 15 hours a day to prairie research, usually seven days a week.

When I spoke to you, I said that this research is unprecedented in detail; that's because I am scrutinizing little plots of prairie, mapping every plant in them millimeter by millimeter. I am documenting the fate of each plant throughout the year – and from year to year – in order to see how each plant grows, reproduces, and dies. Nobody else has ever done anything like this, and I have gained new insights relevant to Bell Bowl.

Second, I will say a few things about prairies in general and Bell Bowl in particular.

A prairie is a natural grassland, made up of native plants and animals. Prairie was once the most widespread ecosystem in Illinois, the Prairie State. Now prairie is the most converted ecosystem in the state. The Illinois Natural Areas Inventory found that one-hundredth of one percent of our prairie remained in good condition.

All sorts of reasoning can be set forth to explain why it is important to preserve prairies. A basic reason is this: prairies are *rare*. As George Fell said, “Nothing becomes valuable until it becomes rare.” Natural prairies are becoming ever more precious.

The few remaining patches of prairie are so small, one might assert that they should not even be called prairies. Indeed the word *prairie* brings to mind vast open spaces. Bell Bowl Prairie is a little island – once surrounded by farmland, now increasingly developed.

There is another way of looking at prairie, though. When viewed closely, at the scale of a square yard, a marvelously intricate, beautiful world is revealed. In the most intact part of Bell Bowl Prairie, when you look down at any square yard, you see it the way that it probably has “always” been – for thousands of years since prairie first developed there. At the scale of a square yard, the vegetation is nearly pristine and primeval.

Almost all of the remaining patches of prairie in Illinois are on land that is too steep, rocky, sandy, gravelly, or wet to farm. The steep, gravelly bluffline of Bell Bowl prevented it from being farmed.

Bell Bowl’s steep, dry, gravelly slope is also key for another reason. Eurasian grasses and weeds can crowd out prairie vegetation, especially if an area is disturbed by mowing or grazing. But on an unusually dry site such as Bell Bowl, prairie plants can hold their own against Eurasian plants. Even then, a patch of prairie will eventually succumb to encroaching trees and shrubs if it is not cared for.

If the Greater Rockford Airport Authority had not committed to the prairie’s proper management in 1977, it would all be lost to brush by now.

My third point: I mentioned last Thursday that I passed only one prairie that is similar to Bell Bowl Prairie in terms of its size and quality when I drove from Urbana to Winnebago County.

That other prairie is in Weston Cemetery, and it was 22 miles east of me when I went past on Interstate 39. I had to reach out across more than 20 miles of cropland in order to say that I passed by that prairie; this shows how rare prairie is in the former Grand Prairie region of central Illinois. Winnebago County has more remnants of prairie because the landscape cannot be so intensively farmed, yet only a tiny fraction of the original prairie survives in the county.

Fourth: I said that Bell Bowl Prairie is fragile, and if you try to move it, it will disintegrate, die away, and be replaced by weeds.

I estimate that roughly 7% to 15% of the plants that are moved from Bell Bowl might survive. Some of the rarest and most sensitive species are likely to die out entirely. My line of reasoning is appended on pages 5 to 9.

It is impossible to move a piece of prairie and keep it intact. Transplanting any part of Bell Bowl Prairie would be an exercise in futility, not a viable option. It would be taking the living equivalent of the most intricate, exquisite stained glass church window, shattering it, casting the shards on the ground, and then hoping that it will reassemble itself.

And fifth: I finished my presentation to you last week by acknowledging that Bell Bowl Prairie still exists *because of* the airport, and I said that you can be proud of that. I am asking you to please continue to care for it.

I am asking that development be redirected in this one specific area, and that arrangements be made so that the prairie can remain in perpetuity.

You have something unique and irreplaceable at Bell Bowl. The prairie could be highlighted as a positive feature of the airport. Seriously, the prairie's Rusty Patched Bumble Bee would make a fitting symbol for the Chicago Rockford International Airport.

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Appendix

Why it won't work to try to move Bell Bowl Prairie

What would happen if mitigation is attempted at Bell Bowl, to salvage what would otherwise be buried or removed by construction?

Answer: The transplanted prairie would lose its high diversity of species, which is a hallmark of our native prairies and a primary reason for protecting them. Furthermore, the most sensitive species would be largely or entirely lost. Most important, it simply is not possible to move a prairie and maintain any semblance of its ecological integrity.

In order to discuss what would happen to the prairie if it is moved, I will introduce three points about prairie ecology.

First point: In an undisturbed, "old growth" prairie, any given square yard of habitat is likely to embrace about a quarter to a third of all of the native plant species growing in the entire habitat. This is a tremendously rich intermixture of species, a community developed by countless generations of plants coexisting without disruption.

A high quality prairie such as Bell Bowl has so many plant species because it is not dominated by only a few species to the exclusion of others. Instead many different species are packed together.

Second point: The high plant diversity of a prairie such as Bell Bowl is explained in part by the fact that a prairie is not just plants: there are prairie insects, other animals, fungi, and other microorganisms. These other forms of life depend on plants for food, and in the process, they affect the vigor and abundance of plants. An individual prairie plant species may be host to a number of specialized insects (little grazers, borers, leaf miners, etc.) that feed *only* on that particular kind of plant. All these "pests" help keep a plant species from becoming so robust and numerous that it crowds out other kinds of plants.

Third point: There is growing evidence that different plant species can cooperate by sharing resources. This happens when a soil organism called a mycorrhizal fungus attaches to the roots of different plants and forms a connection between those plants; nutrients are transferred between plants by way of the fungal strands. Such sharing between species may help explain how so many different kinds of plants can coexist in a small area.

Next I will make some predictions about the effects of moving a prairie, organized in four phases:

- Initial disruption
- First winter
- First three growing seasons
- Longer term

I will estimate how many plants might survive each phase. I will give figures for what

I judge to be a *realistic* outcome, and I will also give a more *optimistic* estimate.

Initial disruption

The most successful efforts to translocate prairie have involved places where there was a thick, dense, strong sod on clayey or loamy soil. When such sod is dug up, it holds together and some soil clings to it. The sod remains intact when it is moved, and it can be laid out at the relocation site.

The soil and sod at Bell Bowl are the opposite of ideal. The soil is gravelly, and the sod is not tough; it will not hold together well when excavated. If translocated, a scoop of Bell Bowl's gravelly soil will become a loose heap with stems sticking out every which way, and with plants buried with their roots in the air.

Many of the plants that comprise high quality prairie have deep taproots. These plants are built to stay put – not to spread via shallow, creeping rootstocks. At Bell Bowl, taprooted plants probably have extra-deep roots for two reasons. (1) Taproots *can* penetrate the relatively porous, gravelly soil (unlike tight, clayey soil). (2) Roots *need* to grow deep to reach water that percolates so freely down through gravel.

Unless a layer of earth more than a foot thick is moved, many plants would lose more than half of their taproot, including a large part of their stored food reserves and their ability to absorb water.

I estimate that only 75% of the plants in a scoop of Bell Bowl Prairie may initially survive being dug up and moved. Or, an optimistic estimate: 90% survival. The rest of the plants in a scoop would tumble off or would be too churned up and mutilated to live.

First winter

The upcoming weeks would not be a good time to attempt to transplant prairie vegetation. Plants have been going into dormancy; if they are moved, they will not be able to start to recover before they must endure winter.

Soil moisture is at a premium during wintertime when the ground is frozen. The region is in a drought, so soil moisture is even more limited than normal. Most prairie plants are drought-resistant, but translocating them may prove to be too much. Churned-up gravelly soil can hardly hold water, and many roots would be shorn off or sticking out into the air. Plants would dry out and die during the winter months.

At the relocation site, the dug-up prairie soil probably would be spread out over land that is occupied by voles (meadow mice). At this time of year, voles have some winter food stockpiled in burrows, and they know where they will get the rest of their food via their surface runways. If a vole and its home are buried by earth from Bell Bowl, I predict that the vole will dig itself out, forage on the transplanted roots and rootstocks, and destroy a substantial part of it. Ecologists have found that the food preferences of voles can strongly influence what kinds of plants live in a prairie.

I estimate that, over the first winter, 75% of the relocated prairie plants might escape being lost to desiccation and voles. An optimistic estimate is 90% survival.

First three growing seasons

During the first growing season after being moved, many plants would die because they were buried too deep or upside down, and they cannot sprout and reach sunlight before they exhaust their food reserves.

Broken roots and rootstocks on the transplants would provide avenues for massive bacterial and fungal infections. Many injured plants would die because they cannot heal and grow faster than they are rotting away. Chemicals in the roots of some “medicinal” plant species might ward off infections, but the usual starchy underground organs would be prone to invasion from soil teeming with bacteria and fungi.

Mortality from shock, wounds, and infections would be greatest during the first year, tapering off so that it might not be noticeable after two or three years.

My discussion focuses on plants because I am a botanist, but the corresponding loss of prairie insects and other native organisms would also be high. Many of them would be left behind when the prairie is moved. And as I noted on page 5, if those other species are lost, then the diversity of plants will further decline. Also on page 5, I referred to mycorrhizal fungi, which may have a key role in fostering plant growth and survival. I’d like to think that those fungi would readily reestablish their delicate connections with plants after being ripped apart by a move, but a soil scientist friend told me no, they won’t.

Of the plants that survive the first winter, I estimate that roughly 50% might persist through the end of the third growing season. At best, perhaps 75% would survive.

Longer term

Beyond three years, two main factors would control the fate of transplants from Bell Bowl: (a) how well the physical environment of the relocation site matches the environment at Bell Bowl, and (b) competition from aggressive plants.

Physical environment

The vegetation of each square yard at Bell Bowl developed its character without interruption over thousands of years – each species adapting itself to the soil right there and adjusting to neighboring plants. The result is a finely tuned mosaic, a community of plants. The relationship between the vegetation and its physical environment varies yard-by-yard across a prairie.

If the prairie is moved, this ecological relationship is ended. Within three years after being relocated, the soil from Bell Bowl would be melding with the ground below. But if the soil is not all the same, with a seamless transition from the new layer of soil to the substrate, then the transplants may not thrive – and if they do not thrive, they will die sooner or later.

If there is an extreme mismatch between the soils, plants will die quickly. I once monitored a patch of sandy prairie that was dug up and placed on top of silty clay loam: within four years, all of the plants that had been moved were dead.

I expect that a site with a good match for the gravelly soil at Bell Bowl could be found to receive the translocated prairie. Impossible to achieve, though, would be to duplicate the position of each square yard of prairie when it is relocated – that is, to place it at its original elevation on a slope, facing in exactly the same direction as it was at Bell Bowl. Instead, plants would have to “sort themselves out,” and a big part of the sorting process would be die-off.

Plant competition

Prairie vegetation disappears if it is repeatedly disturbed (for instance if it is mowed again and again), but the disturbance is not always directly responsible for a prairie’s demise. Instead the disturbance tips the balance in favor of plants that thrive under disturbed conditions, and those favored plants in turn crowd out the injured and weakened prairie plants.

In the long run, most of Bell Bowl’s translocated plants probably would die and be replaced by plants that are better adapted to the disturbed conditions of the transplant site. The successful species would be weedy ones such as goldenrods that were already present on the site – plus the most adaptable and resilient of the transplants. Any remaining sensitive, “conservative” species are likely to be overwhelmed and replaced.

I suppose that, after a decade, there might be 25% survival or reproduction of plants that managed to live through the first three years. I am so uncertain about this, though, that I will not hazard both a “realistic” figure and an “optimistic” figure.

Conclusion

First, I must reemphasize that my focus is on plants, and a prairie is much more than its vegetation.

To see what might be the outcome of moving the prairie vegetation, I’ll take the estimated proportion of plants persisting through each of the four stages and multiply them together:

Realistic estimate: $0.75 \times 0.75 \times 0.50 \times 0.25 = 7\%$ survival of plants

Optimistic estimate: $0.90 \times 0.90 \times 0.75 \times 0.25 = 15\%$ survival of plants

This “back-of-a-napkin” analysis is far from complete and certain. Here is one of its limitations: although seeds of prairie plants would be moved along with the mass of soil, sod, and plants, it is impossible to account for the contribution that seeds might make in establishing prairie vegetation at the relocation site. I can say, though, that my research shows that the rate of seed germination usually is quite low under wild conditions (many of the seeds are eaten), and the great majority of seedlings die in their first year.

My estimates of plant survival are educated guesses. But even if the estimates are off the mark, this appendix affords a way to think through the consequences of trying to mitigate the effects of a development by moving a prairie.

In the long term, it does not matter so much what percentage of transplanted *individuals* will survive – because some of the survivors will reproduce and replenish their numbers. What really *does* matter is the percentage of *species* that survive.

Floristic Quality Assessment provides a way to look into which species might or might not endure a transplant operation. In this assessment system, each native plant species has a rating (ranging from 0 to 10) to indicate how much the species depends on undisturbed conditions. For example a cornfield weed is rated 0 or 1; at the other extreme, a highly conservative species that is never to be expected outside an intact natural habitat is a 10.

Bell Bowl Prairie has nine plant species that rank 8, six species that rank 9, and eighteen species that rank 10. These are exceedingly high numbers, an indication of the high quality habitat at Bell Bowl.

I am confident that some of those highly conservative species could survive a wholesale sod-transfer effort if the operation is managed well and if the weather cooperates. As for the other highly conservative species, it might be possible to dig up individual specimens, move them to a new site, tend them carefully, and keep some of them alive. I fully expect, though, that most of those plants either would not withstand the shock or would not be able to adjust to their new habitat. They would die.

Any consideration of a plant “rescue” effort must not cloud the fact that the natural habitat that supports an endangered species is as important as the species itself. The habitat needs to be preserved in-place and intact. If the goal is to *preserve* a prairie by *moving* it, then the effort will be a 100% failure from the start.