



## EARLY RESTORATION ECOLOGISTS DID NOT INSIST ON EXACT REPLICAS

DNR photo of Buena Vista Marsh Conservation Area by Aaron Carlson

**Traditional versus novel communities:** Prominent restoration ecologists are re-debating the definition of “restoration.” Led by Richard Hobbs, Eric Higgs, and James Harris<sup>1</sup>, many co-authors argue that the terms “restored community” and “restoration” are outdated and should be replaced by terms like “novel ecosystems” undergoing “intervention.” By “novel ecosystem” they mean that humans have modified historical conditions beyond restorability. Other prominent ecologists, including Dan Simberloff, argue that, “The concept of ‘novel ecosystems’ advocates embracing novelty as a way to move forward and away from traditional’ conservation and restoration approaches” (Murcia<sup>2</sup> et al. 2014).

At the core of the debate are claims that three things are new to ecological restoration, that: **It’s hard to turn back the clock to achieve a target with “historical fidelity;” outcomes will be novel; and goals need to be pragmatic** (Murcia et al. 2014). Restoration efforts in the Arboretum and elsewhere in Wisconsin show that none of these is a new idea.

The Arboretum offers the best historical perspective on this debate because, as an intellectual center, it gave birth to the field of restoration ecology with the initiation of tallgrass prairie restoration in 1935. That set the course for a focus on restoring native plant communities—a mission that continues to date. The Arboretum is not only the birthplace of restoration, but also the place where William R. Jordan III published the first journal

on restoration in 1981. Notably, he said in 1982 that **“It should be clear by now that I believe the attempt to restore ecosystems represents a novel kind of activity offering distinctive challenges and opportunities”** (p. 42, *The George Wright Forum*, [www.georgewright.org/024jordan.pdf](http://www.georgewright.org/024jordan.pdf)). Jordan also convened the first conference to identify how restoration contributes to the science of ecology, which led to the first book on *Restoration Ecology* (Jordan et al. 1987). In 1987, he helped establish the Society for Ecological Restoration (SER), which now boasts >2,400 members in >70 countries.

**How the Arboretum portrays “restoration”:** In my opinion, experiences at the Arboretum best exemplify what “restoration” encompassed historically. Curtis Prairie already embodied the ideas that recent authors claim are new. (I’ll use **sepia font** to emphasize the **old age of three ideas**):

- **Was it hard to achieve historical targets?** Yes. Through experiments, plantings of native prairie grasses and forbs, and using prescribed fire, a pasture gradually became our 72-acre Curtis Prairie. It seemed we had turned back the clock by the 1960s. However, we are still battling native shrubs that became invasive, especially gray dogwood (*Cornus racemosa*), which doubled its occurrences (from ~26% to ~57% of censused plots) sometime between 1971 and 1991. Michael Hansen, our Land Care Manager, recently concluded that shrubs expanded despite the consistent



During the dust bowl years, there were surface and subsurface peat fires. Many croplands were abandoned in favor of pastures and conservation land. In the 1950s, several land parcels were purchased for management of greater prairie chickens (*Tympanuchus pinnatus cupido*). In the 1960s, the vegetation was non-natural old-fields (Zedler 1968; Zedler & Zedler 1969); yet it became a State Natural Area in the 1970s. I continue to think of this as an example of restoration—even though the specific site and target still lack “historical fidelity” and the 1850 vegetation is unrestorable.

### Were new ideas already old?

- **Was the conservation goal pragmatic?** Yes. Wildlife biologists wanted to restore the regional population of greater prairie chickens even though the site was further north than the natural range of this species. They wanted a place with open vegetation and grasses that could be maintained by mowing the booming (mating) grounds. The birds were already moving north in response to land uses that created pastures and old fields. Furthermore, land prices were low, due to crop failures and declining markets for bluegrass seed. This was a win-win opportunity—a bird needing a place and a place needing a purpose.
- **Was the outcome novel?** Yes; unquestionably. Neither the dominant vegetation nor the target bird was native to the site. The vegetation of prairie chicken conservation lands varied with microtopography and depth to water table: A few wetland plants (*Carex* spp.) persisted along with agricultural weeds (bluegrass = *Poa pratensis*) in the moist organic soil of swales in between dry sandy ridges that supported invading dry prairie plants, notably little bluestem (*Andropogon scoparius* = *Schyzachyrium scoparium*; Zedler and Zedler 1969).

- **Was it hard to attain “historical fidelity”?** Yes. There was no way to restore deep peat deposits, even if all drainage ditches could have been plugged. Nor could tamarack swamps have been restored to rewetted impoundments, given altered soil and water. But this did not preclude restoration of prairie chickens (a bit north of their historical distribution) and their open meadows (by managing non-native vegetation).

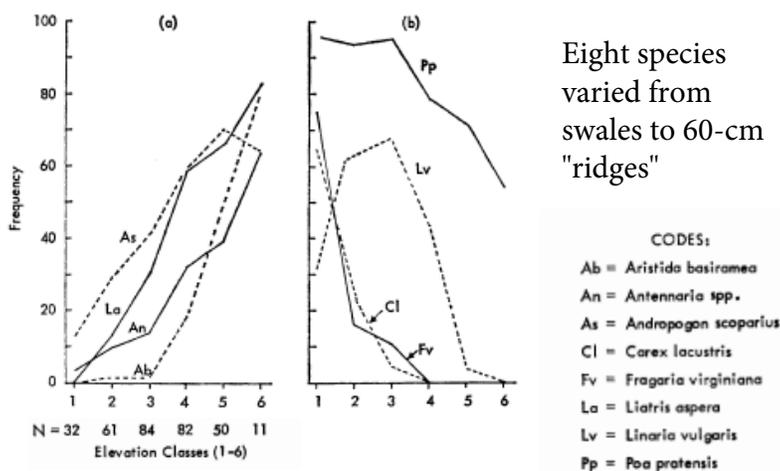
However, the prairie chicken population might not be self-sustaining in the long term. Wildlife biologists determined that the Wisconsin population was at risk due to declining habitat and declining genetic diversity, so in 2009, >100 greater prairie chickens were translocated from western Minnesota to Buena Vista Marsh. It is difficult to turn back the clock, but important to conserve regional biodiversity where and when opportunities arise.

### Can we set strict criteria for all that restoration encompasses?

I don't think strict criteria make sense. Since the beginning, restorationists accepted shifts in where we restore each species. That was of necessity, since there are no details of pre-European vegetation in either the Arboretum or Buena Vista Marsh. Our interpretations are based on early surveyors' data, recorded at 1-mile intervals (a coarse sampling grid that only allows coarse mapping). Historical soil maps are similarly coarse-grained. Also, for Curtis Prairie, we don't know either the wetland area or woodland/shrubland area, although we know that the soil is not deep black soil typical of tallgrass prairie. And for Buena Vista Marsh, we do not know if greater prairie chickens made occasional use of the area before it was drained—or if the birds waited until farmers created open fields and pastures before migrating north.

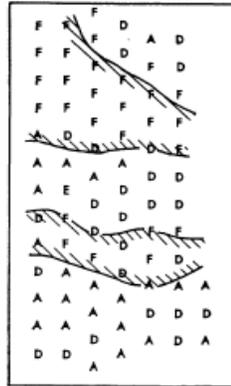
**Because historical targets are general, it is hard for anyone to say how much “historical fidelity” a restoration effort provides, or how much “fidelity” would meet someone’s criteria and standards.**

Since the beginning, restorationists accommodated variations in vegetation composition of both targets and outcomes. At Buena Vista Marsh, the humanized landscape had undulating topography (>1-m elevation range) that was probably reminiscent of the prairie chicken's native grassland habitat further south.



In the 1960s, an association analysis separated five “communities” (called A-F) within stands of <10 acres. For example, the stand below had two swales (hatched) with mostly bluegrass (F) and three ridges with mostly little bluestem (A and D) (Zedler & Zedler 1969).

Vegetation varies in response to variations in topography as well as to belowground spatial patterns that are not obvious. How much of a site would need to meet some criterion for species composition before a restoration site could be considered “historical” instead of “novel”?



## Let’s keep a broad definition of “restoration”

General targets for both vegetation (open meadow) and birds (native to the region) all fall under my umbrella for the word, “restoration.” So do many

“re” words with overlapping definitions and variable uses: reclamation, rehabilitation, recovery, renewal and reintroduction. **Rather than superimposing a new terminology, I suggest that we just clarify what we mean each time we use the term “restoration.”** Let’s not avoid the very term that unites us as scientists and practitioners, that engages the public to volunteer their help, and that prides loose valuable funds in support of conservation of both biodiversity and ecosystem functions. Murcia et al. (2014) expressed a similar thought in cautioning scientists not to create unnecessary risks.

**The Arboretum contribution** to a contentious debate (Hobbs et al. 2014) is that there is nothing new about relaxed ideas concerning pragmatic targets, difficulty turning back the clock (historical fidelity), and inability to achieve specific criteria. Restoration as initiated at the Arboretum was **always a difficult process, with outcomes that include some aspects of novelty, that are best achieved given pragmatic goals.** And it still is.



<sup>1</sup>Richard Hobbs is Professor and Chair in Environmental Science at Murdoch University and the former editor of the journal, *Restoration Ecology*; Eric Higgs is Professor in the School of Environmental Studies at the University of Victoria, Canada; Jim Harris is Professor of soil systems and Chair in Environmental Technology at Cranfield University, United Kingdom. I photographed the threesome at South Korea’s National Science Institute.



<sup>2</sup>Carolina Murcia is the Science Director for the Organization for Tropical Studies at Duke University. Her critique of the novel ecosystem concept was co-authored by James Aronson, Gustavo Kattan, David Moreno-Mateos, Kingsley Dixon and Daniel Simberloff. Photo from her home page.

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