

About Prairie Restoration

Here, I only hope to provide a brief discussion of the fundamentals of restoration. My intention is to make the reader “restoration literate”, with a basic understanding of what happens during a restoration project. For those who are ready to start their own project, I recommend that you consult other, more comprehensive sources. A good place to start is, [The Tallgrass Restoration Handbook for Prairies, Savannas and Woodlands](#), edited by Stephen Packard and Cornelia F. Mutel, © Society for Ecological Restoration, 1997, Island Press, ISBN 1-55963-319-0. I encourage you to visit <http://www.inhs.uiuc.edu/~kenr/prairierestoration.html> . I also invite those that are involved in a restoration to drop me a line, I am most interested in good advice and most willing to share my experiences, alan@camptyler.org

To be true to definition, prairie restoration would be the act of repairing a fragment of once true prairie by eliminating plants and animals that were not there originally and putting back those that were. “Originally” is most often assumed to mean prior to European settlement. In many places, such as Camp Tyler, one might be more correct in calling it “prairie creation”. Along the eastern edge of the tallgrass, the boundary was irregular and fluctuating in response to major disturbances such as drought and fire. It is known that in Smith County, Texas where Camp Tyler is located, that the grasslands were maintained by fires of the Caddo Indians. However, there is no record as to their exact placement or extent. We can only assume that the plot where we are “restoring” our prairie was once tallgrass. We know that in the 1920s that all of the forest in the county, as well as surrounding counties had been removed and that the landscape was all under plow. Our prairie restoration site was most recently a dairy pasture dominated by exotic grasses such as bermudagrass and bahiagrass, before that it was a cotton field. At the onset of our project there were only a few species of native prairie plants present. Of the “Big 4” grasses; little bluestem, *Schizachrium scoparium*, big bluestem, *Andropogon gerardii*, switchgrass, *Panicum virgatum*, and Indian grass, *Sorghastrum nutans*, only little bluestem was present and only one plant! The nice part of starting a prairie where there is no remnant is that one does not have to worry about damaging the remnant

populations. Whether restoring or creating, it is all good. Any parcel of land that is dedicated to growing native plants will help conserve the tallgrass community.

Getting Started

A restoration project begins with a base line inventory. You can hire a consultant to do this for you but in doing so you will miss half of the fun. There are numerous excellent field guides and floras available for any state where tallgrass grows. The biology departments of most major universities have web pages devoted to their states flora and fauna, as do many of the state fish and wildlife agencies. In this day of digital photography and e-mail it is simple to take a photo of a plant that you might be having trouble identifying and send it to an expert. Keep in mind that the plant community will go through seasonal changes and it will require at least a full year to completely inventory your site. As you compile your list of species present, read the text that comes with the species description and determine which are native to your area and which are exotic. Note the relative abundance of each species and where they are growing. Some plants, even the unwanted exotics, will serve as indicators of soil type and moisture. This information will be useful a later date when you are trying to determine where to plant a handful of hard to get or expensive seed.

As you work on the base line inventory of the species that are present you can also start compiling a list of the species that you might expect to be present. You can start this process by looking at the range maps in the field guides. However, it is wise to dig a little deeper into the literature. Just because your site is within the range of a particular species does not mean that your site has the proper microhabitat for that species to grow there. For example, some prairie plants only grow in clay soils and others only grow in sandy, well drained soils. Your sight may not be able to support one or the other.

As your two lists grow you will begin to compare them and two new lists will unfold – the ‘things to get’ and the ‘things to get rid of’ lists. This is where things become real

interesting. Where do you go to get purple cone flower seeds? How do you get rid of bahiagrass?

Things to Get

Source material for your restoration project is frequently referred to as “propagule”, as in stuff to propagate with. This might be seeds, transplants, cuttings or roots. In the pure and perfect world it would be nice if you could travel to a near by vacant lot or right-of-way and gather seeds or plants. Actually, this is the preferred method. There are some do’s and don’ts of course, such as, acquiring permission from landowners, harvesting at the correct time so as to not be wasteful, and collecting in a manner that will not adversely affect the source population. By collecting from local populations you will only introduce genetic strains that have evolved in your locality. This can be important, because if you introduce a variety from a distant location, with a different genetic composition from the local populations, it can hybridize with the local plants and possibly cause the loss of traits that are locally unique. This concept is hard for many to understand, so I offer an analogy, of sorts.

For decades, there has been a effort underway to save the nearly extinct red wolf. They have been successfully breed in captivity and released in their native habitat. However, their native habitat now has more coyotes and stray dogs that it did when the red wolf thrived there, centuries ago. When the wolves are released in the wild, they often interbreed with the coyotes and dogs. The offspring are not red wolves. Thus the unnatural presence of coyotes and dogs is pushing the wolf closer to extinction.

In the same manner, planting a variety of Indian grass from South Dakota in a restoration site in east Texas might cause the loss of something that is special about the east Texas variety. One rule of thumb that I have encountered is to try to obtain propagule from within 50 miles to the north or south and 100 miles east or west.

Having said all of that, I can confide that finding local populations that are accessible and large enough to harvest propagule from for even the most “common” tallgrass

community plants can be difficult if not impossible. On a recent trip from Tyler, TX to San Antonio, TX I took the two-lane back roads in order to look for remnant populations of Indian grass. Over the course of the 300 mile drive I located only one stand of Indian grass, probably no more than 100 stems. You can drive and of the roads from Tyler to Dallas, all of the way across the historic Post Oak Savanna and the Blackland Prairie, and you will not see one stem of big bluestem. I truly hope some reader will inform me that my observations are erroneous but I have read that less than one tenth of one percent of the original Texas tallgrass is left.

Fortunately, there are other sources for propagule. At Camp Tyler we have relied heavily on Native American Seed of Junction, TX, www.seedsource.com. They are one of a growing number of commercial suppliers of native seeds. Native American is also conscientious about providing seed that is from this region. Granted it may be more than 100 miles away, it seems to be the best recourse when local seed is just not available. In addition to seeds, they also sell transplants. I have found transplanting to be very effective, especially in locations where the competition from aggressive exotics such as bahiagrass is intense. Once the tallgrass is a foot tall, nothing can choke it out, but seedlings sometimes have trouble finding enough sun to grow. We also obtain propagule from the local chapter of the Native Plant Society, www.npsot.org/, and occasionally some of the area nurseries and arboretums will have plant sales that include local native plants. For me the most exciting source of propagule is the migratory birds. Many North American birds either stop over during migration or stay for the winter in our prairie. These migrants target prairie remnants as feeding sites because they evolved with the prairie and instinctively know how to find food there better than anywhere else. Many of the prairie plants have evolved seeds that are ingested but not readily digested by birds. Seeds eaten by the birds at one location are often deposited at another many miles away. In the few years that I have watched our prairie develop I have seen several new species appear that we did not plant.

Another source of seed that must not be overlooked is the seed bank in the soil. The seeds of many prairie plants lay viable yet dormant in the soil, sometimes for many

decades. Under the right conditions these seeds will germinate. Such conditions might be brought about by a fire, a soil disturbance, or the appearance of a fungus that has been absent from cultivated soil. As the restoration project unfolds the chances of the right conditions for germination to occur increase.

Things to Get Rid Of

Getting rid of exotics may be the hardest part of restoration. Most conservationists contend that all exotics are bad news; every exotic plant is taking up space that could be occupied by a native. Theoretically, an intact, all native ecosystem should be the most efficient in all of life's processes because all of the component species have been molded by natural selection to fit together perfectly over millions of years of evolution. Anything new must certainly disrupt ecological mechanisms. On the other hand, change is the stuff of evolution. Populations of plants and animals are always expanding and contraction, pushing others out of their way in one direction and yielding to an aggressor in the other.

We are beginning to realize and accept that novel ecosystems are here to stay and now dominate much of the landscape. Some native species do indeed benefit from the presence of some exotics. It might be more prudent to expect control rather than elimination of some exotics. Indeed, some have been here for so long and are such an integral part of the landscape it would seem unnatural to be rid of them. For instance, honeysuckle is deeply ingrained in the lore and culture and landscape of the south. Most people would consider it native even though it came from Asia after the days of Columbus. I once thought that common mullein, *Verbascum thapsus*, was a desired species for our restoration effort. It looks like a prairie plant, and is sometimes referred to as Indian tobacco, it must be native. It is not. It was brought from Europe by the early settlers and planted here because they valued it highly for its medicinal use in curing coughs and congestion. The study of the exotic species and their histories is another fascinating tangent of prairie restoration.

Some exotics are real problems. These are species that become invasive. They have found their way to our soils and like it here because they have managed to leave behind most, if not all of the things that eat them, make them sick, and control the size of their populations. They have a lopsided advantage over our native species which are surrounded by herbivores, pests and pathogens that have coevolved in the tallgrass and have adaptations that keep any of the native plants from monopolizing the landscape. In east Texas bermudagrass and bahiagrass were introduced as livestock forage because their invasive qualities make them superior forage. These grasses are almost indestructible; they can be grazed down to the dirt and come back strong. They thrive in dry, hot weather. They grow best during the time between the winter annuals and the native perennials, choking out the seedlings of the natives before they have a chance to become established. They spread by rhizomes, (crawling underground stems) and by seed. Plowing and tilling just seem to cut up the rhizomes, causing the plants to multiply. Needless to say, they really get in the way of the native plants. Other parts of the country have other species of invasive exotics that behave in similar fashions.

The first course of action that most people consider is to attack with herbicides. We avoid herbicide use at Camp Tyler because of serious questions as to the effect of herbicides on amphibians and possibly children.

Instead, we are trying to use Nature's model of disturbance to give the natives the upper hand. Disturbances are a key component in a functioning ecosystem and play a primary role in maintaining species diversity. If a plot of intact native tallgrass were protected from all disturbances it would gradually become a monoculture of one or two dominating species of grass. A disturbance at the correct time and of the correct intensity will bring about damage to the populations of dominating species giving less aggressive species an opportunity to grow. From late May through July, the native grasses can grow as fast as or faster than the competing exotics. Once the tallgrasses are taller than the exotics they shade out the competition. By burning or mowing short in early May, then planting we are slowly giving the natives the upper hand. We have also found that many of the native grasses grow in "clumps" that can be divided and transplanted. As long as we plant on a

rainy day, the transplants do well. We are also experimenting with over-seeding the exotic grasses with native seed that is incorporated in seed balls.

Many of the lawn and turf grasses that most homeowners are familiar with can be sown simply by tossing the seed on the ground. In contrast, the tallgrass seed must be covered with a thin layer of soil before it will germinate much like the commercial cereal grains. This can be accomplished by plowing, planting and rolling the soil. However, plowing can bring about negative consequences to a partially intact tallgrass community. Another method is to plant the seed on the undisturbed soil with an implement known as the “grain drill” that mechanically pokes the seed into the soil. These are expensive and can plant the seeds too deep. A recently developed idea is to roll the seed into ½” balls of compost and clay mixture then broadcast them. An inexpensive machine can be constructed to make the seed balls in large quantities. We have been doing this for a year but it is too soon to assess the results.

Maintenance

Implementing a thoughtfully designed disturbance regime is the bulk of the maintenance work. The remainder includes monitoring and recording changes, locating and introducing propagule for missing species, and combating invasive species. If a tallgrass community is not disturbed at all, a few of the dominant species will prevail and choke out everything else. If disturbances are too frequent or too severe, only a few hardy, pioneer type species can persist. The ideal plan lies somewhere in the middle. Under the correct disturbance regime, the tallgrass community will include thriving populations of several hundred plants and animals.

As a rule of thumb, the optimum disturbance frequency has been estimated at once every two years. Fire is the most frequent natural disturbance. However, an effective disturbance plan is not as simple as burning the entire tract every other year. Try to keep in mind that to some extent, the more diversity that there is in the disturbance regime, the more diversity there will be in the plants and animals living in the tallgrass plot. Be

careful not to read too much into this because there are limits to how small of a disturbance you can create and still have an impact. To be most effective one must get to know the plant community. For example, you will soon learn that tallgrasses grow in the late summer and bloom in the fall. They will also be the plants to dominate the landscape, because of their stature. Ultimately they should occupy 70% to 80% of the space. If they take up more space than that, you might consider a late summer or fall burn. This will set them back and open up space for the spring flowering forbs that germinate in the fall and grow through the winter. Conversely, if your tract is dominated by spring and early summer forbs and you only have a small percentage of tallgrass, you might consider a winter or spring burn.

Sometimes a planned burn just does not happen. It might be too wet, too windy, or the weather of the preceding season might have been too dry to grow enough fuel to have an effective fire. Things happen. I have postponed a burn because I found something growing in the proposed burn site that I had not expected. Before attempting a burn, please do your homework. I recommend that you at least visit the USGS site at, <http://www.npwrc.usgs.gov/resource/tools/burning/burning.htm#contents>

Mowing is a plausible alternative, in that it will set back a dominant species if you do it at the correct time. If you rake or blow away the hay, you will open up spaces between existing plants for new germination. I was trying to set back the population of giant goldenrod, *Solidago gigantea*, a native forb that dominates much of our restoration site. I mowed a different one acre plot each month for twelve months and observed the results. I found that in the early summer months, the mowing increased the density of goldenrod cover but that the plot that I mowed in October, when the plants were in flower, lost approximately half of its density. I have found that mowing with a brush hog has one result and mowing with a riding lawn mower and blowing off the clippings has another. The latter, much more closely emulates a burn. If there is not enough fuel, the fire will not damage the plants that you are trying to set back. Also, some seeds must experience a minimum temperature before they can germinate. I also try to leave undisturbed places between the disturbed places to serve as refugia for small animals that live in the prairie.

In addition to varying the timing, I try to vary the size and shape of the disturbances. In nature, wildfires are quite variable and may burn from a few hundred square yards to hundreds of square miles. The shapes of these areas are quite irregular, often influenced by topography and wind.

Conclusion

I hope this essay has provided you with a general idea of what restoration is all about. Some authors suggest that it is a lot of hard work. I think it is a lot of fun work. I have enjoyed every minute of this project. The hardest part is the waiting. It requires the patience of Job. Every time you do something, you must wait for the plants to respond. The good news is, that while you wait and watch you get to see all kinds of cool things. I walk through the prairie at Camp Tyler at least once a week. On every trip I see something that I have not seen before. As the years and seasons have gone by, I have come to anticipate the appearance of certain blooms, I have learned where certain animals live and when I see a new species blooming, or a new butterfly or caterpillar, I feel good.

I wish you the best,

Alan Byboth, M.S.