Restoration of Dry Prairie by Direct Seeding: Methods and Examples

Nancy J. Bissett
The Natives, Inc., 2929 JB Carter Road, Davenport, FL 33837
nbissett@thenatives.net

ABSTRACT

Direct seeding numerous dry prairie species was possible using a variety of methods. A growing season burn (usually May through July) activated abundant seed production in wiregrass (*Aristida stricta* var. *beyrichiana* Trin. & Rupt.) and other herbaceous species. From mid-November to mid-December seed was harvested with minimal impact from natural areas using a green silage cutter or Flail Vac brush system. Additional hand- collections enriched the mix and targeted specific ecosystems. Herbaceous seeding rates targeted 50 or more seed per ft^2. Palmettos (*Serenoa repens*) and other shrub seed were also added. Keys to a successful project were gleaned from a variety of seeding events over the past 10 years. A clean site free of aggressive species was critical to success, however, the weed seed bank was not easily depleted, nor was this always necessary. Time of seeding was affected by many factors, several of which are in critical need of research. Many species of the aster (Polygonaceae) and buckwheat (Asteraceae) families have a late fall through early winter germination cycle, and do not germinate well when sown later than early February for several of these species. Frequent winter rains followed by low evaporation rates favored winter sowing and establishment of seedlings before the spring drought. Some grass species such as wiregrass peaked germination in spring and dropped off in summer. Irrigation produced good germination but was not often cost effective. Effective maintenance techniques targeted several aggressive species while most weedy species dropped out with seeded species competition. Several herbicide techniques, mowing, and burning were used. At the Reedy Creek Mitigation Bank project cover of native species has exceeded 70% while exotics have been less than 5%, and over 270 native non-weedy species have been recorded.

INTRODUCTION

Dry prairie vegetation consists largely of a number of grasses, sedges, and forbs with scattered shrubs and few to no trees, making it similar in structure to the widespread flatwoods ecosystem. Because such a large number of individual plants occupy a given area, it is economically more feasible to apply seed rather than plant from containers in order to restore this system.

There are several differences in restoration by seeding between the Midwest (where prairie restorations have a long history) and Florida. In the Midwest prairie seeding has occurred since 1939 (Sperry 1994) and has been greatly expanded since the 1960s (Jordan 1994, Packard and Mutel 1997), whereas in Florida, restoration by seeding has only been attempted in the last ten years. We did not know until 1989 that the major native grass, wiregrass (*Aristida stricta* var. *beyrichiana* Trin. & Rupt.) was able to produce viable seed when we grew some of the first seed in our nursery. In the Midwest much of the prairie seed has been hand-harvested from remnants such as railroad track rights-of-way and propagated for seed production in planted fields. The seeds are then cleaned, certified, and mixed to specifications for particular projects and seeded with drills and other machinery that can accept cleaned seed. Unlike the Midwest and West, there have been no native grass seed producers in Florida. Florida, however, does have large acreages of existing flatwoods and dry prairie. Wiregrass seed is very long and slender with three awns and it has not been possible to clean the seed of awns without breaking a large percentage of the seed; therefore, different seeding mechanisms are needed than the seed drills commonly used in the Midwest (Pfaff and Maura 2002).

Even though prairie restoration in the Midwest has been practiced for over six decades William R. Jordan III writes in the Foreward of The Tallgrass Restoration Handbook that "very little about prairie restoration has achieved the status of the routine or even the commonly accepted" (Packard and Mutel 1997). By these standards our efforts are very much at the beginning learner stage. Each project presents new challenges, and lessons are learned from failures and successes. Observations as well as monitoring data can offer insight for new methods.

Over the past ten years we have developed various site preparation, seed harvesting, and planting techniques for introducing diverse groundcover and shrub layers of the dry prairie and flatwoods ecosystems at a number of sites including phosphate companies, mitigation banks, government agencies, and private corporations. During this same period The Nature Conservancy at Apalachicola Bluffs and the Disney Wilderness Preserve, CF Industries at Plant City, and others have performed seeding trials and seeded acreages for flatwoods and dry prairie groundcover. In this paper I discuss experiences on a few seeding sites and general observations I have made through the years.

Land of Fire and Water: The Florida Dry Prairie Ecosystem. Proceedings of the Florida Dry Prairie Conference. Reed F. Noss, editor. 2006.

REEDY CREEK MITIGATION BANK RESTORATION SITE

The upland portion of the restoration at the Reedy Creek Mitigation Bank in northeast Polk County, Florida began in 1997 with 186 ac (75.27 ha) of bahia (*Paspalum notatum*) pasture. The goal was to convert it to scrub; scrubby, mesic, and hydric flatwoods; and seepage slope by intensive site preparation, seeding, and planting.

Site Preparation

Cattle grazed the bahia pasture until one month before we began preparing the site for seeding. We bush-hogged areas that had vegetation higher than one foot and uneven vegetation such as small wax myrtles (*Myrica cerifera* L.) and bluestems (*Andropogon*, *Schizachyrium* spp.) so that herbicide could be uniformly applied. Using professional spray nozzles in differing boom lengths from 50-5 ft, we applied 4% glyphosate, a broad spectrum herbicide at a rate of 5 qts/ac. In areas around trees and edges where there was remaining vegetation, we used a single hose nozzle in order to preserve as much of the existing vegetation as possible. After several weeks most of the vegetation died and we touched up the site with additional herbicide on any remaining spots. When all undesirable pre-existing vegetation died, we began a series of disking events beginning with a deep disk to break up the bahia rhizomes and ending with a shallow disking event that helped to level the site. A large metal roller was filled with water and the site was rolled to make the site seedbed ready and to firm the soil so that it would better retain moisture. This work was completed in October, and by early November areas turned green with large numbers of flatsedge (*Cyperus* spp.). We made one final light application of glyphosate on those areas that had a heavy cover of flatsedge.

Seeding and Planting

Harvest areas consisted of open flatwoods and dry prairies that were burned in late spring and early summer to initiate viable wiregrass seed production. In central Florida these dates were usually between May through mid-July. Wiregrass seed matures and is available for harvest between mid-November through mid-December in central Florida. By mid-December most of the seed has dropped from the stems. Green silage cutters equipped with 14 ft and 17-ft wide cutting blades harvested all material above a 12- to 16-in height that included the seed stems of wiregrass, other grasses, sedges, and forbs, and other vegetative material such as palmetto frond tips. The green silage cutter blew the material into an attached wagon which was then transported and dumped at the seeding site and spread to a depth of 12 in to prevent overheating. Overheating can reduce or kill the viability of the seed.

For part of the seed palette we selected, we needed to hand-collect some species because they ripened earlier than the general harvest, were not present or were not present in the quantities we desired in the machine harvest areas, occurred in areas that were drier or wetter than the area of the machine harvest but were typical of a target restoration area, or were a pioneering species that could prove useful in temporarily occupying the restoration site while the slower growing natives were getting established. We began hand-collecting seed in late spring for such species as Leavenworth's tickseed (*Coreopsis leavenworthii* Torr. & A. Gray), a pioneering species that later proved to be useful in temporarily reoccupying areas where hogs had rooted. Lopsided indiangrass (*Sorgastrum secundum* [Elliott] Nash), one of the dominant grasses in dry prairie, matured in mid-October and was available for collection for about five days. Hand- harvesting of various species continued through the fall up to the time we seeded the site at the end of November and early December. A crew weighed, divided, and mixed the seed into lots that targeted the various ecosystems from xeric to mesic and hydric.

Seeding began as soon as the machine harvest was delivered to the site. From various projects we learned that seeding as soon as the major seed harvest matures has several advantages. Some families such as the aster family and buckwheat family are more likely to germinate in winter and their germination drops off as summer approaches. In some cases, we have observed a dramatic drop in germination within a couple of months as in silver-leaved aster (*Pityopsis graminifolia* [Michx.] Nutt.), October flower (*Polygonella polygama* [Vent.] Engelm. & A. Gray), and sandhill wireweed (*Polygonella robusta* [Small] G. L. Nesom & V. M. Bates). Though many of the grasses germinate readily in the spring, some begin germination earlier. Also, in central Florida the spring months of March, April, and May are the driest months of the year. Rainfall is low in the winter months, but it regularly accompanies the frequent cold fronts as they push through the area, and the drying potential is low.

Because there was considerable vegetative bulk along with the seed, we modified a sod sprigger consisting of a wagon with a moving bed that pushed the material forward into rotating prongs that pull the material over an opening in the bottom of the wagon. Positioned in front of the sod sprigger was a cultipacker that created furrows about 1-in deep. Behind the sprigger were culters and rollers for covering the seed and firming up the ground. We spread the hand-collected seed over the wagon as the sod sprigger was filled with machine-harvested seed. As the seeder progressed over the site, we gathered samples from the ground and counted seed to assure that 50 or more seeds were sown per square foot. In addition to the machine-harvested seed, we sowed about 2 lbs of uncleaned hand-harvested seed per acre.

We tried two methods of irrigating the seeded areas. With each method only a small area could be effectively irrigated. Two shallow wells were dug. These wells, though costly, could pull only enough water to irrigate 1.5 acres at a time. We irrigated another area by pumping water from a ditch. Beginning in February we irrigated these sites twice a week for approximately 10 weeks with 0.4-0.7 in of water delivered during each watering event. We did not run comparative sampling between irrigated and non-irrigated areas; however, a visual assessment revealed that germination was much higher in those areas under heavy regular irrigation for 10 weeks. Species such as wiregrass that require a longer germination period seem to especially favor irrigation for increased germination rates. Unless water is readily available at a high volume and pressure, it may not be feasible to enact an irrigation system.

We began planting additional containerized plant species, predominantly shrubs, towards the end of the summer following seeding. This is the optimal time in central Florida for planting in more xeric areas because generally the rains are more consistent toward the end of summer and the plants are still actively growing and can establish their root systems sufficiently to survive the stressful spring droughts. The crew watered all plants after planting, and we monitored the site for additional water needs and watered on an 'as needed' basis until the following summer rainy season began.

Exotic and Nuisance Species Control

Site preparation techniques eliminated almost all of the bahia grass, but bahia grass did germinate from seed in the more xeric areas. The maintenance crew spot-treated these areas using a 4% solution of glyphosate in backpack sprayers. Spray was directed at the center of the plant to prevent drift to adjacent desirable species. During the second growing season we spot-treated with imazapic so that bahia grass that was growing with native species could be controlled without affecting the native species. The concentration in the backpack was calibrated to equal 9 oz. per acre if distributed at a predetermined rate. This was critical to avoid injury when overspraying desirable vegetation. However, when the target plant was isolated, a slower and heavier rate was applied to achieve a greater kill rate. The open areas left by the dead bahia was recolonized from seed produced by previously seeded species such as corkscrew threeawn (*Aristida gyrans* Chapm.) and yellow buttons (*Balduina angustifolia* [Pursh] B. L. Rob.).

Dogfennel (*Eupatorium capillifolium* [Lam.] Small ex Porter & Britton), a native weedy species seeded heavily over the site from the existing seed bank. We rigged a 12-ft wick to an ATV and used a 6.5% glyphosate solution with a blue marker and wicked the dogfennel beginning around mid-summer when it was taller than the desirable native species. When "deftly" administered this rate killed almost all of the dogfennel. In areas that were not treated the dogfennel began to die three to five years after seeding. After the site was burned, most of the remaining dogfennel died or was suppressed.

The heaviest impact by exotics came from feral hogs (*Sus scrofa*). Only intensive and continuous hunting and trapping has kept the hog damage in check. Hog-damaged areas initially recover with such species as Leavenworth's tickseed and blue maidencane (*Amphicarpum muhlenbergianum* [Shult] Hitchc.). These areas were most noticeable by their lack of wiregrass, which did not recover from that impact.

The most aggressive species that required herbicidal control were several exotic grasses including bahia grass, bermuda grass (*Cynodon dactylon* [L.] Pers.), torpedo grass (*Panicum repen* L.), natal grass (*Rhynchelytrum repens* [Willd.] C. E. Hubb.), and cogon grass (*Imperata cylindrica* [L.] P. Beauv.). By using the methods described above, most of the other native and exotic weedy species declined without intervention after the first two years wherever there was good establishment of native conservative species. By using the methods described above, we were able to keep exotic cover below 5% (Fig. 1).

Burn Management

In May of 2003, we burned all of the upland areas. The site would have carried a fire just two years after seeding, but planting additional species from containers and several years of drought limited our ability to obtain a burn authorization, and delayed burning until the site was over five years into restoration activities. By this time many wax myrtle and groundsel tree (*Baccharis halimifolia* L.) that germinated from the seed bank were three to ten feet tall. The burn killed most of these shrubs and dogfennel. The five aggressive grass species mentioned above generally increase following fire and were treated again with spot spraying of a 4% solution of glyphosate a few weeks after the fire while they were isolated from native species.

Present Site Conditions and Monitoring Results

Each year after the initial seeding and container planting the site was monitored for each species for frequency and cover along 40 quadrats that were 50 ft long by 2 ft wide. Woody vegetation was also monitored in larger quadrats, but that information is not included here. Frequency was measured by presence in each 2×1 ft segment. Cover was measured by cover classes in each 2×10 ft segment. The results were grouped by xeric, mesic, and hydric habitat. The cover of indigenous species ranges from 75% for scrubby flatwoods, to 83% in mesic and 92% in hydric flatwoods after 5 years. Exotic species cover ranged from 3.7% for scrubby flatwoods, to 3.5% for mesic, and 2.7% for hydric flatwoods. Flatwoods has similar vegetative composition to dry prairie except that it has a scattered pine canopy. The results of this monitoring in the mesic flatwoods restoration over a 5-year period are shown in Fig. 1.

Wiregrass is a slow growing species that is present, but very slender the first year after seeding and increases in cover over time. It became more dominant as some of the pioneering species such as the lovegrasses (*Eragrostis* spp.) decreased. Wiregrass increased in cover from 3% during the first monitoring year to 42.9% in the fifth year in the scrub to scrubby flatwoods area and from 6.7-33.8% in the mesic flatwoods areas.

By 2003 the diversity of species characteristically native to these systems in the seeded and planted areas was 277 species. Twelve of these species are federally or state

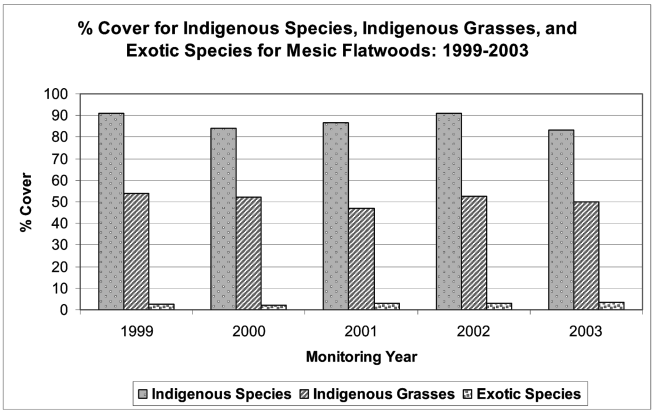

Figure 1. Monitoring data for the first five years of restoration at the Reedy Creek Mitigation Bank.

listed as threatened or endangered plants and were either seeded, planted, or preserved in the restoration area.

FLORIDA GAS TRANSMISSION ANCLOTE MITIGATION SITE

Near the center of Pasco County a cattle pond was previously excavated and the fill was piled several feet deep onto the adjacent flatwoods. For this mitigation, the fill was mostly pulled back into the pond and in December of 1998 we seeded 9 ac with seed that we harvested from an adjacent site that burned from a wildfire in June. We harvested and seeded with the green silage cutter and modified sod sprigger as we described for the Reedy Creek project, but no hand-collected seed was added to the mix.

The only exotic species at the site and in the adjacent areas was the bahia grass that was seeded onto the fill. Most of this material was pulled back into the cattle pond. Almost no weedy species and only remnant bahia sprigs emerged at the site together with the seeded material. Native species also germinated from the seed bank in the areas that were brought back to the original grade of the flatwoods. In June of 1999 we monitored 40 elongated quadrats (10×2 ft) that were randomly placed throughout the site (Berryman & Hennigar 1999). The percent cover was estimated over the entire quadrat. Density counts were made within the initial 2×5 ft for most of the identifiable taxa present. Wiregrass averaged $6.8/m^2$ and exceeded the density counts of any other species documented on the site. The density of wiregrass in natural flatwoods habitat has been found to average 4-5 individuals/m^2 (Clewell 1989). A total of 62 species of herbaceous vegetation were present in the 40 quadrats. Non-native species cover averaged 1.8% and consisted mostly of bahia grass and bermuda grass. Wiregrass and many other species matured enough to flower nine months after seeding (Fig. 2). In 2003 a fire in the adjacent flatwoods also carried through the restoration area.

It is useful to compare this site with other sites where site preparation began with removing bahia sod by lifting the sod and up to 2 inches of soil for sale or reuse elsewhere. At those sites a heavy weed cover still emerged from the seed bank and bermuda grass, which has rhizomes deeper than 2 inches rapidly spread over the site. In a related study, 7-10 cm of soil was removed from a bahia grass pasture on Basinger Fine Sands soils. Two years after sod removal there were 49 native and 9 non-native species in the plots including a small percentage of cover by bahia and bermuda grass (Violi 1999). To obtain a weed seed and rhizome free site, more than 2 inches of soil should be removed.

OKALOACOOCHEE SLOUGH RESTORATION SITE

Fifty acres of former bahia pasture were seeded with dry prairie species in 2003 at Okaloacoochee Slough, located in Hendry County north of County Road 532, that is managed by Florida Fish and Wildlife Conservation Commission (FFWCC). As at the Reedy Creek site, site preparation followed a number of steps to insure that almost all exotic species died except for the seeds in the seed bank. Jean McCollom, FFWCC manager at the site prepared the site by herbiciding and re-herbiciding until all perennial grasses appeared dead. She then disked the site with deep cuts first to break up the rhizomes and then conducted shallower disking to level the site and finally rolling the site with a water filled roller.

Figure 2. Wiregrass, chalky bluestem, yellow-eyed grass, St. John's wort, and witchgrass shown here are typical of the groundcover from seeding at Florida Gas Transmission Anclote Mitigation site.

We harvested seed with the green silage cutter and by hand-collecting seed. The modified sod sprigger incorporated both the machine and hand-harvested material as described above in the Reedy Creek description.

A large population of feral hogs occupies Okaloacoochee Slough, and after hog damage began to appear in the seeded area, FFWCC installed a solar operated electric fence on the perimeter. The area around the fence was herbicided so that the electric current would not be interrupted. Hogs are attracted to recently disturbed sites such as restoration areas, and the fencing has kept most of the site undamaged. The fencing can be reused on future sites.

In March of 2004 Jean and I qualitatively evaluated the site. We found only one small clump of bahia grass, but many native seeded species and native species germinating from the seed bank. By mid-summer, grasses, sedges, and many forbs typical of dry prairie dominated the site. We quantitatively monitored the site in the fall with the same methodology as described above in the Reedy Creek section. Bahia grass cover fell from 68.8% cover before restoration began to 0.01% cover ten months after seeding in October of 2004. Bahia did not germinate from seed as it did at Reedy Creek. From our experience at several projects, we noted that bahia seed germination occurred mostly in the xeric portions of a site. Smutgrass (*Sporobolus indicus* [L.] R. Br.) had a 4% cover and the highest concentration of exotic species on the site, and is currently controlled by spot spraying with glyphosate. We found 142 species during the monitoring event that took place ten months after seeding. Of these, 124 species were native and 18 species were exotic. Though many of these species were present in the seedbank, we have not yet determined what percentage may have come from seeding.

However, our experience has shown that seed emerging from the seedbank tend to be weedy and pioneer species. The major groundcover components of dry prairie or flatwoods have very little presence in the seedbank (Jenkins 2003) We think that the relative success of this site this early in the restoration process is due to very thorough site preparation that included herbiciding followed by disking that removed almost all of the exotic grass cover and provided a smooth seedbed ready condition.

GREEN SWAMP WEST

Two hundred acres of bahia pasture are being restored to high pine in the Green Swamp by Southwest Florida Water Management District. We assisted with site consultations and performed the harvesting and seeding tasks. Though much of this site is drier than a dry prairie system, it offers important insight into site preparation and exotic species management. This project was divided into a several year project so that lessons learned from one year could be applied to the next year. The seed donor site also had limited acreage.

During the first year the entire site was herbicided and burned. Most of the area to be seeded that fall had high mortality of bahia grass, but the tough rhizomes still snaked over the surface. The soil surface was also rough in many areas. The combination of the surface exposed rhizomes and uneven soil surface would not have given good seed to soil contact. Most of the site was disked before we seeded, but a small portion was left undisked. The undisked portion did not have as many weeds, but had less seed germination than the disked portion. Bahia grass germinated well over the entire site, and was difficult to control once it began to spread. As noted previously, the chances of bahia germination seem to be greater on drier sites.

By the following year, when we were ready to seed the second phase, the dead rhizomes still had not disintegrated. It had been approximately one and a half years since the initial kill. At this point we decided to have the site finished by disking and rolling in August so that the surface would be smooth and the bahia seed could germinate in time to be herbicided before seeding. Though some of the bahia grass did germinate and was controlled with an additional glyphosate application, enough germinated the following year to require further control. Plateau (imazapic) herbicide was applied at 9 oz/ac in June, when most native seedlings had sufficient growth to withstand the herbicide effects and most of the bahia seedlings were killed. The herbicide application also suppressed many weed species and the natal grass.

There has been an ongoing discussion among upland restorationists about the effects of disking after herbiciding. At the Disney Wilderness Preserve, The Nature Conservancy prepared sites with repeated herbicide applications beginning at least a year before seeding. At these wetter sites the rhizomes have disintegrated enough to not adversely impact seeding. They have also used the Grasslander seeder described in the next section. Because it uses disks to scarify the soil before dropping the seed, the necessity of having a seedbed-ready site is somewhat lessened, however, this method still disturbs the soil surface.

ALTERNATIVE HARVESTING AND SEEDING METHODS

A green silage cutter has made it possible to harvest large quantities of seed from many species at a time and seed hundreds of acres at many sites each year. However, it is a costly piece of farm machinery for harvesting native seed one month of the year and is not always readily available. Even though seeding in November and December is generally the optimal seeding time for central Florida, not every project can be seeded at that time. Hand-harvesting some species such as the lopsided indiangrass that matures in October can also be costly. Therefore we have also used a brush type collector called the Woodward Flail-Vac Seed Stripper from Ag-Renewal, Inc. in Weatherford, Oklahoma which can be attached to the front of a tractor as an alternate harvesting method. The brush can be raised or lowered to an optimal collection height while the tractor is moving. It brushes the ripe seed and some stalk into a bin for a relatively clean collection.

Since many of our seeds are still attached to stems and have awns and pappus that do not seed well with a seed drill, a seeder was needed that will seed chaffy seed and some stems. The Grasslander seeder distributed by Grasslander in Hennessey, Oklahoma can be attached to a tractor and easily seeds both trashy seed and cleaned seed. We have held seed collected in the fall for a few months before seeding and have placed seed in cold storage for seeding the following year.

At an IMC Phosphate mine site we were able to seed 30 ac of washed sand tailings in late February, after most winter rains passed. Water guns were already positioned on the site from an earlier planting of trees and shrubs, and IMC watered the site 2-3 times a week for several months. Wiregrass and other grasses readily germinated. Although a number of species from the aster family such as yellow buttons, garberia (*Garberia heterophylla* [W. Bartram] Merr. & F. Harper), silver-leaved aster, and species from the buckwheat family such as October flower and sandhill wireweed were added to the mix, we found very few seedlings. The late seeding may have affected their ability to germinate at this time of the year.

Nestle Waters constructed a bottling plant in Madison County in north Florida. We seeded 10 ac with Flail Vac and hand-collected seed and dispersed the seed with the Grasslander. The site was too far for hauling bulk seed, stems, and leaves, but this alternate equipment gave us the option of seeding a more distant area that was not designed to be a restoration site with more constricting seed source criteria.

SUMMARY THOUGHTS

A successful seeding of dry prairie groundcover requires careful thought and planning that should begin at least a year in advance so that each step can occur in the proper time period for optimal results. Seed donor sites need to be located and burned between May and mid-July for viable seed production of wiregrass and good seed production of many other species. Hand-collection of many species will not only enhance diversity, but also sup-

plement with pioneering species and target sub-communities within the restoration site. Hand-collected species ripen from spring through late fall. Pasture sites often need a full year of preparation activities, and for drier sites at least from late spring through fall in order to eradicate several of the more aggressive exotic grass species.

The two most important factors that we have observed that affect success are good site preparation and rainfall or other watering after seeding. The first can be done with proper time and planning. The second can only occur if there are sufficient resources to supply additional water.

Restoration success also depends on control of exotic aggressive grasses after the initial seeding. Most weedy species decline rapidly with good competition, so extra effort is unnecessary. Nevertheless, a few aggressive grass species will spread rapidly and not decline with time or fire.

Finally, each site has different soil characteristics, hydrology, seed bank, vegetation, history, and climate during restoration. There is no cookbook solution that will assure success. A suggested timeline summarizing activities can be seen in Fig. 3. However, specific conditions need to be addressed for each site. Additional research is needed in many areas including: germination curves for many species such as wiregrass, control methods for smutgrass and many other species, and ways to decrease costs and increase harvests so that larger sites can be restored. This type of restoration is still in the early phases of learning and discovery.

Oct Yr. 1	Finalize planning and contracts
Oct Yr 1-Jul Yr. 2	Herbicide and follow-up herbicide as necessary
Jul Yr. 2-Sep Yr. 2	Disk as necessary
Sep Yr. 2-Oct Yr. 2	Roll to level and firm soil
Sep-Nov Yr. 2	Herbicide as necessary
May Yr. 2-Dec Yr. 2	Collect additional seed by hand or harvester
Nov –Dec Yr. 2	Harvest, prepare, transport and seed
Jan Yr. 3-Dec Yr. 7	Evaluate and maintain with selective techniques
Jun-Jul Yr. 4 or 5	Burn site
Aug – Sep Yr. 4 or 5	Plant containerized species
Aug Yr. 4 or 5-Jun Yr. 5 or 6	Monitor and water containerized species as needed until rainy season begins

Figure 3. Sample timeline for seeding and planting a dry prairie.

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