

## **Appendix K**

### **Guidelines for Native Grassland Restoration Projects**

by

Jim Dillard, Technical Guidance Biologist  
Texas Parks and Wildlife Department, Mineral Wells

#### **INTRODUCTION**

Native grasslands and prairies, with their ecologically complex plant and animal communities, were an important component on the landscape of early Texas. They were dominant features on the landscape in the Edwards Plateau, Cross Timbers and Prairies, Coastal Plains, High Plains, and Lower Rolling Plains. They contributed significantly to forage production for livestock grazing and habitat for a wide variety of wildlife species. Most of the native prairies found in the Blackland Prairie and Coastal Prairie Regions of Texas have been depleted. Only isolated relic native prairies sites remain. Native prairies were also found within most of the other ecological regions of the state where adaptable soils site occurred. Soil that once supported these vast plant communities of native perennial grasses and forbs now maintain a thriving farming economy. Most of these lands are now devoted to the production of wheat, milo, corn, cotton, hay, improved pastures, and an array of other cash crops to meet our demands for food and fiber.

It is not possible to totally replicate the native grasslands and prairies that once existed in the different ecological regions of Texas. These guidelines, however, represent basic and fundamental techniques and procedures that should be addressed when attempting to restore or reconstruct range sites to resemble native prairie plant communities in Texas. Only with time can land truly evolve through the stages of natural plant succession to replicate the diverse flora and fauna characteristic of climax native prairies. There are land management steps that can be taken to speed up this process by reintroducing native plants or their cultivars on those lands that once supported native grasslands and prairies. Texas Parks and Wildlife Department recognizes the importance of native prairies and grasslands and their function as habitat for many wildlife species including native and migratory birds, small and large mammals, reptiles and amphibians, insects, and invertebrates. Each ecological region will require different techniques, planting procedures, species selections, and site preparations to be successful. It will be imperative that a coordinated effort be made to draw upon the expertise of other agencies and groups with knowledge and training on native grassland and prairie restoration before undertaking a restoration project. Agencies such as the United States Department of Agriculture Natural Resources Conservation Service (NRCS), Texas Agricultural Extension Service, Soil and Water Conservation Districts, Native Prairies Association of Texas, Texas Parks and Wildlife Department, United States Forest Service, and universities are logical sources of information concerning the specifics to formulate grassland and prairie restoration plans. Many of these organizations have identified successful techniques and procedures through research and demonstration projects in different parts of Texas. No plan should be considered

complete that has not taken into consideration the experience and knowledge already available from such sources.

The following outline covers most of the major elements that should be addressed in a grassland restoration plan. Many variables in techniques are possible and may be considered adequate if supporting evidence is presented to justify the approach to grassland and prairie restoration. As each site will be different, every effort should be made to identify specific techniques or steps that are applicable to each site.

## GRASS SPECIES

Native grasslands/prairies are diverse plant communities where 50 to 90 percent of the vegetation is grasses. They are the basic framework of the site and are associated with a wide variety of forbs or other plants. The more individual grass species planted, the better. However, initiation of a restoration project can include the initial planting of as few as four species for the site. Grasses planted, if from commercial seed sources, should be climax grass species for the ecological region of the state being considered and adapted to the soils found on the site. Sites may be suited to tall, mid-, or short grass species, depending on individual site classification or soil type. It may be necessary to plant different grass species on different locations of the site due to differences in soil type, moisture retention properties of the soil, PH considerations, or other microhabitat factors.

Selection of individual grass species to plant should be based on information obtained from the local NRCS or Soil and Water Conservation District (SWCD) office or other recognized source with knowledge about climax grass species of the area. Their range site descriptions will also be useful. Seed sources should be from within 300 miles of the site or nearer to assure adaptability and improve success of initial establishment. Grass seed will have a PLS (pure live seed) or germination rating which should be checked - the higher the better. Many commercial seed companies also will mix seed on request when ordering. Seed should be clean to improve flow through grass seed drills during planting. Soil type is also a factor to be considered when selecting grass species to plant.

## FORB SPECIES

Forbs or broadleaf herbaceous plants represent a major component of native grasslands/prairies and may be seasonally co-dominant. Annual and perennial species are found in native prairies and are responsible for the majority of species diversity. Planning native grassland/prairie projects should also incorporate initial introduction of a selected number of forb species. A plan should provide for the planting of at least four perennial species from the ecological region and adapted to the site. Range site descriptions and climax vegetation check list from the local NRCS or other recognized source should be reviewed. The planting of additional species of annual and perennial species is encouraged as the site develops over time.

Annual forb species should not be introduced on the site until planted grass species become established. Establishment of grasses may require periodic mowing, at least initially, and will make establishment of annual forbs difficult. Most sites will produce annual forbs and some perennials from existing seed banks in the soil. Annual forb diversity will increase over time. Annual forbs should not be planted during the first two years of the project.

A listing of seed sources for native grasses and forbs is also available from the National Wildflower Research Center in Austin. When ordering seed from any commercial seed dealer, always ask about the source of the seed you want. Be selective and shop around for seed availability when you will need it and the price you are willing to pay.

Native grasslands/prairies may also be reestablished using cut seed hay from an existing native prairie site. Seed can also be combined from an existing stand of native grassland. Techniques for planting seed obtained by these methods will be discussed. Annual forb seeds may also be collected by hand, stored to dry, and planted on selected sites throughout the life of the restoration project to improve plant diversity.

## SITE PREPARATION

Site preparation is perhaps the most important element to be addressed in planning a native grassland/prairie restoration project. The initial success of plantings will often be dependent on those steps taken to reduce weed competition, provide a suitable seedbed, and promote growth of seedlings. Competition by cool-season grasses and weeds will make initial establishment of native grass plants difficult and require site management. Many of these plants are alien species and are undesirable in the completed project.

As each site will be different, an evaluation should be made to determine what existing vegetation complex is present and what steps will be necessary to set back plant succession so species planted can germinate and grow. It is important to determine the history of the site including past land use, crops grown, species of improved grasses planted, cultivation or other mechanical soil disturbances, herbicides used, etc. A check with the local NRCS or Farm Service Agency (FSA) office will be helpful. Aerial and topographic maps will help you evaluate the site to determine important features such as drainages, slope, or other physical features important in planning the restoration project. County soil maps should be closely reviewed during the early planning stages to determine soil types and adaptability of grass and forb species to be planted on the site.

One approach to grassland/prairie restoration is to plant forbs initially during the first fall period of the project and grasses during the late winter months of the following year. For a fall planting of forbs during October, the site must be prepared well in advance. Mowing and periodic light disking during the spring and summer months prior to planting will help set back germination and establishment of existing weeds and grasses. Shallow disking is recommended to avoid stimulating the existing dormant weed seed

bank in the soil. Several diskings will be required initially and again just prior to planting. Application of an approved herbicide such as Roundup may be necessary on some sites prior to planting to control vegetation regrowth or undesirable species such as Johnsongrass, coastal bermudagrass, or cocklebur. A year's lead time is preferred for initial site preparation. Fire may also be used in initial site preparation to reduce rank vegetation.

A cover crop such as Haygrazer or other sorghum varieties may be planted on some sites to be restored during the summer, harvested in the fall, and the remaining stubble used to stabilize the soil surface for planting with grass seed drills. Not all sites require such plantings, depending on the individual site and strategy being used to establish grass and forbs. This technique reduces soil erosion by wind and water and may be necessary on some sites. Stubble should be left to a height of at least four inches.

Soil preparation specifications and guidelines for specific soil types and range classifications have been developed by the NRCS and are available at local SWCD offices.

## PLANTING

Preferred planting dates for perennial forb seed is during the fall, particularly the October-November period. Although most perennial forb species will not germinate until the spring, it is necessary that they undergo the chilling and softening process in the soil. Forb seeds may be planted with mechanical seed drills or broadcast spreaders, hand-carried seeders, broadcast by hand, or be mixed and incorporated with grass seeds during the grass planting process. Most forb seeds require shallow planting depths into a firm seed bed. Forbs should not be planted earlier than the first freeze of the fall. Planting date information is also available from commercial seed dealers who provide recommendations for seed they sell. Planting dates will also vary, depending on what part of the state the site is located in. Native grass seed should be planted in Texas between January and April. Dry conditions during this period may substantially influence germination and growth of grass seedlings.

Seeding rates of commercial seed are available from the dealer. Seeding rate information for soil and range sites are also available from the local Natural Resources Conservation Service office. Seeding rate recommendations for pure stands of individual grass species may require adjustment to allow for planting of multiple species or mixes. Generally, a generous seeding rate for native grass species will improve the odds for a good stand the first year. Seeding rates will depend on the number of individual species being planted, type of equipment, and proportion of species desired in the final stand.

There are several types of equipment that are effective for planting grass seed. Grass drills are probably the best equipment and have greater reliability in establishing a stand. Grass drills are often available for use from local SWCD offices. Also, commercial contract farmers who specialize in grass plantings normally have this type

of equipment. Common brand names are Tye, Nesbitt, John Deere, and Turax. Cultipackers are also used and consist of a seed box and roller system to pack seed into the ground. Seeds may also be planted by a fertilizer spreader followed by a harrow to work seed into the soil. Hand-held broadcast spreaders or those operated by small all terrain vehicles may also be used.

Seed hay taken from a native prairie site can be scattered over prepared ground by hand from a trailer, followed by a light harrowing to incorporate it into the soil. Prairie hay bales may be available and are easily stored. Such plantings should be done in the fall following the harvest of native seed hay. This method is not reliable because there is no guarantee that viable seeds have been produced and that germination will occur. Although native grasses may appear to have good seed production, only by conducting a germination test will you know if live seed are present and establishment of seedlings is likely.

Fertilization is optional during the initial planting of native grasses and forbs. It may serve to promote the growth of undesirable forbs and annual grasses and slow establishment of the desired species planted. Fertilization rates can be determined by soil analysis tests or based on recommendations from the NRCS or Texas Agricultural Extension Service.

Forb seed purchased from seed dealers should be specified as native, not domesticated seed. Mixes are generally not recommended unless they contain a desired species composition adapted to the region and are those species you want. Individual species plantings are preferred. One approach to seeding forbs is to mass plant a variety of adaptable species and let the site, through the process of natural selection, determine where certain species will do best. A continuing effort should be made by the landowner to introduce additional forb species to the site as the project progresses over time.

## SITE MANAGEMENT

During the first year, growth of grass seedlings and perennial forbs may not appear impressive. Most growth of these plants will be below ground in the development of root systems. Annual weeds and other on-site grasses will respond to soil disturbances associated with initial planting operations. Mowing will be necessary during the first two years. Restoration sites should be mowed to a height of no less than 4 inches to reduce competition from annual weeds and undesirable grasses. It will also serve to reduce moisture loss from the soil. It may take 2 to 3 years growing time for native grasses to dominate the site vegetatively. Perennial forbs should respond sooner and become established along with annuals. Timing for mowing will have to be determined on-site and will require regular attention by the landowner.

Grazing is not recommended during the first three years. If vigorous growth of planted grass species does occur during this time, limited grazing during the dormant season may be possible. After three years, grazing may be incorporated into the management

plan for the site by grazing during the growing season under a rest and rotation system. Grazing is not required for grassland/native prairie restoration projects, rather it should be used as a tool in their management.

Control burning is also a tool that can be used for site management. No burning should be conducted during the first three years after grasses have been planted. After that time, if the site has developed sufficiently and forage and thatch becomes excessive, burning on a 3 to 4 year rotation can be initiated. Fire is a natural event for grasslands and prairies that benefit from its occurrence. Burning will stimulate growth of dormant forb seed, promote growth of above ground vegetation, improve soil fertility, and help control the invasion of undesirable woody plant species found in the area. Fire releases nutrients back into the soil and reduces shading of new grass and forb seedlings. Many new species will also germinate from the existing soil seed bank. Winter burns benefit warm-season dominant plants, whereas summer burns promote growth of cool-season plants. Depending on individual site management strategies, the use of prescribed burning, mowing, and grazing will be the primary tools available for site management of grassland/prairie restoration projects.

## LITERATURE CITED

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Wildflower Meadow Gardening. National Wildflower Research Center, Austin, Texas.  
Burlison, Bob and Micky. Homegrown Prairies. Reprint. The Prairie Dog, Newsletter of the Native Prairies Association of Texas.  
Native Plant and Seed Sources of Texas and Oklahoma. National Wildflower Research Center, Austin, Texas.

## SUGGESTED INFORMATION SOURCES

USDA Natural Resources Conservation Service (local)  
Soil and Water Conservation Districts (local)  
Native Prairies Association of Texas  
3503 Lafayette Avenue, Austin, TX 78722-1807  
Texas Parks and Wildlife Department  
4200 Smith School Rd., Austin, TX 78744  
National Wildflower Research Center  
2600 FM 973 North, Austin, TX 78725  
Plant Materials Center, NRCS, Knox City, TX  
The Nature Conservancy of Texas  
P.O. Box 1440, San Antonio, TX 78295  
Texas Agricultural Extension Service (local)  
Native Plant Society  
USDA Farm Service Agency (FSA) (local)  
USDA US Forest Service

USDA US Fish and Wildlife Service  
Texas A&M University/College Station  
Texas Tech University/Lubbock  
Texas A&M University/Kingsville  
Southwest Texas State University/San Marcos  
Sul Ross State University/Alpine  
East Texas State University/Nacogdoches  
Other Universities