Appendix Y

Recommendations for Restoring Desert Grasslands

Importance of Grasslands

Native grasslands, 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, Rolling Plains, and Trans-Pecos. They contributed significantly to forage production for livestock grazing and habitat for a wide variety of wildlife species. Texas Parks and Wildlife 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. In many regions of Texas, soils 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. Grasslands in the Trans-Pecos are used extensively for livestock grazing and many still support a diversity of wildlife species. Some of these grasslands, especially where irrigation is possible, have been converted to cropland or improved (non-native grass) pasture. However, one of the greatest problems for grasslands in the Trans-Pecos is the gradual but steady encroachment of brush species such as mesquite, creosotebush, and tarbush.

Desert Grassland Restoration

There exists a prevalent problem throughout much of the Trans-Pecos that poses a great challenge – the recovery or restoration of vast areas that are now devoid of all herbaceous vegetation. These particular shrublands consist of virtually pure stands of creosotebush and/or tarbush. Some of these areas are gradually losing their soil, while other areas have long since lost all appreciable amounts of soil. The remaining soil exists as pedestals at the bases of the creosote and tarbush shrubs. Unfortunately, this is not a static situation and many grasslands are currently in a transition phase toward increasing brush densities, dying grasses, and increasing soil exposure. That is, many healthy grasslands are undergoing the initial phases of this process, and some existing “badlands” are expanding (becoming larger) into surrounding grasslands.

Creosote and tarbush have long been components of the Chihuahuan Desert, but to a much lesser extent than current densities and distribution. Historically, these invading shrubs were severely limited by periodic fires that occurred primarily in summer (lightning strikes and fires set by native Americans). For the past 100-120 years, the occurrence of fire in the Trans-Pecos has been greatly reduced. This is a result of active protection of residents and structures (firebreaks and fire-fighting), inadvertent firebreaks (highways, county roads, railroads, etc.), and the reduction of fine fuels by livestock grazing. There is historical evidence that fires in the southwest deserts

occurred on average about once in 10 years (see Appendix F – Recommendations for Prescribed Burning in West Texas). Fires were frequent enough and intensive enough (heavier loads of fine fuels) to control saplings and seedlings of invading shrubs. Over a period of several decades without fire, invading shrubs have been allowed to increase in size and density. In far west Texas where soils are generally shallow, and rainfall is limited and highly erratic (seasonally and annually), grasses can tolerate very little competition for moisture and nutrients. In most years, livestock grazing pressure that exceeds "light" can further reduce the ability of grass plants to compete and survive.

The effect of invading shrubs on grassland health and vigor can be observed in several stages:

Stage 1 – healthy desert grassland with few or no invading shrubs (scattered cholla and/or yuccasmay be present)
Stage 2 – healthy grasses with light density of invading shrubs (creosote or tarbush)
Stage 3 – scattered grasses with considerable exposed soil (moderate density of invader shrubs)
Stage 4 – very light grasses, much exposed soil, considerable wind and sheet erosion, heavy density of invader shrubs
Stage 5 – grasses are absent, most soil has been lost and is down to gravel layer, invader shrubson soil "pedestals"

Very little progress can be made with areas in the Stage 5 condition. Restoration efforts would be expensive, and results would be very gradual. Recovery efforts in areas where soils have been lost must involve techniques that replace soil/organic matter on the ground, followed by seeding to accelerate the recovery process. One technique with some potential for small-scale projects involves the development of a berm down-slope of the target area to catch run-off during rainfall events. Over a period of years, the run-off may deposit enough sediment on the gravelly "wasteland" to support early succession seedlings or a grass-seeding effort. The restoration effort must also include the mechanical or herbicidal control of competing shrubs prior to establishment of grass seedlings.

There is another technique with some potential on localized (small) areas where the development of a berm is not possible. This method involves fencing of the area and feeding/haying cattle herds on a temporary basis (winter) to deposit organic matter (hay residue and manure) on the area to be seeded. This process would have to be repeated several times until an adequate amount of organic matter was present to support a seeding effort. To avoid losing freshly deposited organic matter through wind or sheet erosion, the hay residue and manure should be incorporated into the ground immediately following cattle removal in late winter (hoof-action may be ineffective on gravelly substrates). This can be done with a chisel plow or heavy offset disk (depending on shrub size) which also will uproot and/or stress many of the competing shrubs. After an adequate amount of organic matter has been deposited and following mechanical control of shrubs, a mixture of native grass seed can be worked into the soil. Pioneering grass seedlings and clumps would be protected by fencing with the

expectation that they would over time intercept additional organic matter (wind-borne dust and run-off sediment during rainfall events).

The only technique with potential on a large scale is the use of a chisel or ripper to establish alternating strips of treated and untreated brush along the contour. This practice will remove much of the competing brush, improve water infiltration, and allow sedimentation from up-slope runoff. The untreated strips will help to prevent further erosion and provide a watershed for treated strips down-slope. Over a period of years, the treated strips should intercept enough soil for grass seedling establishment, and the mechanical technique can be repeated on the untreated strips.

Some improvement can be expected with areas in the Stage 4 condition, as there are remnant grass clumps, soil, and presumably a seed source. A more rapid management response can be achieved for areas in the Stage 3 condition, while the management of Stages 1 and 2 is the easiest and least expensive (prescribed fire).

There are several options for grassland restoration of Stages 3 and 4. These alternatives include broadcast herbicide treatment and mechanical treatment. Mechanical treatment may be in the form of root removal (root-plow, chisel, heavy offset disk, etc.) or top removal (Lawson aerator, chaining, cabling, roller-chopping, etc.). Either treatment category should be conducted in parallel strips (~2 tractor widths) along the contour so that about 50% of the target area is treated. For flat areas, the treatment strips should be established perpendicular to the prevailing wind direction. The untreated strips will protect exposed soil in adjacent strips and prevent erosion (slow run-off) until grasses become established in the treated strips. Root-removal techniques may require grass-seeding to accelerate the recovery process. After grasses become established in the treated strips (will require several years), the process is duplicated on the untreated strips. Extended drought following the treatment will slow and/or reduce the grass response but may result in increased mortality of woody plants. The benefits of this rather expensive and labor-intensive process will be short-lived without the periodic implementation of prescribed fire to prevent the re-invasion of creosote and/or tarbush.

Summary

It is not possible to totally replicate the native grasslands that once existed in the different ecological regions of 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 grasslands. 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. 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 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.